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Case Studies on Actua's National Aboriginal Outreach Program

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Executive Summary

For twenty years, Actua has provided hands-on, interactive education enrichment experiences in science, technology, engineering, and mathematics (sometimes referred to as STEM) to Canadian youth aged 6 to 16 years. The National Aboriginal Outreach Program is delivered annually to 30,000 First Nations, Métis and Inuit (Indigenous) youth in 200 communities across Canada by Actua’s network of 33 members at universities and colleges across Canada, and their own outreach team.

The goal of the National Aboriginal Outreach Program is to engage and involve more Indigenous youth in STEM. The experience is designed to encourage and support more Indigenous youth to pursue STEM studies and careers and to see the importance and relevance of science in everyday life. Programming in four communities, North Bay, Ottawa, Kugaaruk, and Talayoak - were selected as case studies to review the experience of Actua’s Outreach Team in implementing the National Aboriginal Outreach Program.

The case study experiences illustrate several outcomes and lessons:

Campers develop self-confidence and an enhanced interest in STEM studies and careers.

A strength-based approach that connects Indigenous youth to what they already know about science is vitally important. A key strategy is to root science education in place and to be intentional about linking local Traditional Knowledge to modern science.

The role of Elders or other Indigenous community volunteers is critical in making the connections between Traditional Knowledge and modern science. This important role needs to be communicated and shared with community contacts and significant planning is required to ensure their engagement in all communities.

Instructors are well prepared for their camp season, and the intensive pre-season training is vital for the science curriculum and cultural aspects of the camp.

Indigenous instructors make a valuable contribution to the camper experience, the connection to the community, and the learning of fellow instructors.

Instructors' profound summer experiences can influence their career path, and equip them to be ambassadors of Indigenous culture.

Ultimately, success in Actua's National Aboriginal Outreach Program contributes to the resilience and economic independence of Indigenous youth. This contributes to the development of the next generation of innovators essential to Canada's social and economic prosperity.

Context

For twenty years, Actua has provided hands-on, interactive education enrichment experiences in science, technology, engineering, and mathematics (STEM) to Canadian youth aged 6 to 16 years. The National Aboriginal Outreach Program is delivered annually to 30,000 First Nations, Inuit, and Métis youth in 200 communities across Canada by Actua's network of 33 members at universities and colleges across Canada and their own outreach team. In 2014, Actua's outreach team delivered programs in partnership with a variety of community organizations in Nunavut and northern Ontario.

The goal of the National Aboriginal Outreach Program is to engage and involve more Indigenous youth in science, technology, engineering, and mathematics. The experience is designed to encourage and support more Indigenous youth to pursue STEM studies and careers and to see the importance and relevance of science in everyday life. The number of Indigenous people in STEM studies and careers is extremely low.¹ This trend can be reversed by engaging youth in hands-on, culturally-relevant experiences that inspire them to see themselves in these fields and provide them with first-hand knowledge and understanding of science and engineering careers.

The underlying premise of Actua's National Aboriginal Outreach Program is that the Traditional Knowledge of communities and the prior skills and experiences of young people are the foundation onto which new interest and knowledge in science can be built. Actua's programs are designed to celebrate youth's worldviews and build confidence by helping them recognize that they already know a lot about STEM and that STEM is very much a part of their communities.

The Canadian Council on Learning has concluded that "[Indigenous] people in Canada are sharply under-represented in STEM; more can be done to increase the relevance of learning and engagement of [Indigenous] students in science and technology. Choosing careers in science and technology will benefit [Indigenous] students directly through employment, but more importantly they can make a tremendous contribution to Canada from the unique perspectives to science and technology based on the values implicit in [Indigenous] knowledge and ways of knowing."

History

Actua's National Aboriginal Outreach Program is delivered through its 33 network members located at universities and colleges across Canada and through Actua's Outreach Team that engages communities not currently served by the network members. Collectively, Actua's network members and Outreach Team annually engage 30,000 Indigenous youth in 200 communities nationwide in a combination of school workshop and weeklong camp experiences.

Network members are at varying stages of development with respect to their capacity to deliver on all successful practices outlined in the model. Some are excelling and leading the way forward by contributing new successful practices. Others are working to advance their model through support from Actua and their host institutions.

¹ Canadian Council on Learning: http://www.ccl-cca.ca/CCL/Reports/LessonsInLearning/LinL20070116_Ab_sci_edu.html, Accessed October 16, 2014

Programming in four communities – North Bay, Ottawa, Kugaaruk, and Talayoak – were selected as case studies to review the experience of Actua’s Outreach Team in implementing the National Aboriginal Outreach Program. The cases were selected to represent the cross-section of communities that participate in the program and are intended to illustrate the features and characteristics of the National Aboriginal Outreach Program in action, as well as examine the short-term impact of the program on campers and instructors. Not only do the cases assist future programming by the Actua Outreach Team and network member programs, the lessons from the National Aboriginal Outreach Program can serve as guidance to any organization developing STEM programs in Indigenous communities.

The following is a brief overview of the four communities that were chosen to represent a cross-section of the 200 communities across Canada with whom Actua works:

North Bay is a small Ontario city, often referred to as ‘the gateway to the north.’ It is part of the traditional territory of Nipissing First Nation. Actua partnered with the North Bay Indian Friendship Centre’s Waaban Program to offer a camp from July 7-11, 2014. Actua has previously offered camps in North Bay, the most recent being in 2013.

Ottawa’s population includes over 40,000 people who identify themselves as Aboriginal in ancestry, from over 400 different Indigenous communities.² The Odawa Native Friendship Centre provides a wide range of programs and services to the Indigenous community in the Ottawa-Carleton Region of Eastern Ontario as well as surrounding communities, and has partnered with Actua on various programs since 2009. The Odawa Native Friendship Centre hosted an Actua camp from August 11-15, 2014.

Taloyoak, population 809, is located in Nunavut’s Kitikmeot region. The community is accessible only by air and served by annual supply sealift. In 2013, Actua partnered with Talaoyoak for the first time to offer a camp and workshops to students in kindergarten through to grade 12. In 2014, Actua delivered a camp from July 28 - August 1.

Kugaaruk is also located in the Kitikmeot region of Nunavut with a population of about 750 people. Inuktitut is the first language of Kugaaruk, with students only beginning English language instruction at grade 4. In 2013, Actua partnered with Kugaaruk for the first time to offer workshops to the kindergarten through to grade 12, hosted a school-wide science olympics, and a summer camp program. In 2014, Actua delivered a four-day after-school camp from August 11-14.

Actua’s National Aboriginal Outreach Program is continually evolving to meet the ongoing and changing needs of communities. The ongoing development of the model is guided by input from communities, Actua members and the annual experiences of instructors and campers. The Program is also informed through relationships with Indigenous educators and leaders of Indigenous organizations with shared interest in Indigenous education.

² <http://www.cbc.ca/news/canada/ottawa/5-things-to-know-about-ottawa-s-aboriginal-community-1.1000724>, Accessed October 16, 2014.

Activities Accomplished

Camp sessions typically ran from Monday to Friday, from 9 a.m. to 4 p.m. each day and involved campers between the ages of 7-12. The exact duration, timing, and participant adapted to fit what worked best for the host community. Actua's Outreach Team typically sends three instructors to the community two or three days in advance of the camp's scheduled start date.

Planning for camps begins months in advance, with the Actua office working with local contacts to sort out logistics, such as camp venue, camper recruitment and registration processes, and engagement of community volunteers to help with the program. In addition, arrangements are made for instructor travel and accommodations keeping in mind strategies for making efficient use of resources, often scheduling camps according to pre-set airline flight paths.

Camp days were filled with fun, hands-on science activities, each lasting from 30 minutes to two hours. One of the activities used in the case study communities was 'Minerals in Your Mouth' where campers role-played as dentists. Using real dental tools, they examined model teeth, removed simulated plaque, and drilled out simulated tooth decay. They practiced filling cavities and discovered how minerals and metals are used in tooth repair. Then, they swapped their dental masks for goggles as they became chemical engineers testing their own toothpaste formulas against commercial brands. Along the way, they discovered strategies for maintaining their own oral health and the important roles minerals play in keeping teeth strong.

The first day of the camp sets the foundation for the week. Instructors introduced themselves to the campers and help them to become familiar with one another and STEM in their communities. The campers' safety is a priority, and right away important instructions such as 'we never eat science' were shared. Instructors helped campers to realize that STEM is more than what they think it is and, right from the beginning, started to break down stereotypes about science, including perceptions about gender roles. By setting high expectations and empowering youth to make good decisions from the outset, instructors helped youth feel safe to take risks, make new friends, and trust in the process. Actua's rules are all stated in the positive ('I can ask for help' or 'I stay with the group', for example) so that youth are reminded of what is possible.

One of the early activities in the case study camps was a community mapping exercise where campers and instructors looked at their community through the lens of STEM. Campers worked as a group to build an interactive map of the community, starting with different buildings and natural features that were important to the campers. Campers then looked at the map and ask questions like: What happens in those locations? Who uses that space? What's their job? Special guests from the community who visited the camp were invited to add places important to them. Throughout the week, new lessons in science were referred back to the map: Does this activity remind them of any new places, people, or jobs on the map? Where does science already exist in the community? The emphasis in all of the activities was to help kids to recognize their innate skills needed for the activity and to build new skills.

When activities didn't naturally fit onto the map, instructors led discussions with campers about how STEM could provide new job opportunities for their community. Campers recognized that STEM skills lead to numerous job opportunities both currently and potentially available in the future. For instructors, the community mapping opportunity provided them with a structured opportunity to be welcomed into the community by the youth and the community contact. They felt more informed about

the unique attributes of this community and in turn felt more comfortable exploring and getting involved during their camp week. This allowed them to feel more confident making connections between STEM and local cultural knowledge.

From the start, campers were encouraged to see themselves in STEM roles and to find links between their interests and science. At the end of the first day, they celebrated what they had achieved and were genuinely excited about the week ahead. Instructors encouraged them to write down their personal goals for the week. In a creative way to celebrate these, they placed their hand-written notes in simulated rockets that were launched, as yet another demonstration of science in action.

Elders and other Indigenous community volunteers played a key role in the camp program. They provided important linkages to the community's culture and Traditional Knowledge. Elders led opening and closing ceremonies, communicated the importance of the camp to campers, and shared important teachings and messages. Typically, in other Actua camps, Elders or other Indigenous community volunteers will lead an activity, such as a traditional practice, or a take the campers on a field trip to a place of local or cultural significance.

Throughout the week, campers were invited to think about what they were learning. Comments and photos were recorded on a 'reflection wall', and at the end of each day instructors led a debrief exercise using a ball with prompts, such as 'I am good at science because...' and 'My Elders have taught me....'. Through self-reflection, youth began to recognize their own knowledge acquisition and attitudes towards science changing and ended up appreciating the opportunity to celebrate and reflect on this development. Youth would often make their own connections and independent contributions to the camp reflection wall without instructor prompts.

As the week progressed, campers increasingly applied what they learned earlier in the week to new challenges. For example, towards the end of the week, they were presented with an engineering challenge to design a new piece of personal safety equipment for underground miners. Using what they had learned from an earlier electronics project, they role-played as electrical engineers to solve this problem. Applying their collaboration and problem-solving skills and following an engineering design process, they were able to develop working prototypes of their ideas. They recognized the importance of applying a user-centred focus to developing their product while applying their knowledge of electrical circuits.

On the final day of camp, parents, other family members, and interested community members were invited to an open house event. Campers led their families and friends through a number of activities that demonstrated what they had achieved throughout the week. The engagement of parents, family members, and community is important for ensuring long-term encouragement and support of youth in their exploration of STEM.

The lead-up to camp involves careful planning and preparation, including recruiting community volunteers, finding a space for the camp, arranging transportation and securing lodging for the instructors, and promoting the camp to potential campers. Equally important to advance planning is the ability of the Actua Outreach Team to adapt to different situations that arise through the natural course of the summer. Despite every effort to plan ahead and maintain ongoing communications with community contacts, each of the four case-study community initiatives presented unique circumstances and the need for last minute changes and adaptations.

In North Bay, Actua had made plans to work with participants in the Waaban Program, a program for First Nations youth between the ages of 12-17 to learn about and participate in First Nation culture. Actua camps are typically designed for younger ages (9-12), and it was not apparent that older youth would be attending until much later in the planning process. The older youth were enthusiastic for the camp, and the North Bay Indian Friendship Centre and Actua agreed that it was worthwhile to proceed. Instructors adapted the material to suit the older participants and found the older campers were very interested to learn how the science worked within each of the different experiments.

In July, Actua and the Community of Kugaaruk confirmed a camp for the week of August 11. In Nunavut, school typically starts in late August or early September. Yet, in early August, Actua learned that the camp week coincided with what would be the first week of school for youth in this community. Rather than cancel the camp and go to another community on short notice, Actua and the community opted for a week long after-school science program.

The school was very enthusiastic about the idea and in the end, younger students attended the program from 3:30-5:30 p.m. and older students attended from 6:30-8:30 p.m. Each grade was offered a chance to attend the program, so each day a different group of students attended. To make this program work, a meal was provided to campers and instructors from 5:30-6:30 p.m. Four community members came every day to prepare a meal, sharing their culture through food. With the mornings and early afternoons open, instructors visited high school classes and were able to engage high school students in discussions about post-secondary education.

At the Odawa Friendship Centre, one of the instructors had to end their season early due to a family tragedy and was not able to be part of the instructor team for the final week of camp. One of the instructors from the Nunavut pod travelled from Cape Dorset to Ottawa to join the Ontario instructor team for this final week. This presented an opportunity for instructors from different instruction teams to work together, and share learnings about the different ways in which each team had delivered elements of the program throughout the summer.

The Taloyoak camp did not have any major adaptations. It was the closest to the original design and concept of all the four camps.

Materials or Tools Developed

Outreach Team Training Topics:

- Actua’s Code of Conduct
- Actua’s Mission and Values
- Classroom Management
- Communications
- Community Engagement
- Conflict Resolution
- Emergency Procedures
- Evaluation
- Indigenous History and Culture
- Gender Equity
- Inclusion and Accessibility
- Occupational Health and Safety
- Program Approach and Curriculum
- Team Building
- Technology
- Travel, Logistics & Finances

Activities and resources designed to support the connection between Traditional Knowledge and STEM:

- Traditional Knowledge and STEM Curriculum Connections Matrix
- Community Mapping Exercise
- I Spy Science Activity

Logic Model

Actua’s National Aboriginal Outreach Program model has evolved over time and incorporates current thinking and practices related to the most effective ways to successfully guide and support Indigenous youth engagement and participation in STEM and engineering studies and careers. It consists of a progressive learning model that focuses first on youth’s current understanding, attitudes, and skills and follows with knowledge building in STEM.

Actua supports the theory that youth learn best when they feel self-confident about their knowledge, and feel safe in environments that support and respect their worldviews. In order to realize long-term success in engaging and guiding Indigenous youth towards STEM related studies and careers, Actua first demonstrates that current knowledge of self and community has real applications that can lead to STEM careers.

Actua’s National Aboriginal Outreach Program model consists of four main components:

1. Community engagement
2. Program content and experience
3. Indigenous instructors and role models
4. Training and information sharing

This holistic approach inspires Indigenous youth to realize their potential and understand their current strengths in a way that helps them fulfill their role in the world. The model is grounded in the idea that each individual has their own unique life pathway or journey of experiences. These pathways are grounded in culture, families, and communities.

Actua's National Aboriginal Outreach Program model is strength-based. The design of camper experiences, successful practices for community engagement, instructor recruitment, and network member training processes starts with the recognition of prior knowledge and experiences. Whether it is a youth participant, an instructor, or a director of a network member program, recognizing prior experience conveys that their worldviews matter and provides a starting point from which learning can occur.

Specifically, when we recognize the prior knowledge of youth, we deliver the message that they can contribute to advancement in STEM. They also start to understand how increasing skills and knowledge in STEM can benefit them. Ultimately, we can help guide youth towards a wider understanding that includes a new vision of themselves, confidently pursuing learning from both Traditional Knowledge and modern science perspectives.

The key characteristics of the National Aboriginal Outreach Program:

- Program content designed to provide youth with exposure to a wide variety of STEM experiences and career opportunities.
- Activities designed to accommodate a wide variety of learning styles, with a blend of hands-on design and build opportunities, group work activities, individual activities, demonstrations, physical activities, and role-playing games.
- A strength-based approach to instruction that builds confidence, critical thinking and problem-solving skills, collaboration and team building skills, and inspires youth to pursue new learning.
- An approach to instruction that recognizes youth's prior knowledge, and helps youth to understand that their worldview matters and is relevant.
- Locally and culturally relevant content that respects Indigenous traditions and culture and that connects Traditional Knowledge with modern science. This content is developed with the input of communities, Actua network members, and the experiences of instructors and campers, as well as Indigenous educators and leaders of Indigenous organizations with shared interest in Indigenous education.
- Opportunities to help youth to see themselves reflected in STEM through exposure to Indigenous role models, incorporation of Indigenous instructors on teams and through involving young undergraduate students in STEM disciplines as instructors.
- Inclusion of local Elders and other Indigenous community volunteers in camp programs to lead cultural experiences and share Traditional Knowledge with campers.
- Engagement of parents and family members by encouraging youth to take activities home and through designed open-house events where parents, family members, and friends are invited to celebrate camper successes at the end of a camp week.

Inputs: Resources Human & Financial

- Teams of three instructors (Outreach team)
- National administration and coordination of NAOP program
- Participation from local Elders, Artisans and/or other volunteers
- Community space such as a classroom made available to the program
- Science and program equipment for camp activities

Strategies / Major Activities

- One week science camps in First Nations, Inuit, and Metis communities
- Relationship building with First Nations, Inuit, and Metis communities
- Incorporate local Traditional Knowledge into camp experiences and demonstrate the connection between Traditional Knowledge and STEM related knowledge
- Focus on the current understanding, attitudes and skills of youth and instructors first, and knowledge building second
- Increase the number of Aboriginal undergraduate STEM instructors
- Provide a training program including a training manual that introduces the rationale and research behind NAOP

Outputs and/or Performance Indicators

- NAOP camp sessions offered in communities in Ontario and Nunavut during the summer
- 25 campers participate in each camp session

Short Term Outcomes

- Youth develop increased confidence, new skills and knowledge, a love of learning and a deep curiosity about the world
- Youth are personally empowered with the new skills, attitudes and knowledge they have developed, and are more fully engaged in school and in their community
- Host communities are engaged partners in the program

Intermediate Outcomes

- Youth choose to pursue STEM through high school and college or university.
- Youth develop strong personal foundations coupled with an understanding of the role and value of STEM. They are prepared to contribute fully as informed, scientifically literate decision makers.

Ultimate Goal/Impact

- Youth have the capacity to contribute to the development of a better world through STEM and innovation.
- Actua contributes to the development of Canada's knowledge economy, and skilled workforce by promoting the development of human capital in Canada.

Outcomes

- Campers develop self-confidence and an enhanced interest in STEM studies and careers.
- A strength based approach that connects Indigenous youth to what they already know about science is vitally important. A key strategy is to root science education in place and to be intentional about linking local Traditional Knowledge to modern science.
- The role of Elders or other Indigenous community volunteers is critical in making the connections between Traditional Knowledge and modern science. This important role needs to be communicated and shared with community contacts and significant planning is required to ensure their engagement in all communities.
- Instructors are well prepared for their camp season, and the intensive pre-season training is vital for the science curriculum and cultural aspects of the camp.
- Indigenous instructors make a valuable contribution to the camper experience, the connection to the community, and the learning of fellow instructors.
- Instructors' profound summer experiences can influence their career path, and equip them to be ambassadors of Indigenous culture.

The Role of Elders and Indigenous Community Volunteers

The direct engagement of Elders and Indigenous volunteers is integral to the National Aboriginal Outreach Program model. They reinforce that there are different ways of knowing and that science is part of a community's tradition and culture. The following section outlines case study experiences in engaging Elders and Indigenous volunteers at camps.

North Bay, Ontario

When Lorraine Whiteduck Liberty did a smudge ceremony for the North Bay campers on the opening day of camp, campers had a lot of questions about sweetgrass: Where do you get it? Why does it smell like that? She was one of two Elders invited to be part of the camp that week. Lorraine returned again on Tuesday and spoke about water as part of the ice road engineering activity. A camper chimed in, "I remember my grandmother telling me where the spring is." In her water presentation, Lorraine also

talked of the connection between water and sweetgrass. Again, there was a lot of curiosity from the campers, so on Friday of the camp week, she made an impromptu visit to camp to speak more about sweetgrass. Campers learned where to pick it, how to braid it, and why it is respected. She explained the way that she thanked the earth for the grass she was using and spoke about how the earth would renew the grass that was picked. This led to a discussion about other things that were renewable, including the wind, prompting a discussion of wind energy. Lorraine's presence and teachings provided valuable science lessons in ethno-biology and wind power, as well as a series of powerful moments of sharing Traditional Knowledge.

"As a grandmother, I am responsible to carry my bundle teachings and to share them with youth."
Lorraine Whiteduck Liberty

Roger Chum was another First Nation Elder involved with the North Bay Camp. He led an opening ceremony, gave an inspirational talk about the importance of school and post-secondary education, and visited the camp each day. His enthusiasm for science was inspiring to campers and to instructors, and he encouraged them to keep moving forward, even in the face of challenges. Roger, too, made the link between Traditional Knowledge and modern science when he talked about different kinds of medicine. He also talked a lot about how he lives his own life, providing campers with a role model for positive, healthy behaviour.

"This is going to be fun! I'm also going to be learning some stuff." Roger Chum

Odawa Native Friendship Centre, Ottawa, Ontario

Mary-Lou lahtail is an Elder, originally from the Cree community of Attawapiskat in the James Bay area of Ontario. The campers at the camp week at the Odawa Native Friendship Centre listened closely as she taught them a song in Cree as part of their closing ceremony. Mary-Lou discussed the seven grandfather teachings and emphasized the importance of learning these at a young age. When Mary Lou came into the busy and excited atmosphere of the last afternoon and open house of camp, the campers were suddenly focused and attentive.

"It is important to share my knowledge with youth because they need to be able to discover more about their culture. They do not know much about their culture, which is why I really appreciate when I get called to visit. Children love to listen and learn the stories. I found the campers were very ambitious. I taught them a song in Cree and they kept asking me to repeat it until they could sing it themselves. I always remind children of the seven Grandfather teachings and the importance of learning these at a young age." Mary Lou lahtail

Taloyoak, Nunavut

In Taloyoak, an Inuit community contact, Curtis Jayko, also engaged in the program as a mentor. He brought the campers to the community fire station, let them try on fire suits, and showed them the truck and all of the equipment. He discussed fire safety with the campers, which set the stage for campers to learn about the science of fire and fire protection. He also talked about his job as Fire Chief, explaining that he grew up in the community, stayed in school, and now had a job that he really liked.

Curtis and the instructors then spent time looking at other careers in the community, and how science played a role in those. Curtis also tried to arrange for an Elder to visit the camp, but the Elder he hoped could attend was out of town during that camp week.

Trying on the firefighters' safety gear reminded campers of the dangerous situations firefighters have to be prepared for, much like in the camp activity 'Engineering for Safety,' where youth learned safety measures in the mining industry. Each camper had the chance to 'fire the hose' with the help of other firefighters, and role play a scenario where the campers had to crawl to safety. This field trip was a highlight, as almost all campers mentioned the fire station as one of their favourite camp moments, some saying that they hoped to become a firefighter one day.

Kugaaruk, Nunavut

It was not possible to schedule Elder or Inuit volunteer visits to the after-school camp in Kugaaruk.

Traditional Knowledge and Modern Science

Another key tenet of Actua's Aboriginal Outreach Program model is the connections made between Traditional Knowledge and modern science. This section describes a mapping activity designed to root camper experiences in place and explores how activities are adapted to reflect local culture and connections to Traditional Knowledge.

Mapping Activity

In designing a STEM camp where the experience and worldview of campers is the starting point, the program goes a long way to communicate to campers that what they already know is valid and meaningful. Campers began their camp experience with the community mapping exercise at the case study locations of North Bay, Kugaaruk, Taloyoak, and at the Odawa Native Friendship Centre in Ottawa.

By making this a starting point, the campers were able to connect all subsequent science experiences with what was already familiar to them and to root their experiences in what they know best – place. The link to the familiar is not limited to Traditional Knowledge. Ice roads, local lakes, the zamboni at the arena, campers' homes, or the community's health centre were all examples of points of engagement with what campers knew, and all provided an opportunity to learn more about science.

"Making links to our traditions is very important, a lot of our programming is based on this." Daniel Desrochers, Coordinator, North Bay Indian Friendship Centre.

For the camps set in a more urban environment, the mapping exercise can be more challenging. Campers may travel from different parts of the city. They may also originate from different traditional areas and vary in the extent of their connection to their culture. As a result, campers may have different reference points. In these cases, instructors would adapt the exercise to focus on a common area, such as the Friendship Centre hosting the camp. In remote communities, it is much easier to take the campers outside. Community Mapping and I Spy Science are enhanced when campers get to observe and think as a group, letting their interests be their guide. For example, when they see construction workers, it is an opportunity to talk about engineering, or when they see water, it is a chance to discuss

fish, plants, and algae. Campers would often come to camp later in the week with pockets full of rocks, ready to learn more about their science.

“We saw their curiosity happening first hand. As we walked around, the campers were learning and thinking in different ways.” Sarah Hognestad, Actua Outreach Instructor

Adapting Content to Community

The approach of the instructors is to be responsive to each community. Upon arrival in a new community, instructor teams would walk about and explore the area. Not only did this provide a way for them to meet and interact with people in the community, it also helped them orient themselves to some of the possibilities for science in each place.

Each community has its own unique features, and the capacity to adapt ensures that the story of science is not a singular one disseminated by Actua. Instead, it is a relational story, shared by the unique people and culture of each place. This adaptation was further reinforced by the way instructors reacted to the interests of the campers. For example, a lesson on light included pointing a laser at Jello to watch how light bends. When instructors learned that some of their campers were very interested in spear fishing, they were able to make the connection to how bending light makes fish underwater appear to be in a different place.

“We always benefitted when a community contact was able to take us around; it made it easier to make connections to the science content of our camp.” Logan Seaman, Actua Outreach Instructor

Role of Instructors and Role of Community in Connecting Traditional Knowledge to Modern Science

Instructors realized that their role was to facilitate activities and experiences that helped campers make connections between Traditional Knowledge and modern science; however, they understood that it is not their role to determine what constitutes tradition or Traditional Knowledge. This responsibility falls on the community members and the campers. Instructors were careful not to present themselves as experts in Traditional Knowledge. This was especially the case for instructors who were not First Nation, Inuit, or Métis.

Making connections between Traditional Knowledge and modern science can be an adjustment for some instructors, whose prior experience may have been with programs that are solely focused on STEM. The Community Mapping and I Spy Science activities are designed specifically to facilitate the integration of Traditional Knowledge into the program, and the presence of Elders and Indigenous volunteers has a profound influence on the degree to which Traditional Knowledge can be incorporated into the camp experience.

Community Engagement

Actua had a history of working with the four case study communities. Camps were held in the communities of North Bay, Kugaaruk and Taloyoak in 2013, and Actua has had an ongoing relationship with the Odawa Native Friendship Centre in Ottawa since 2009.

Planning for summer camps typically begins in March. At this time, Actua's Outreach Coordinator connects with the community contact in each community. Communities are responsible for hosting the camp and, before committing to a camp, Actua requires that a responsible authority within the community signs a formal camp agreement.

Community contacts played an important role booking space, confirming dates, recruiting campers, and identifying Elders and community mentors who can help with the program. The first point of contact in a community was typically a Senior Administrative Officer at the Hamlet or municipality or the Executive Director of a Friendship Centre or recreation centre. This senior individual often designates another individual, perhaps a recreation coordinator or a program director, as the key liaison with whom Actua will work in planning the camp.

In Taloyoak and Kugaaruk, the community's recreation coordinator was the primary contact, and at the Odawa Native Friendship Centre in Ottawa and in North Bay, it was the program coordinator responsible for youth programming. When circumstances change, others can get involved. For example, in Kugaaruk, when the program shifted to an after school program, the school's principal became highly involved.

As camp gets closer, the Outreach Coordinator was in touch with the community contact more frequently, with a final check-in a few days before camp starts. Details such as travel itineraries and instructor cell phone numbers were shared and any last minute troubleshooting was addressed. During the camp, the Outreach Coordinator checked in with instructors to make sure that they had what they needed for the week and that there weren't any issues and concerns. The Outreach Coordinator connected with the community contact the week following the camp to share thanks, shared some of the highlights from the instructors, and heard any feedback that the contact may have to share, including an invitation to participate in a follow up survey and interviews.

Actua understands that the one-week camp does not stand alone; it is part of a long-term relationship with a community. Many things, such as identifying Elders who can participate in the camp, happen on the ground just as the camp is getting started. With many sites offering a camp each year, Actua recognizes that it is ideal to maintain an ongoing connection with communities. A longer standing presence in a community builds trust and familiarity. The more that communities understand what the camp is about and how they can contribute, the more Actua and communities can be proactive with their preparations. The hope is to develop relationships with several people who will contribute as volunteers to the camp. This would allow for alternatives should someone be unavailable, and would add value with more perspectives and connections.

Communities Welcoming Instructors

Instructors felt very welcome in the communities where they delivered camps. In each of the case study sites, community members went out of their way to extend their hospitality. In Talayok, for example, the community contact prepared a Caribou stir fry and took the instructors out on the land, where they learned Inuit navigation techniques.

“There was always someone to check-in on us and make sure that we were welcome in the community.”
Samantha Spencer, Actua Outreach Instructor

Remote community members are as curious about the instructors as the instructors are about the place they are visiting. When instructors arrive in a remote community and walk around for the first time, they are often approached by local youth who want to talk and ask questions. This provides an opportunity for the instructors to further promote the camp, and generate some additional interest among youth who may not be registered.

The on-the-ground experience during camp week is one of trust and reciprocity. Community volunteers let the instructors lead the program, but are quick to step in when help is needed. Instructors approach their role with flexibility and humility. Everyone genuinely wants the campers to have a positive experience, and there is a common recognition that this results from chipping in, adapting to each situation, and being sincere in the collaboration.

“Youthfulness, engagement and academic background of your teams is a great asset. Their connectedness with children of these remote places fills in the gap between daily schooling and something more. Keep coming and expand your program.” Jerry Maciuk, Principal, Kugaaruk Ilinniarvik School

Recruiting Campers

Campers were recruited through a variety of strategies. In the two remote communities, word was spread through posters, as well as through Public Service Announcements on local radio and television stations. In addition to promoting the camps through the Friendship Centres, the Odawa and North Bay Native Friendship Centres recruited from within existing programs.

While every effort is made to register campers in advance of the camp, the program can easily accommodate last minute registrants who typically learn about the camp opportunity through word-of-mouth from friends; however, registrations are generally capped at 30 youth for safety reasons (maintaining appropriate instructor/camper ratios) and to ensure a consistent depth of experience for all campers.

At the Odawa Native Friendship Centre, a partner organization, Sacred Heart, helped to advertise the program to the youth whom they serve. The program coordinator at the Odawa Native Friendship Centre also looked to include Indigenous foster children of non-Indigenous parents.

Having a history of offering camps also serves as a form of advertising. For example, in Talayoak, a lot of kids came to the camp wearing their Actua t-shirts from prior years.

In all cases, the community is invested in having a successful camp and does a lot to bring campers into the program.

“Community support is so vital. It is sometimes hard for us as instructors to make the cultural bridge to Traditional Knowledge. The best camps are when there is a lot of community support.” Andrew Henderson, Actua Outreach Instructor

Youth Outcomes

Participation

In all case study sites, registration levels were roughly the same, about 30 campers. In the four case study sites, participation was higher in the remote, northern community camps. In Taloyoak, 20-25 campers came each day and in North Bay and Odawa, about 15 campers each day. In Kugaaruk, the change to the after-school format meant a lot of campers participated for shorter periods. Factors influencing registration numbers include engagement across the entire community, the novelty of a camp experience, and the extent to which instructors are highly visible while they are in the community.

In an Actua science camp, campers are encouraged to try things, make mistakes, and there is no measuring of right or wrong answers. Some campers may be intimidated by the school system, and the western approach of ‘right and wrong answers’ can lead to fears about camp. The instructors work to dispel these fears as quickly as possible.

Participation is more than just having campers show up. The engagement and interest of campers is essential to success. The instructors observed that they often do not have time for every activity on the week's agenda. Activities can run over: some topics really resonate with campers and there is value in going deeper into the topic or taking advantage when an opportunity presents itself, such as an impromptu visit from a community member or an invitation to visit a place of local cultural significance.

Confidence and Interest in STEM

"A person who does science in my community is me, my family, and everyone around me." North Bay Camper

This comment is illustrative of the extent to which the Actua camp increases campers' interest in science. Instructors observed that many campers start on the first day of camp with the perception that science is boring or difficult. Their interest level grows over the course of the week.

Asking questions is a marker of increasing confidence. Confidence is an important pre-determinant of a youth's likelihood to pursue ongoing studies and/or careers in STEM.

Each week, instructors witnessed campers ask more and more questions each day. Campers were more comfortable with asking about things they didn't understand or wanted to know more about. Campers also demonstrated a marked increase in their readiness for problem solving. For example, when campers were given a design and build challenge involving the construction of a flashlight, they began with a drawing of their design followed by an opportunity to create a prototype made out of basic supplies (household items, paper, glue, sticks, etc.). As campers encountered challenges translating their drawing into a three dimensional prototype, they learned how to problem solve. They recalled what they had learned from previous activities and found their own solutions to the design challenge.

"By the end, [the campers] were going for it. They dove right in and were really exploring." Logan Seaman, Actua Outreach Instructor

Acceptance and inclusion were also key factors in building confidence. Megan Fafard, the program coordinator responsible for supporting the camp at the Odawa Native Friendship Centre observed one camper, whom she knew to have a difficult time making friends, immediately accepted and fully engaged in the camp program. Fostering this inclusive environment is very important, especially given that science has the potential to be intimidating.

"A lot of times we'd have shy, quiet kids, who were afraid at first that they would not be right and they would hold back. But by the end of the week these shy youth were very comfortable speaking up and participating fully at camp. Our job as instructors is to support them in that." Samantha Spencer, Actua Outreach Instructor

Another important factor in ensuring inclusion is the staff's attention to gender equity and breaking down misconceptions about gender roles in STEM.

"In each community, we helped break gender stereotypes. Some campers didn't think that girls could be dentists or doctors. We were great role models." Katie Twance, Actua Outreach Instructor

Campers built self-esteem through the course of the week, and Actua's program is exceptional in the way experiencing success occurs all week. Instructors have the philosophy that there is success in all campers, and the objective of the program is to help them to discover that. Activities are often designed so that campers develop their own definition of what success looks like by developing their own goals, i.e. I'm going to build the most cost efficient flashlight, I'm going to complete the activity, I'm going to build the brightest flashlight, etc. As a result, campers take pride in what they are doing. For example, during the Minerals in Your Mouth activity, campers would ask for more time to complete the activity because they wanted to do a good job at removing the simulated plaque from the teeth.

The core ingredient to confidence, inclusion, and increased self-esteem is the element of fun. A key feature of an Actua camp is laughter and excitement. As Daniel Desroches from North Bay Indian Friendship Centre observed, "*One reason the learning is easy is that the instructors are having as much fun as the kids.*" The fun aspect raises interest, as does the variety of activities that present a range of opportunities for campers with different interests to find something they really like. For one camper, a favourite activity could be the one where they figure out binary code, for another it could be the core sampling activity in a simulated mining operation.

The end result was a measurable increase in camper confidence as demonstrated in the confidence evaluation exercise led by instructors at each camp. In order for Actua to be truly successful in its mission of providing all youth with transformational life-changing experiences in science, youth first need to recognize the experiences they are having are indeed life-changing.

Career Engagement and Interest in Science

Actua's program is designed to expose youth to a wide variety of science and engineering studies and related career opportunities. Whenever possible, linkages are made to local development. Not only does this provide youth with a better understanding of the science behind the development in their region, it also connects them to related career opportunities. For example, when there is a nearby mining operation, campers will explore all aspects of the mining industry starting with 'what are minerals for and how do we use them?', 'where do we find them and how?', and 'what are sustainable practices for their extraction and land recovery?' They are encouraged to think critically about all the processes, and along the way they discover professions such as environmental engineer, hydrologist, even archaeologist. There is much more to mining than just geology.

A common comment after an activity was 'I didn't know that was science.' For example, in the nursing station activity, campers role-played as various health professionals, including first aid attendants, nurse practitioners, and laboratory technicians. Using stethoscopes, otoscopes, and sphygmomanometers campers collected vital signs and other data. They also practiced splinting and casting and took on the role of laboratory technicians, as they performed simulated blood chemistry tests with simulated blood. Many were genuinely surprised that what they were finding fun and engaging also included science. Once given the opportunity to role play in various professions and experience the enjoyment of those roles, many campers indicated their interest in pursuing the careers they were learning about. Some were keen to work in their community's health centre. Others said they wanted to be a community wildlife officer, dentist, or fire chief.

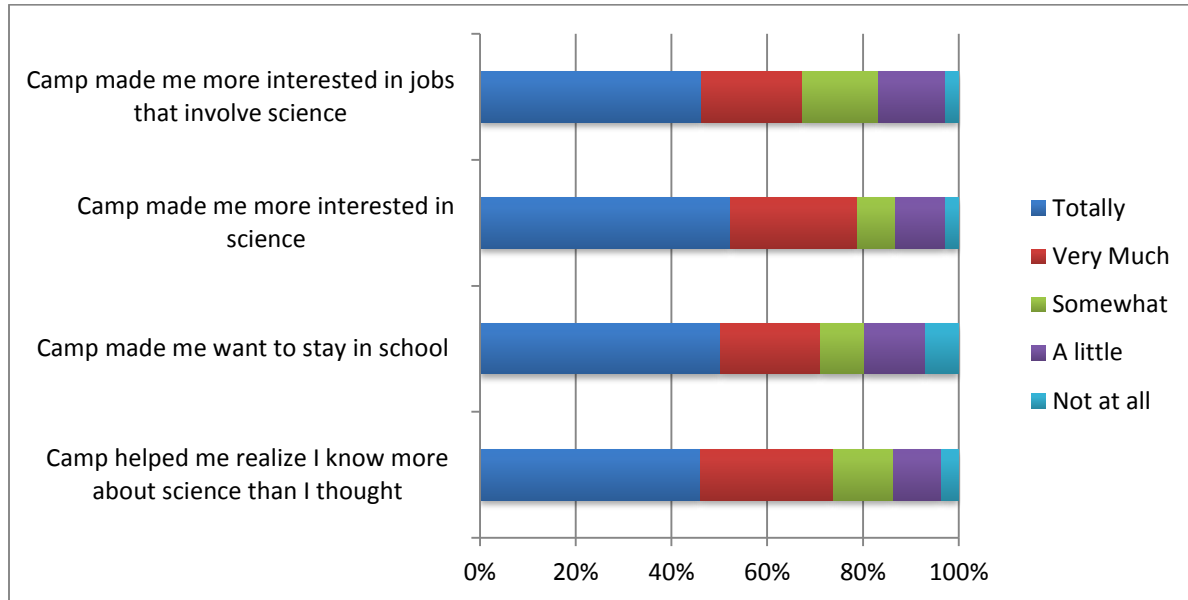
Evidence of increased interest in STEM careers was also manifested in the results of post camp surveys.³ As illustrated in the chart below, 67% of campers responded that they either “totally” or “very much” felt that camp made them more interested in jobs that involved science.

Encouraged by what they were learning, 74% of campers reported that camp helped them to realize that they knew more about science than they had thought. Beyond interest and enthusiasm, survey results also pointed to positive future intentions with 79% of campers stating that camp helped them to be more interested in science and 71% stating that camp made them want to stay in school.

These results are again consistent with past evaluations of Actua programs that have attributed Actua experiences to increased confidence and enjoyment of science and increased likelihood of pursuing future studies in STEM.

³ In Kugaaruk, most campers were involved with the program for a maximum of four hours. The extent to which the program could have the same outcomes as other communities was much less, and because of this, and the limited instructional time, surveys were not conducted with the campers in this week.

Figure 1.0



"I wish it lasted all summer; it was so good for the kids." Curtis Jayko, Taloyoak Recreation Coordinator and Fire Chief

Instructor Development

Actua's model of education outreach involves the recruitment of undergraduate students in STEM studies as instructors. This for-youth-by-youth model provides youth with direct exposure to positive young role models who represent the post-secondary environment. Within the context of the National Aboriginal Outreach Program, Outreach Team instructors receive training that prepares them for the delivery of science camp in rural and remote communities, as well as training that prepares them to deliver the content.

While instructors have a strong background in STEM, few are actually of Indigenous background, and others have varying levels of background or experience in working in Indigenous communities. As a result, another key component of instructor training is preparation for program delivery in Indigenous communities, including training in cultural awareness and Canadian Indigenous history.

Preparing to Deliver Program Content

The training experience for instructors is less about positioning them as experts in science and more about teaching them to reflect the principle of lifelong learning and curiosity that is integral to an Actua summer camp experience. Instructors are not expected to have all the answers; rather, the training emphasizes familiarizing them with the content and teaching them how to adapt and problem solve when situations arise. At the same time, non-Indigenous instructors gain confidence in working within Indigenous cultures.

The Outreach Team instructors gathered in Ottawa in July for one week. The training experience was designed to model the camp experience. Instructors were given hands-on learning opportunities and direct exposure to cultural experiences. Early in the training, the emphasis was on the creation of safe spaces for youth to learn. Instructors learned about how kids form groups, what to watch for regarding control bullying, social conventions, gender equity, and how to adjust to different learning challenges that may arise.

This was done early so that when the instructors started to review the science content, they were already in the mindset of the camper experience. More than learning the content, it was about understanding who they were teaching and how they were expected to bring the science into that context. Instructors were also allocated time for last minute logistics preparations before they were to head out to their first community.

Cultural Awareness

A highlight for the instructors is preparing for their time in Indigenous communities. Actua's Senior Advisor to the National Aboriginal Outreach Program, Doug Dokis, shared stories with instructors and provided examples of what they might find different in Indigenous communities. He also introduced instructors to the First Nation culture they were going to experience in Northern Ontario.

The instructors also had an informal lunch with students and instructors with the Nunavut Sivuniksavut Program, an Ottawa-based program that prepares Inuit youth for continued studies and career development. The instructors found this exchange and the time with Doug to be very useful. In fact, the instructors felt that they would have benefitted from spending even more time on cultural preparation. They were keen to understand more about unique aspects of Inuit culture, and receive more examples of what to expect and how best to react or respond to different situations.

Difficult situations were explored through role play. For example, an Actua staff member from the national office role-played as a camper, while instructors reacted in the moment to what was happening. This was a useful way to talk about important classroom management techniques, how to solve conflicts between campers, and how to resolve other issues that might arise. At the end of the summer, instructors were surprised that much of what they covered in training actually happened, and when something they didn't cover occurred, they were confident in their problem-solving abilities.

While the training is comprehensive and thorough, Actua recognizes that training cannot cover every possible situation. Actua tries to form instructor teams with at least one returning instructor so that they can bring their experience from the previous season to the team, something that instructors found valuable. Logan Seaman observes, *"It was a huge asset to have someone who had the experience. She had been to many of the communities before and could help the rest of us to be more comfortable as we got started."*

Instructor Impact

"Life changing." This is what several instructors said about their summer experience. The opportunity to travel to remote communities and engage with First Nation, Inuit, or Métis culture was powerful for most instructors. A majority of the instructors involved in case study communities said they would like to return for another season, and several of the instructors see themselves eventually returning to the

Canadian north in other roles, either as an educator, an engineer working on energy systems, or a doctor.

Through their experience, instructors become much more than camp program leaders. They become more informed about Indigenous culture and issues and discovered the beauty and richness of Indigenous communities. They carry this expanded perspective into their studies and, most likely their careers, something that ultimately benefits communities. They recognize the value of what they are doing and feel it is a highly rewarding experience.

“The experience has been incredible. It has definitely changed how I think about the north and has opened my eyes to a big part of the country that I hadn't heard much about. I'm in my first year of medicine, and, because of this summer, when I graduate I intend to spend some time in the North as a doctor. If you can find a way to get there, do it; it will change what you think of as Canada and what it means to be Canadian.” Logan Seaman, Actua Outreach Instructor

Indigenous Instructors

One of the instructor groups in the case study communities included a First Nation instructor; the other did not. The third instructional team (not part of any case study site) also included a First Nation instructor. It is a goal of Actua's to recruit more instructors who are Indigenous. The experience in the case study communities shows the importance of instructional teams with both Indigenous and non-Indigenous instructors. The non-Indigenous instructors learn about a part of Canada where they have little experience, and as noted above; their expanded perspectives influence their interests and prepares them for their future careers as informed citizens, highly respectful of the value of Indigenous ways of knowing and Traditional Knowledge.

Indigenous instructors play a critical role in inspiring Indigenous youth to see themselves represented in STEM. They also enhance the safe space that the camp creates. Just like having Elders and Indigenous volunteers from the community directly involved in the camp, Indigenous instructors contribute to an environment where campers feel comfortable being themselves. *“I want to work for Actua,”* is what a couple of campers from Kugaaruk shared at the end of their experience in the after school program.

“The experience is very rewarding. I feel we impact kids' lives on so many levels. It's something I don't want to stop doing. I want to continue to help give kids more confidence and to them to know that they are special.” Amanda Peltier, Actua Outreach Instructor

The cultural knowledge of Indigenous instructors is also of benefit to the non-Indigenous instructors. As peers, they provide a safe source of information for non-Indigenous instructors who feel comfortable asking questions related to Indigenous culture and how to respond appropriately to emerging situation. This enhances the confidence of the non-Indigenous instructors and builds their confidence in working effectively in Indigenous communities.

One of the challenges to recruiting Indigenous instructors is the persistently low number of Indigenous students in STEM fields, something that this program seeks to address in the long term. In the meantime, Actua is working on strategies to build stronger relationships with organizations that support post-secondary education of Indigenous students as a means to increase the recruitment of Indigenous instructors.

The evaluation measures that were used.

This review takes a case study approach, examining the on-the-ground experiences of Actua's National Aboriginal Outreach Program delivery by Actua's Outreach Team at four locations where week-long camps were delivered in 2014. While specific activities or experiences vary from year to year or by camp location, the overall approach to Indigenous outreach program delivery would be representative of the successful practices outlined in Actua's National Aboriginal Outreach Program model that has developed over the past 20 years.

The case studies explored the following key questions.

Community Engagement: A strong partnership between Actua and participating communities is vital for a successful program. A good relationship reflects each community's unique interests, respects local culture, and provides the opportunity for local volunteers to participate. What does community engagement look like on the ground? What is done before, during, and after the camp to build and sustain meaningful partnerships with communities? How does this contribute to the camp's intended outcomes? Do Elders and other community volunteers get involved with the camp program, and if they do, how does this contribute the program's outcomes?

Program Content: Activities are designed to expose youth to a wide variety of STEM studies and careers and make connections between Traditional Knowledge and modern science. What are the strategies for engaging with youth and communities to incorporate Traditional Knowledge into the camp experience, while also achieving the above objectives? How are the principles of prior knowledge and respect for culture integrated into the program?

Youth Impact: Activities are designed to build confidence, as well as critical thinking and problem-solving skills, collaboration and team-building skills, and inspire youth to pursue new learning. Campers should also better recognize science in their communities, and their prior knowledge in science. To what extent do the participating youth increase their confidence and connect their prior knowledge to what they are learning about science? Does this build new interest and future intentions for science?

Instructor Experience and Development: Instructors play a critical role in delivering successful camp experiences. For some, it is their first exposure to northern and/or Indigenous communities. How does the training prepare instructors? What components of the training are most useful? Are there areas where more training is needed? How does this experience affect them? Actua is trying to recruit more Indigenous instructors. What was the impact of having an Indigenous instructor as part of the team? How does it benefit the camp experience? How does it benefit their non-Indigenous teammates? How does the experience influence instructors' career interests?

The following sources were used to prepare this evaluation:

- a) Camper survey conducted by every camper on the final day of camp;
- b) Notes and observations made by instructors following debrief activities during the camp;
- c) Interviews with instructors. Once during the camp season and again following the camp season;
- d) Interviews with the lead community contact in each of the case study communities;
- e) Interviews with Actua staff with responsibilities for the National Aboriginal Outreach Program; and
- f) The results from the confidence test-tube exercise (see below).

* Confidence test-tube exercise: Actua devised a unique way to provide youth with the opportunity to reflect on how their experiences were impacting them. Confidence is a key, determining factor in youth's future engagement in STEM. Actua designed a hands-on activity that gave youth the chance to turn the abstract concept of confidence into a visual representation. First, youth were taught about survey scales and played a game that helped them measure the degree to which they agreed with various statements by standing on different points on a number line. Next, youth talked about what confidence means to them, and what it might feel or look like at camp. Before a number of key activities, youth were asked to pipette an amount of coloured water into a 'before' test tube that would represent how confident they felt about the kind of science in which they were about to engage. Youth thoroughly enjoyed this chance to put their science skills to the test as they visually represented how they felt. After the activity, youth were asked to measure their confidence levels again and pipette their new levels of confidence into a second, 'after' test tube. Finally, youth were photographed with their before and after 'confidence' test tubes. During post-camp surveys, youth often mentioned this activity as a camp highlight and were eager to show their family and friends during open house events about how their confidence had changed through camp. In fact, 77% of all campers reported an increase in confidence following the activity.⁴ This outcome was reinforced by instructors' observations of camper behaviours as described above and is consistent with other evaluations conducted by Actua.

Lessons and Significant Accomplishments

The Role of Elders:

The case study experiences are illustrative of the vital role that Indigenous Elders or volunteers play in ensuring a positive and meaningful learning experience for Actua campers. Roger, Lorraine, Mary Lou, and Curtis spent a lot of time talking with the campers and sharing their personal experiences. The campers showed great respect for the presence and teaching of the Elders and volunteers. The respect for Elders was inherent in the communities, and their discussions led to many linkages to modern science.

However, involving Elders or other Indigenous volunteers can present scheduling challenges. The connection to Elders and Indigenous volunteers is managed in advance through Actua's relationship with the community contact. Even with advance planning, it is normal for Indigenous volunteers to be suddenly unavailable as they may be out on the land or out of town on short notice.

At the same time, Actua is learning to better articulate to community contacts, the role that Elders can play in the camp experience. Community contacts are sometimes not clear on why the presence of an Elder or Indigenous volunteer is requested. They may not fully understand the value that they offer the youth as part of their camp experience. As a result, instructors sometimes arrive in the community with confirmed arrangements for Elder participation in the camp. They will still attempt to recruit an Elder or Indigenous volunteer, but on such short notice it is often not possible to find someone who is available at the required time.

⁴ Campers were asked to rate their confidence from 1 to 5, with 1 being low and 5 being high. The average response for before the activity was 2.5, and the average response for after the activity was 4.

The week-long Elder engagement that was possible in North Bay illustrated an ideal situation. The campers got to know the Elder better over the course of the week, and as a result could respond to the camper's interests. Similarly, when Lorraine Whiteduck Liberty returned to talk about sweetgrass, she was able to build on her own experience with the campers to extend the value of her presence at the camp. Roger Chum's ongoing involvement in the camp provided a foundation upon which he could make connections to the importance of post-secondary education. Having a presence at the camp for more than just the duration of a one hour presentation helped provide the Elders and Indigenous volunteers a better context upon which to share their knowledge and make a connection to modern science.

Community Engagement:

Traditional Knowledge stands alone as an inherently highly valuable element of the camp. It is a vital part of working in partnership with Indigenous communities, and is the basis for a respectful and authentic collaboration. There is great natural enthusiasm for the science activities that constitute a typical Actua camp. Learning about electricity by making a flashlight is a fun and useful activity on its own. The weaving of Traditional Knowledge into the camp experience serves to further enhance the credibility and familiarity of what is being learned about science.

Actua is working hard to strengthen strategies for increasing the linkages between Traditional Knowledge and modern science. As instructors learn more about Traditional Knowledge and practices, they can design science activities that respond to what Elders and other community members bring into the program. For example, we can imagine activities on tension and strength to accompany the braiding lessons of Lorraine Whiteduck Liberty.

With the help of the Senior Advisor of the National Aboriginal Outreach Program, Actua Outreach Instructors are beginning to document the areas of Traditional Knowledge that are shared by Elders and Indigenous volunteers so that more activities can be designed to proactively make those linkages. Step by step, the program is looking to increase the integration of Traditional Knowledge into camp experiences so that the linkages become a seamless component of a whole camp experience.

The case study demonstrates the valuable partnerships that Actua and participating communities have developed, and how the National Aboriginal Outreach Program contributes to positive experiences that strengthen the self-confidence of Indigenous youth and their interest in STEM studies and careers.

Instructor Impact and Development:

The National Aboriginal Outreach Program is rooted in respect for local culture. Its success hinges on the value that Elders and Indigenous volunteers contribute through sharing of cultural experiences and Traditional Knowledge. Communities also play a key role in supporting camp logistics and providing a welcoming environment for instructors which also contributes significantly to the success of camp experiences. Parents and family members also contribute to the success of the camp experience by supporting their children and sharing in the celebration of their successes.

Actua instructors make excellent role models for the youth with whom they engage. As undergraduate students in STEM studies, they provide youth with direct connections to the post-secondary experience. They are also adept at adapting program content to meet the unique learning styles of campers. Instructors' skills, training, and dedication contribute to high-quality science camp programming. Their personal experiences in the National Aboriginal Outreach Program also shape their thinking and interests. When they carry these experiences back into their lives after the camp season, they share their expanded perspective of Indigenous communities and people.

Both non-Indigenous and Indigenous instructors bring significant value to the program. Strategies for increasing the recruitment of Indigenous instructors are needed as it is very important for Indigenous youth to see themselves represented in science careers. Indigenous instructors are also well-positioned to further enhance the connections between Traditional Knowledge and modern science.

Youth Impact:

The ultimate sign of success is the experience of the campers. In Kugaaruk, North Bay, Ottawa, and Taloyoak, campers spent one week learning about themselves and the world around them through STEM. Campers realized that they knew more about science than they thought, and as a result, most are now more interested in science and are more interested to stay in school. Ultimately, success in Actua's National Aboriginal Outreach Program contributes to the resilience and economic independence of Indigenous youth. This contributes to the development of the next generation of innovators essential to Canada's social and economic prosperity.

Lessons Learned:

Actua's model for engaging Indigenous youth in STEM studies and careers has developed over the past twenty years by applying lessons learned in Indigenous communities, listening to community leaders and other Indigenous educators, and remaining abreast of current research and recommended successful practices of Indigenous education.

Actua's practice is to continually learn and reflect. With each season, the National Aboriginal Outreach Program improves, building on the lessons of the past. This case study evaluation has revealed a number of important lessons and recommendations that will shape the future of the program and the training provided to Actua's network of 33 members at universities and colleges across Canada.

1. Adaptation is key: Instructors are trusted to be flexible in response to the unique needs and sometimes last minute changes that can occur. Their training reinforces this and builds their confidence to handle all of the situations for which they cannot plan. This is empowering to both communities, in recognizing their unique needs and circumstances, and to the instructors, who feel supported in taking leadership within the program.

2. Indigenous and non-Indigenous instructors each add value: The ideal composition for an instruction team is a mix of Indigenous and non-Indigenous instructors: Indigenous instructors for their contribution as role models and the way they can help strengthen the cultural link to programming and to community engagement; and non-Indigenous instructors in the way they become informal connectors between Indigenous and non-Indigenous culture. Strategies are needed to ensure the successful recruitment of more Indigenous instructors. It would also be

very beneficial to engage Indigenous instructors who are from the region where programming is to be delivered.

3. Urban camps and remote camps have different characteristics: The experience in remote communities like Taloyoak and Kugaaruk were very different from the urban settings of Ottawa and North Bay. The general approach and concepts were the same, but there were important nuances in how they integrated Traditional Knowledge, engaged partners, and promoted the camp. Instructor training, communications materials, and aspects of program design need to be reflective of these differences.

4. A long-term relationship strengthens the program: The National Aboriginal Outreach Program is already highly relational. Actua and community hosts are active partners, who share common interests for the success of the camp and the campers. The ramp up to the summer season has its inevitable moments of intensity, but the more the planning can shift to an ongoing relationship, the better understanding communities will have and the more the camps will be able to support the inclusion of important program features, like the participation of Elders and community mentors.