INSTEM

Land Camp Evaluation

PREPARED FOR:

ACTUA

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FSC is a forward-thinking centre for research and collaboration dedicated to preparing Canadians for employment success. We believe Canadians should feel confident about the skills they have to succeed in a changing workforce. As a pan-Canadian community, we are collaborating to rigorously identify, test, measure, and share innovative approaches to assessing and developing the skills Canadians need to thrive in the days and years ahead. The Future Skills Centre was founded by a consortium whose members are Toronto Metropolitan University, Blueprint ADE, and The Conference Board of Canada

1. INTRODUCTION

For over 25 years, Actua has partnered with Indigenous communities to deliver its Indigenous Youth in STEM (science, technology, engineering, and mathematics) Program (InSTEM). Recognizing the underrepresentation of Indigenous students in postsecondary education, and particularly in STEM related disciplines, the program aims to deliver culturally connected STEM programs for K-12 youth to contribute to achieving equitable education outcomes and STEM engagement for Indigenous youth in Canada.

Actua's InSTEM programs are grounded in Indigenous Knowledges and the deep understanding that Indigenous Peoples have always known about STEM. Elements of STEM are intrinsic to Indigenous ways of knowing and the day-to-day life of Indigenous Peoples. Through program delivery and partnerships with local Indigenous cultural practitioners, Actua facilitates connections between Indigenous aspects of culture, Traditional Knowledge, and Western science, thereby broadening the pathway for youth to explore their potential as future innovators in STEM.

Actua's InSTEM program provides Indigenous youth with transformational STEM experiences that:

- Connect them to positive young Indigenous role models;
- Connect them to local Elders and Indigenous volunteers who contribute their cultural experiences and Traditional Knowledge to our high-impact program content;
- Provide high school credits designed with the cultural and educational priorities of the community at the forefront of our work (*Note, only some of the programs provide high school credits);
- Impact their attitudes and behaviours towards future STEM learning and careers; and
- Build self-confidence, problem-solving and critical thinking skills.

1.2 ACTUA FOR-CREDIT LAND BASED PROGRAMS

Actua's for-credit land-based programs provide opportunities for students to obtain high school credits that are focused on the connections between aspects of Indigenous culture, Traditional Knowledge, and Western STEM concepts. Three programs are being reviewed during this evaluative project (Camps A, B, and C - all pseudonyms). The programs were in northern, central, and southern Alberta, Canada. The camps were a collaboration between Actua, school boards, local education providers, community members, and Actua network members. Diverse project partners lent their strengths to ensure all the camps were successful.

The programs are tailored for the local context and aim to engage students in learning about Indigenous Knowledges and their connections to STEM. In addition, the camps aim to introduce youth to potential career opportunities in STEM. Although offering flexibility to suit their contexts, the programs share some overarching goals:

- Increased skills, knowledge, and confidence in STEM.
- Increased pride in self, identity, and connections to culture.
- Increased understanding of connections between Indigenous Knowledge and STEM.

The camps share these overarching goals, but present content tailored to their context. As Indigenous-led projects, the camp organizers were cognizant to prioritize community-led programming that was reflective of the students' backgrounds and contexts. Thus, while the focus of the camps was similar, the content and delivery methods varied to suit local needs.

2. EVALUATIVE FRAMEWORK

Actua hired the Indigenous-owned educational services company Ridge Road Training & Consulting, Inc. (RRTC) to carry out the evaluation. This evaluation is guided by Indigenous worldviews and perspectives. It aims to holistically capture the essence of each program and to convey how it is accomplishing its goals. The 4Rs of *respect*, *relevance*, *reciprocity*, and *responsibility* are used to orient the framework (Kirkness & Barnhardt, 2001). The 4Rs allow RRTC to centre Indigenous Knowledge and worldviews, whilst being accountable to the Indigenous communities the programs are taking place in.

> ***Respect*** for Indigenous cultural and community knowledge. The evaluative methodology sees value in speaking to a range of partners in the camps and seeks to understand the camps in a holistic way.
>
> ***Relevance*** to the needs of the community. The evaluation will seek to provide accurate and insightful information about the effects of the camps, as well as seeking input into how the camps can be more aligned with the needs of the community.
>
> ***Reciprocity*** with the community, where the benefits are tangible for everyone. The information from the evaluation will be used to improve and refine the camps, which should continuously strive to meet and exceed program goals.
>
> ***Responsibility*** to the community ensures that accountability, credibility, and transparency are at the forefront of this relationship. The evaluative project will be explained in detail to all participants and program partners.

Focusing on the 4Rs allows the evaluation to be cognizant of the contextual factors impacting the camps and the wider aims of the land camps in addition to student content acquisition. The 4Rs provide a holistic lens for interpreting and evaluating the land camps in an equitable, authentic, and accurate manner.

2.1 EVALUATION QUESTIONS

This evaluation sought to gain accurate and authentic insights into the functioning and impact of each of the three land camps. The evaluation aimed to:

1. *Gain insight* into the functioning of the camps and the participants' and partners' perspectives on them.
2. *Assess effects* of the program on the students, instructors, program partners, and community members.
3. *Encourage self-reflection* in those taking part in the program evaluation. It is hoped that the evaluation participants all reflect on their learning journey during

the camps. Those leading the camps can also use this opportunity to reflect on their practice and enact self-directed change.

4. *Change practice* by using the feedback to improve program functioning.

Evaluation questions serve to hone the evaluation process and help to guide the selection of methods. The evaluation of the land camps sought to answer the below questions:

1. Do youth who participate in the camp demonstrate increased skills, knowledge, and confidence in STEM?
2. Do youth who participate in the camp demonstrate an understanding of the connections between Indigenous Knowledge and STEM?
3. Do Indigenous youth who participate in the camp demonstrate more pride in self, identity, and connections to culture?
4. What are the strengths, and weaknesses of the camp? What barriers and challenges were encountered?

These questions seek to deliver information into whether the programs are having the desired outcomes and are meeting their goals.

2.2 METHODOLOGY

Actua, the program evaluators, and the camp organizers collaborated on contextual and reflexive evaluation methods and tools. Due to the varying lengths and formats of the camps, as well as the camp organizers' methodological preferences, each camp was evaluated with different combinations of evaluation tools/instruments. Common evaluative elements across the three camps were included to provide comparable data. The table below summarizes the evaluative methods employed at each camp.

	Evaluative Methods
Camp A	● Student Survey ● Educator Survey ● Educator Interview
Camp B	● Student exit slips

	● Student sharing circles ● Educator sharing circle ● Educator interviews
Camp C	● Student exit slips ● Student self-assessment ● Student interviews ● Staff interviews ● Direct observations

The evaluative methods focused on capturing rich qualitative data on the participants' experiences attending and/or facilitating the camp. Camp C was selected for direct observation by Ridge Road Training & Consulting evaluators as it was the only overnight camp that lasted several nights. Thus, the data and descriptions of Camp C may be richer than Camps A and B.

The collected data was thematically analyzed by Ridge Road Training & Consulting staff. During the thematic data analysis process individual responses (e.g., exit slip, survey, interview transcript, observation field notes) were coded for particular themes connecting to the evaluation questions. Once all the responses were coded, Ridge Road carried out a cross-case thematic analysis, looking for trends and patterns within and across the three camps.

The data was then compiled into a series of three case vignettes, one for each of the three camps. In each vignette, after a brief background of the given camp, the data is presented through three main themes for each camp: STEM and Indigenous Ways of Knowing; Pride in Self, Identity, and Connections to Culture; and Strengths & Suggestions for Improvement. Under each theme, rather than present only statistics, this report sought to present enough description and testimony so as to provide a holistic picture of the camps. Indigenous Knowledges and perspectives see the world as interconnected, as whole, whereas, Western scientific approaches tend to isolate variables, thereby fragmenting knowledge into discrete and insular categories. In the spirit of the camps seeking to link STEM and Indigenous ways of knowing, the vignettes are meant to identify variables (i.e., themes) while maintaining the sense of interconnection. This not only acknowledges the interconnected nature of learning and knowing, but also presents each camp in a structured and comprehensive manner, allowing the reader to immerse themselves in the camp experience.

3. VIGNETTES

3.1 CAMP A

3.1.1 CAMP BACKGROUND

Camp A has operated for two years and is offered in fall, winter, and spring. Each camp set (i.e., fall, winter, spring) consists of three 2-day camps, with three separate groups of students attending a 2-day camp. The Spring 2023 set of three camps was evaluated for this report. The camp organizers—Actua, their network members, and the participating school boards—have an established working relationship that allowed for a smooth camp planning process. Having run camps previously, organizers were experienced in the logistical planning involved in hosting the camp. Original plans outlined a partnership between the local community education organization and a single Actua Network Member; however, the Actua network member had to withdraw from one of the Spring 2023 set of camps. Yet, there was enough coordination and preplanning in place to allow another Actua network member to support program delivery for the second set of Spring 2023 camps.

Most students at this camp identified as Indigenous. A little less than one-third identified as non-Indigenous. Camp organizers designed learning opportunities to build on any prior knowledge learners bring with them. This prior knowledge is connected with the camp's spiritual basis and Indigenous ways of knowing to develop knowledge of water stewardship and medicinal plants. Broadly speaking, the camp aims to help learners gain an appreciation for the land and an understanding for how it can provide for them and how they can benefit the land as individuals.

In total, 30 students took part, engaging in several activities to further expand their Indigenous and STEM Knowledges. Starting with a smudge ceremony to promote a new cultural experience, the students learned about 20 medicinal plants, trees, and berries, blending STEM and Indigenous Knowledges through discussion of the interconnectedness of plants and their medicinal properties. The students learned how these plants can be used to prevent and cure illnesses. The students then transitioned to learning about water stewardship and how to sample and monitor a body of water. Again, Indigenous perspectives on water were linked with scientific practices of water purification efforts. The weather had an impact on the camp, as the tents originally secured for the students had to be reallocated to people being relocated due to wildfires. Students who successfully completed the camp were awarded a high school credit.

3.1.2 STEM AND INDIGENOUS WAYS OF KNOWING AND LEARNING

To ascertain students' self-reported growth in STEM and Indigenous knowledge learning, the evaluation employed Likert Scale questions (see matrix below). The survey asked students to rate their growth in learning about STEM and Indigenous knowledge, as well as the camp's ability to make connections between the two.

Likert Scale Matrix

Not at All	A Little	Somewhat	A Lot	Very Much
1	2	3	4	5

Almost all students felt that they left the camp more knowledgeable in both STEM and Indigenous ways of knowing. The students' average response to learning about STEM was 4.03 and 4.4 for learning about Indigenous ways of knowing. Just as importantly, when asked if the camp made connections between STEM and Indigenous knowledge, the average response was 4.16. The only topic where responses were more evenly spread across the spectrum was whether the camp made students think more about future careers in STEM (average response 2.83). Some students said yes, but several also showed they were somewhat indifferent or not interested in a STEM career, with 70% selecting the "Somewhat" or less when asked if the camp made them consider a career in STEM. Not having an overwhelming interest in a STEM career should not take away from the positive effects of the camp. As described above, students still learned about the relationship between STEM and Indigenous Knowledges, and left the camp with stronger understandings of STEM, Indigenous cultures, and themselves as individuals.

Many students' favourite part of the camp was learning about different plants and their uses as medicine. Others were fascinated when taught to use their natural surroundings as tools for filtering water. There were also students who greatly enjoyed the beading activities, and some who were pleased to take away memories of building and sleeping in tipis. The overarching aspects that made the camp special were the experiential learning, Indigenous teachings, and the storytelling/ sharing knowledge and experiences. Cumulatively, the students showed that their engagement in education was enhanced through the Indigenous pedagogies and the land-based setting. As one student expressed, "I liked how it's so calm, not like the city at all." This seemingly simple comment speaks volumes about where and how relational learning can thrive.

While the educators (who accompanied the students to camp) were in their roles where they ensured student support, they also became participants in the camp. Just like the students, the educators had their favourite parts and showed enjoyment for learning about plants as medicine and about water filtration. One educator felt that the camp was "such a relaxing experience with a great wealth of knowledge." Once again, education in this context was stimulating and without great pressure but engaged no less with knowledge creation. Educators observed the building of relationships between students and described how, at the beginning of the camp, some students were "not familiar with each other. They're a little shy at first. By the end of it they form into friends, they're comfortable speaking with each other and sharing."

3.1.3 PRIDE IN SELF, IDENTITY, AND CONNECTIONS TO CULTURE

One camp organizer spoke about the spiritual focus of the camp, where students and instructors would discuss connections of the Creator with all the living plants and organisms around them. Having an appreciation for the land was a resonating point with the students. During a camp sharing circle, the educator observed the students gain an appreciation of Indigenous knowledge and how the camp strengthened the students' "inner spiritual strength" (Camp A Organizer). It is likely that this spiritual growth will translate to an increased pride Indigenous students have in their cultures.

There is also ample evidence of students making connections to their Indigenous cultures. The camp underpinned much of the teachings with spirituality and the students reported learning about Indigenous plant uses as a highlight of the camp. The educators reported witnessing a change in the ways the students thought about their environment as a system of relationships to which they belonged. "This is the reason I do what I do," said one educator, "to see the students and see them respond and its impact." To this, educators expressed that a highlight of the camp was building cultural knowledge and spiritual connection to the land.

3.1.4 STRENGTHS & SUGGESTIONS FOR IMPROVEMENT

Students expressed great support for the camp experience, most of them saying they would recommend the camp to others. However, a few students were less enthusiastic about endorsing the camp. Of the 30 students respondents, 7 (23%) opted for the "somewhat" or "a little" response for how likely they are to recommend the camp to a friend. Even these less enthusiastic voices, though, still showed belief that the camp would be good for other students to experience. Despite a few critiques (e.g., need more detailed packing lists to better prepare for the camp), no students said they disliked the camp or that other people should not participate.

Every educator said they would strongly recommend the camp. They reported leaving camp with more knowledge about STEM and Indigenous ways of knowing. Educators were also learners, highlighting that education is dynamic and ongoing.

Even with the highlights of the camp, students still felt that the camp could be adjusted in some ways. The few points for improvement noted by the students concerned the logistics of the camp, which suggested considerations for the context rather than the content. Students desired more details on the permission forms (e.g., more specific supplies needed and more specific pick-up times). A couple of students wished there had been better washroom facilities, and some students stated that the camp would benefit from better mattresses for sleeping. Additionally, while camp facilitators could not control the weather, some students wanted more opportunities to take breaks from the heat. The final point for improvement, according to students, was that they wanted more experiential activities. Given that so much of the camp involves experiential learning, this wish seems to be a request to experience more of the camp's teachings, rather than being a critique of the camp.

From the experience of planning and facilitating, the educators did also provide some points for improvement to consider. They felt there could be stronger pre-camp communications, such as a more detailed packing list that helps participants appropriately prepare for the experience (e.g., students were not properly prepared for rain). Like some of the students, the educators believe better mattresses could be beneficial, so everyone has better rest. Finally, some educators feel that the camp needs to be expanded to include younger grades of students. Mirroring students' points for improvement, this final point from the educators is not so much a critique of the camp, and more an encouragement for the continued expansion of the camp.

3.2 CAMP B

3.2.1 CAMP BACKGROUND

Initially Camp B was hoped to be an overnight camp. For logistical reasons this was not feasible, and it was adjusted to daytime programming only. The students were transported to and from home each day. Students received high school credits for successfully completing the camp. The camp was a collaborative effort, as the school board and Actua partnered with several First Nations communities, an Actua network Member at the local university, and a business conference, to offer students a diverse camp experience. In total, 25 students participated in the six-day camp. Three days of camp here held in local First Nations communities, one day at the local university, and two days at a business conference. Camp programming focused on Indigenous cultural teachings and STEM.

The students listened to teachings about the region's Treaty history, as well as the history of the local First Nation. They took part in a guided medicine walk around the community, where medicinal plants were highlighted and explained. The students learned about how different First Nations erect tipis and took part in a tipi raising activity. The students also learned about traditional hand games and how they incorporated probability. At the local university students were hosted by the Actua network member and students explored virtual reality and a virtual mapping activity. On the last two days of the camp, the students attended a business conference providing the students the opportunity to engage with and learn from Indigenous business leaders. Four of the students were panellists at the conference and delivered a presentation, which received a standing ovation.

3.2.2 STEM AND INDIGENOUS WAYS OF KNOWING AND LEARNING

Educators saw students making connections to STEM and particularly the storied approach to teaching and learning STEM used in the camp. "I was shocked with how much they remembered," shared one educator. "It made me realize how much they attended to the stories and made connections to STEM." The students internalized stories they heard concerning ecology, engineering involved in tipis, and astronomy, making connections between Indigenous knowledge and STEM. "Our people have always been, technically, scientists for as long as we've existed," said one student. They

continued, “We’re scientists because we know the land … Even if people just see it as cultural views, it’s more than that … they go hand in hand together.”

Educators overheard students saying, “science is not about textbooks, it’s about Indigenous ways of learning and listening to the land.” Through stories and experiential learning, students recognized Indigenous knowledge as never outside of STEM. They are always linked. With this reminder, options for additional learning and education seem more possible. One student said the camp’s land-based approach “made me more interested in university. I used to think that university was just not going to be something that I would be doing. But it [the camp] made me more open minded to it.” Speaking of STEM specifically, the student reflected,

> I used to think that STEM was not going to be something I would ever be good at doing, but now, this made me realize that there are different levels of what STEM is. It’s not just super difficult math. It’s not just a lab. It’s being out on the land.

Seeing a relationship between the land and STEM work, a student declared, “it’s important to not take the land you live on for granted and to actually speak face to face with people who have lived here for generations, instead of just reading about the land from a school textbook.” The camp is meant to help students embrace the land by being on it and to connect stories with experiential learning.

Students found joy and benefit in finding the relationship between the stories and the land. One student recalled that they

> found that it was much easier to remember how to build it [a tipi] correctly and all of the steps without making a mistake after hearing the story, because the story sticks so much easier than a set of bullet point notes would. So, I feel like that's what I've found is the connection. That's a different technique.

The students saw and embraced the connections between STEM and Indigenous cultures and knowledge, and the students are likely to carry this understanding with them into the future. This knowledge and understanding was reflected in the students’ participation in the two-day business conference. The students were actively engaged, exploring career opportunities and engaging with the presenters and panellists. Teachers remarked about the quality and poignancy of the students’ questions and comments, thereby demonstrating an enhanced understanding of STEM. Additionally, the conference served as a real-life example of how Indigenous knowledges and STEM can be meaningfully connected. Students were able to network and a few secured internships and other career opportunities previously unknown to them.

3.2.3 PRIDE IN SELF, IDENTITY, AND CONNECTIONS TO CULTURE

Students often recognized their own mental, emotional, and cultural growth through the camp. Reflecting on what the camp has done for them, a student portrayed such growth when saying, “It’s really helped me realize who I am and not to be afraid of who I am and not to be ashamed. It's just really helped me find myself.” But while students would enjoy experiencing the camp again, many expressed the belief that other students

should have the opportunity to attend before anyone returns for a second time. Words from one student summarize this idea well:

> Even if they [students] identify or come from the heritage of an Indigenous group, a lot of people can never get the opportunity to be in line with that. And they can never understand fully what that means unless they're given a knowledge or an opportunity, or like a door opened, which I feel is very, very much what this program does.

As this student's statement shares, there is a recognition of the camp as engaging with ideas and issues that are important for all. Students reflecting on the camp were not just thinking of themselves and, rather, saw the camp from a relational perspective. Such a perspective helps to frame education—STEM or otherwise—within relationships and connections.

The broad concepts of connection and interconnection became foundational to the different ways the students reflected on their time at the camp. Through their sharing circles and exit slip responses, students spoke of connecting to the land, culture, knowledge, and people, but, quite noticeably and importantly, they recognized these as all linked together. Praising the work of the camp, a student saw how the experience "really builds a sense of community among students … honours Indigenous ways of knowing and doing … works on increasing representation" and was "just so beneficial at increasing self-confidence." Seeing these connections and relationships helped students see their surroundings in a new light. In turn, the students felt comfortable to carry themselves more freely and as connected and part of those surroundings, rather than beside or outside of them.

Educators saw how the camp "immersed students into a cultural experience that they'd never experienced before." One educator shared, "It's never spoken about [in the usual day to day], the pride in their culture and their learning, learning about each other." A student expressed their joy around the camp opening space to "be yourself and show what you really are, instead of having to be completely different for the whole entire thing." This student and students who shared similar feelings were referring to their sense of freedom and comfort to openly and without hesitation live and enact their Indigenous culture. Two students saw the camp as an opportunity to connect with their spirituality and to build relationships with other people. To engage in good and effective education, students anywhere need to feel safe and feel a sense of belonging within the learning environment. The camp provided a place where they could "find yourself and find pieces of yourself that you never knew that you had and be able to journey through it." In many cases, students found these pieces of themselves through the knowledge sharing by Indigenous Elders.

Storytelling by Elders is at the core of knowledge sharing in Indigenous cultures, and students listened intently. "To see all of these stories in one place kind of validated all the thoughts and emotions I had towards our people," said a student. With great pride, they declared, "we're strong people!" The purpose of the stories went beyond just learning of the past and building a sense of identity. Students saw the stories as foundational to developing new and different views of the world, sometimes starting to see applications of STEM through Indigenous approaches.

3.2.4 STRENGTHS & SUGGESTIONS FOR IMPROVEMENT

There was a belief amongst students that it is important to have both "the opportunity to still learn just as much, if not more than usual, and getting a break … to have more fun, and to be outside, is definitely something that I think everybody should get to experience." Part of the fun, as one student exclaimed, was that the camp allowed them to miss school, but they were still actively learning. This distinction was very telling of relationships students have with learning versus with the school setting. Learning on the land helped students see STEM and Indigenous Knowledges as intertwined, not in opposition. By the camp's end, when students were asked if they would recommend the camp to others, their responses were overwhelmingly 'yes'. Showing great enthusiasm and appreciation for the camp, one student described

> This was such an extravagant experience that I feel honored to have been a part of … it was very important to be there, very important to listen. And just to be able to connect more with the land and learn more … I would definitely recommend this.

More than just a fun time, the camp engaged and connected with students—their whole selves. Not always from day one but certainly by the end of the camp, they saw the camp as providing opportunities for learning in new and different ways.

Educators saw the value of the camp even before it began—hence their efforts in preparation and facilitation—and so, felt dedicated to overcoming any challenges to making the camp happen. As one educator described, "A large part of the [planning] discussions was about how to navigate the rigorous school board policies and processes in place to ensure meaningful teaching and learning, and students and staff safety when planning for a new experience." One educator spoke about how the establishment of the partnership with Actua and the camp planning process also resulted in the exposure and removal of some structurally embedded systemic barriers to Indigenous land-based learning in their board. They stated that planning the camp

> helped us identify and then break down some systemic barriers in our system that worked against Indigenous students being able to engage in this type of learning experience. That's major. Staff from across the entire organization worked together to overcome the barriers that we faced. The focus was never on no, but how.

Some concerns, however, remained with some educators about whether the camp would be framed by the school board as part of a special "add-on" to (i.e., not required) students' education. For so many of the students who shared their feelings about the camp, the camp is a place where they experience real learning that often feels inaccessible in other settings. The camp for them is not an "add-on"; it is effective education.

The educators also shared some learned logistics lessons. Students' participation in the camp began with permissions before they actually arrived on site, and parents had to be involved. As one educator remarked,

> There was a lot of paperwork (e.g., acknowledgement of risk forms, consent forms), and we [educators] would've liked more time to prepare paperwork to send out to parents. Next year, all the paperwork needs to be done at once and needs to be condensed so parents aren't overwhelmed.

In addition, an educator suggested that "it would also be good if, even before camp started, there could be meetings with students to give students a foundation that they can take with them as they enter camp." Student meetings would be both for logistics (e.g., planning to pack and travel) and for their mental approach, so they can more quickly engage with their learning and require less time to find their feet in the new setting. Educators believe that the lead-up to the camp could be more streamlined and could better prepare students so they enter the camp on a solid foundation.

Multiple educators applauded the camp for meaningfully blending Western STEM concepts and Indigenous approaches to learning from the land. However, there were desires that certain activities be more aligned with STEM. Due to a compressed planning schedule, there was uncertainty of what exactly First Nations community partners (i.e., Elders) would share. This was a missed opportunity to connect the content to STEM. Likewise, the digital mapping activity was flagged for needing further scaffolding and time to complete for students to gain the most benefit from it.

Teachers were pleased with the general agenda setup, and some even wished an additional day dedicated to experiential land-based learning. One teacher shared that "a number of students that I've worked with in the past and in the present really talked about not seeing themselves represented within school communities and beyond," and the camp offered a place to boost that representation, giving Indigenous students especially a place of belonging.

There were also some growing pains in coordinating the efforts of multiple organizations (e.g., school board, Actua, Actua network member, First Nations). At times, the coordination felt siloed, with individual actors organizing their own portion of the camp without larger overarching planning conversations. It was suggested that the planning process be made longer, with more opportunities for relationship building and concerted planning. Ultimately, though, educators expressed that there should be more of this sort of learning, and students should be encouraged to take part in the opportunity. They hope the partnerships that support the camp continue because "there is a lot of potential. A lot of learning." Considering that this was the first year the camp was being planned and the number of partners involved in organizing the camp, everyone felt that the camp was a great success.

3.3 CAMP C

3.3.1 CAMP BACKGROUND

The logistical processes of organizing Camp C take significant amounts of time to complete. The array of logistical details, ranging from procuring adequate meals for the students to ensuring school division policies are abided, is considerable and presents a

substantial challenge to the camp organizers. The camp organizers expended an immense amount of time and energy to make the camp a reality.

It all begins with relationships, with the reciprocal exchange of ideas and information. Camp organizers, some of whom are Indigenous, dedicated themselves to nurturing relationships with Elders and Knowledge Keepers. These relationships shaped the composition of the camp, as the Elders offered the fundamental principles by which the camp would be guided. These principles were in turn developed into activities the students would partake in. The result was a holistic and authentic camp experience moulded by Indigenous perspectives, cultures, histories, and traditions.

The spirit of collaboration was also extended to the interorganizational partnerships that were key components of the camp. Partnering organizations offered additional learning opportunities to students and were intimately involved in the planning stages of the camp. The communal and open approach to planning allowed all actors in the process to have a voice and meaningful participation in the process, reflecting Indigenous values of reciprocity and consensus.

In total, 14 Indigenous and non-Indigenous students attended the land camp, with the majority being Indigenous. Students were selected to attend the camp for two reasons: they did not perform well in a classroom setting and/or were at risk of not graduating. One support staff member from a school explained that the "students that are here need to be here." Staff were composed of two teachers, one educational assistant, two Elders, one cultural advisor, three staff from an Actua Network Member, and three environmental scientists (for one full day activity). Students received a high school credit(s) for completing the camp.

The camp was situated within the Rocky Mountains. During the day, activities took place both on the land and in the on-site building (when technology was required). The camp took place over 5 days, Monday-Friday, with students sleeping over at the camp each night in tents that they set up themselves upon arrival. Over these 5 days students participated in cultural and STEM-based activities from morning to late afternoon. Each morning started with a smudge ceremony and all three meals each day were eaten communally. The first day was dedicated to orientations and setting up the tipi. The cultural advisor, with the support of the lead facilitator, explained the process and had students complete the tipi set up. The following day, students completed a full day multi-activity lesson on repopulation and health of the white bark pine tree. On Wednesday students moved through various cultural activity stations where they peeled tipi poles and prepared a moose hide using traditional methods. Inside, students also had an activity station set up, facilitated by staff from an Actua Network Member, where they created a pinhole camera. Thursday was a full day dedicated to canoeing on the nearby lake, and on Friday students packed up and left for home.

3.3.2 STEM AND INDIGENOUS WAYS OF KNOWING AND LEARNING

Many students expressed feeling more engaged in the camp's learning experiences because they were not used to, and enjoyed, approaching STEM experientially. They also said this experience made it easier to retain information. One student specified that

they were interested in attending land camp because they were looking forward to "finding a different way to learn other than paper and pencil." Many students recognized indirect and sometimes direct connections between STEM and Indigenous ways of knowing presented to them throughout the week's activities:

> All of their [Indigenous Peoples'] knowledge connects to STEM in some way. Making the tipi requires using math. Science connects them to the land. Technology developed through the tools and weapons that Indigenous people had and used throughout time. They used engineering through developing tipis as their shelter. They used all their knowledge to allow this to happen.

Another student reflected on how, when an instructor pointed out the STEM within a cultural or land-based activity, they would stop and actively think about how they could see which area of STEM was incorporated into a specific activity. Another said they are now considering a career in environmental science, now with understanding of how math and engineering fit together out in the field. Many students previously viewed science as needing to be in a lab, but upon "actually going out there [the land], I realized that science is everywhere and in everything." The importance of experiential learning cannot be overstated when hearing students' reflections:

> When measuring the trees, how do we get diameter from circumference, ask me any other day I wouldn't remember but because we had this exercise and I was able to relate it to something hands on, I retain that so much better, because it has a purpose.

Every student interviewed expressed feeling that their overall experience at land camp was positive. Most of the students spoke about being able to learn and retain information better in an experiential setting. Not only did they see the information as useful, the students were also able to see how this information was directly applied to the field. The students were excited to share this newfound knowledge with their families and friends. At an informal sharing circle, a student reflected on being able to share information on tree disease they learned at the camp with their community. This example demonstrates the demystification of STEM occurring at the land camp.

This demystification process had tangible results, with students' perceptions of STEM being altered. One student's perception changed from not seeing STEM as useful to recognizing that not only does it have a purpose and many uses but it "can be interesting and fun" as well. Providing students with new perceptions of STEM and making STEM approachable will perhaps encourage these students in the future to create pathways for themselves that will lead to careers in STEM.

Based on the observations and conversations with the students, STEM learning was indeed happening. However, there were instances where the evaluators felt that further connections between STEM and Indigenous knowledge could be made. It must be noted that camp organizers specifically adopted a less structured approach, focusing on experience before content. This approach made it difficult to determine how much STEM learning the students were engaging in. Likewise, while the program evaluators were present on site most of the day, some STEM learning may have taken place when program evaluators were not on site. There were instances where STEM was connected

to Indigeneity (e.g., archery), but these connections were inconsistently made. Learning activities too often focused more on Indigenous Knowledges *or* STEM, but not links between them. For example, when the environmental scientists led a day-long learning experience on tree health, the STEM component was quite evident, but it was loosely connected to Indigenous knowledge. This learning activity could have benefited from further integration of cultural teachings into the STEM content. Further learning opportunities and alignment with STEM could be incorporated into the camp programming. The tipi construction process, for example, could involve more examination of mathematics, engineering, and science of the tipi. This does not necessarily have to involve traditional seat work; more experiential pedagogical methods (e.g., oral discussions of STEM, drawings/ sketches of the STEM aspects of tipis) can be effective.

3.3.3 PRIDE IN SELF, IDENTITY, AND CONNECTIONS TO CULTURE

Over the course of the camp the students, who attend different schools in different communities, forged relationships and connections with one another. The students were sharing their learning and importantly embracing their Indigenous cultures. Invited Elders provided students with invaluable Indigenous perspectives on the land and environment. Through activities and conversations with the Elders, students saw the importance of a respectful relationship with the environment:

> Everything has life/purpose, everything leads back to each other, like the bird and the trees and the bird eats the seed from the trees and the tree needs the bird to spread the seed so the tree can grow elsewhere.

Students spoke about wanting to understand mother nature rather than taking it for granted. One Elder drew connections around the relationship between environment and Blackfoot culture when he explained that if an animal in Blackfoot territory goes extinct, that animal's spiritual society (made up of individual members) no longer exists either. Explaining the importance of students learning on the land, the cultural adviser shared "being in the mountains is a different feeling, letting them [students] know this is where our people lived, this is why you feel this power". Students expressed enjoying the time they spent listening to and talking with the Elders:

> During our talks with the Elders and story time, I was surprised with how much knowledge and wisdom each Elder had. They tell their stories with description and the way they explain is very wise. It makes me feel intrigued in the conversation and wanting to learn more. It surprises me how fast time goes when the Elders tell their stories.

In the evenings, students were able to gain cultural knowledge and insights from the Elders and learn in an Indigenous way by gathering in a circle and listening to the Elders (which is how Indigenous people shared knowledge for thousands of years). Cultural teachings clearly affected the students. They were observed voluntarily taking part in cultural practices (e.g., drumming, singing, peeling tipi poles, cleaning moose hide) without any prompting. Students were given the option to sleep in the tipi they had all

constructed. On the first night there were no volunteers, whereas on the last night, more students wanted to sleep in the tipi than it could accommodate.

The value of establishing a relationship with ancestral homelands during the transitional period of youth cannot be overstated. Students were able to leave the camp with a stronger sense of who they are as Indigenous peoples and where their ancestors came from. For many students, it was their first time partaking in cultural activities. As the students became more comfortable with one another, those who had cultural knowledge shared what they knew with those who did not:

> Last night at the archery station. I shared my wisdom by explaining to a peer how to shoot the bow and arrow correctly so they could avoid getting injured. I have had experience shooting…

During free time Indigenous students taught others traditional hand drum songs, and one student mentioned that her biggest takeaway from the week was the chance to learn from her peers. When tipi pole peeling, a student who had peeled tipi poles with her family every summer took initiative to demonstrate and teach the practices that work best for her. These sharing and teaching opportunities are special; they allow students to learn and teach one another. The knowledge sharing demonstrates the students' comfort and commitment to honouring and celebrating their culture.

3.3.4 STRENGTHS & SUGGESTIONS FOR IMPROVEMENT

As the above evidence indicates, the camp was quite successful in engaging youth in learning about STEM and Indigenous knowledge, although further connections can be made. Learning occurred within a trauma-informed environment premised on safety, respect, and inclusivity. The camp educators intentionally approached the learning content in a decentered way, where the students would participate in learning experiences, which would later be connected to STEM. The camp educators embraced the camp experience and dedicated themselves wholly to ensuring the camp was a success. This was done by nurturing an inclusive, casual, and warm environment. The students were on a first-name basis with all the adults at the camp, a small but significant gesture to reduce the hierarchical power dynamics. Considerable effort was made to allow students to feel safe both physically and emotionally. Students were always treated with respect and kindness. This opened a space for the students to be vulnerable, to open themselves up, and to share freely with the wider group. This is particularly important, as some students may feel the stigma of not being knowledgeable in their Indigenous culture or not being "Indigenous enough." The environment was not lost on the students, who frequently spoke about enjoying the relaxed and informal atmosphere of the camp. Moreover, students displayed care and compassion towards one another. They were respectful, friendly, and inclusive of all who came into the camp. A true sense of community was established in this camp.

Educators saw great value in the camp, not only to students but also to themselves. The university STEM instructors treasured an incredible, moving opportunity to be a role model and share knowledge they care for deeply. School and community-based educators, too, felt valued for their knowledge and contribution to the camp. The

educators all felt land camp is an important and engaging experience. Summed up by the cultural facilitator, “I wish more schools would do camps like this … all schools should be doing this for all ages”.

However, organizing and hosting the camp is taxing on the educators, who must spend considerable personal time in the evenings and weekends working on the camp. They were on site 24 hours a day during the entire five-day camp. Considering students awoke at 7:00am and went to bed at 11:00pm, the educators had to embody their educator role at least 16 hours a day. The pressure of having to be “on” is tremendous, compounded by the separation from family and friends.

There are concerns regarding compensation, rest time, and burnout. The exertion of the staff is commendable, but it also raises doubt about the sustainability of this workload for prolonged periods of time. Existing and future camp organizers would benefit tremendously from logistical assistance, as it is unrealistic and unfair to expect a handful of individuals to undertake this level of responsibility and commitment multiple times a year. School boards must be made aware of the resources needed to run the camps. Streamlining the process for camp approval would assist the camp organizers in efficiently planning and setting up the camp. Without additional supports, it is doubtful that the educators will be able to sustain the work involved in hosting the camps multiple times a year or even annually.

4. DISCUSSION

This evaluation sought to determine effectiveness of the Actua InSTEM land camps to connect youth, and particularly Indigenous youth, to STEM and Indigenous knowledge in an Indigenous-led and -oriented way. Particularly, the evaluation aimed to answer the following four questions:

1. Do youth who participate in the camp demonstrate increased skills, knowledge, and confidence in STEM?
2. Do youth who participate in the camp demonstrate an understanding of the connections between Indigenous Knowledge and STEM?
3. Do Indigenous youth who participate in the camp demonstrate more pride in self, identity, and connections to culture?
4. What are the strengths, and weaknesses of the camp? What barriers and challenges were encountered?

The evaluation demonstrates that the camps employed a truly holistic and Indigenous approach to education. Positioning the activities on the land and reframing STEM through an Indigenous lens opened new possibilities for the students. Through this approach all three camps were largely successful in teaching students about STEM and Indigenous knowledge, as well as increasing Indigenous students' sense of pride and connection to culture.

4.1 STEM & INDIGENOUS KNOWLEDGE LEARNING

Prior to participating in the camp, many of the students had a misperception of STEM as occurring in exclusionary laboratories by highly trained researchers, an image they hardly ever saw themselves reflected in. These perceptions highlight the often exclusionary and inaccessible nature of STEM based disciplines.

The three camps were all effective in weaving STEM and Indigenous knowledges into rich and deep learning experiences. Student and educator responses, coupled with direct observation by the program evaluators, demonstrate the camps' abilities to engage high school students in learning about STEM and Indigenous knowledges. The responses across the three camps exhibited considerable learning taking place and it can be reasonably concluded that the camps are achieving one of their main purposes of connecting youth to STEM and Indigenous knowledges.

Additionally, the student and educator responses attest to the impact the camps are having in showcasing how Indigenous ways of knowing have been and continue to be vital for the growth and development of all people. The camps perform this function in a trauma-informed manner, where connection and relationships fostered the learning opportunities. Only once a safe learning environment was created did the students feel free to learn and discover. Through this participation, many had transformational experiences that will likely reverberate in their futures.

Room for further program growth does exist. Camp A may wish to focus on showcasing some possible career options related to STEM to further pique students' interest in exploring these careers. Camps B and C were in their inaugural years and there were the expected growing pains concerning the planning and execution of the camps. Camp B can potentially benefit from becoming an overnight camp, thereby increasing the amount of time students engage in further learning. Camp C may consider the further interweaving of STEM and Indigenous knowledges.

4.3 PRIDE IN SELF, IDENTITY, AND CONNECTIONS TO CULTURE

The concerted effort to educate the youth on the land served as a profound shift in the students' thinking not only about STEM and also broader learning. Students were invited to explore their own identities, to forge new relationships, and consider new possibilities. They saw their cultures not only validated but truly appreciated and utilized for all they have to offer. This legitimation serves as an inspiration for the students to imagine a different future for themselves; one that involves STEM.

The Indigenous students' growing sense of pride in their Indigenous identities was perhaps one of the most powerful impacts of the camps. There were numerous instances where students expressed enhanced understanding and appreciation for their culture. Framing Indigenous knowledges and cultures as equal to Western modes of thinking was a crucial element of each camp, one that had a profound impact on reframing students' conceptions of their own culture and STEM. Elevating pride in self and identity whilst simultaneously furthering connections Indigenous students have to their cultures was a major achievement of the camps. Considering many students may not have similar opportunities to engage in their own culture, makes this component of the camps that much more vital to preserve and expand.

4.4 IMPACT ON EDUCATORS

Although not specifically evaluated for, the impact on the educators taking part in the camps was profound and warrants inclusion in the present discussion. The deep sense of fulfilment expressed by nearly all educators exemplifies the richness and value of the camps. Many Indigenous educators reported feeling valued and validated in their work. The camps are a place where Indigenous cultural knowledge is held in the same esteem as Western knowledge. Many educators feel tremendous joy seeing the impact the camps are having on the kids, one being moved to tears over his experience. The non-Indigenous teachers were exposed to and participated in authentic Indigenous-planned and -led learning experiences. The camps validate Indigenous teachers' approaches to education while also serving to inform non-Indigenous teachers of Indigenous curricula and pedagogies.

4.5 RECOMMENDATIONS

As with any initiatives, improvements and refinements can be made. The below list includes some recommendations arising from the participants, as well as the program evaluators, for Actua and project partners to consider in planning and holding future InSTEM land camps.

- **Embedding ample planning time to design the various learning activities.** Some activities in Camp B were flagged for needing additional scaffolding and there were scheduling challenges. These will need to be reviewed in a collaborative fashion to design a new way forward.
- **Reflecting and reviewing the connections between STEM and Indigenous knowledge**. There were a couple of instances where Indigenous knowledge and STEM could have been further aligned and integrated. Reviewing options for this synthesis could provide new avenues of consideration for experiences, content, pedagogy, and assessment.
- **The creation of a community of practice around land camps**, where different camp practitioners can come together to share resources and useful insights. The educators at Camp C spoke about being siloed and wishing to learn about other similar camps taking place across the country. A further extension of this and other camps would be the invitation of family and community members to participate in the camp, a suggestion made by a couple of educators at Camp C.
- **Development of additional logistical support and support personnel to organize and host the camps.** Planning and holding the camps involve significant logistical challenges. Actua can work with participating school boards to review policies and processes involved in hosting the camps and investigate which could be removed. Additional research with camp organizers is needed to determine the necessary supports organizers need.
- **Consider expanding and/or extending the camps**. Camp A appears to be quite effective in blending Indigenous knowledges and STEM and could potentially benefit from additional days for students to expand their learning. Likewise, Camp B would likely benefit from being an overnight camp, which would solve considerable transportation challenges and extend the learning experience. Educators in Camp C suggested greater involvement of community members and families, which is an area warranting further exploration.

5. CONCLUSION

The camps are a deeply moving and spiritual experience for all involved. They provide a unique opportunity for the students to deeply immerse themselves in their culture; to be surrounded by supportive Indigenous role models; and to explore new ways of

seeing the world around them. Much more than educating Indigenous youth about STEM, these camps opened a portal into what Indigenous education can be.