INUIT QAUJIMAJATUQANGIT IN ELEMENTARY LIFE SCIENCE EDUCATION: STORIES FROM THE KIVALLIQ

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Abstract

Inuit Qaujimajatuqangit in Elementary Life Science Education: Stories from the Kivalliq

Marjorie Kaviq Kaluraq

This study examined how to incorporate Inuit Qaujimajatuqangit [Inuit knowledge] into elementary life science teaching in Nunavut. Interviews were conducted with Kivalliq teachers and elders to understand what teachers have done to incorporate Inuit Qaujimajatuqangit into their practice and interviewed elders to understand what Inuit Qaujimajatuqangit is, how it was shared, and used prior to the introduction of schools. The researcher used critical narrative inquiry to interrogate their practice in relation to the narratives of the elders and teachers. This research argues that Inuit Qaujimajatuqangit can be incorporated by Indigenizing science learning through content, processes, values, and Inuktut language of instruction; and decolonized by challenging the influences of standard Canadian curriculum. Sharing stories to construct elementary life science curriculum is a viable method for enabling culturally responsive and culture-based science education.

Keywords: Inuit Qaujimajatuqangit, life science education, Inuit science learning, decolonize, Indigenize, elementary science, narrative inquiry, land-based education, Inuuqatigiit curriculum, Inuit pedagogy, Indigenous knowledge, Inuktut language of instruction, embodied knowledge, experiential learning.

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1 Introduction - Nalunaijainiq

Questions about the ways in which Inuit knowledge has been used in science education are driven by reason and passion for Inuit self-determination. My experience as an Inuk student in the science field and instructor in teacher education have taken me to this point where I am questioning how Inuit Qaujimajatuqangit[1] [IQ] have been mobilized in Nunavut science education. In this study, I aim to understand how elementary life science education in Nunavut has been decolonized and Indigenized using Inuit Qaujimajatuqangit and Inuit culture by capturing stories from teachers about their teaching experience. Stories from elders about their lifelong learning and teaching experience uniquely situate Inuit Qaujimajatuqangit as practical and concrete worldview; I apply them within a theoretical framework of decolonizing and Indigenous theories. I intend to achieve this using critical narrative inquiry research methods. Sharing stories for learning is a common pedagogical practice between Inuit culture and academia, making it a suitable method to use in this research.

As David Newhouse put it, "a good mind is reason tempered by passion" (Widdowson and Howard, ed., 2013, p.358). Pursuing this research is a journey of growth towards a good mind that is built on reason while guided and fueled by passion. Passion for Inuit knowledge, the environment, and education have brought me to this point where I make my thoughts and feelings vulnerable to my unknown audience. The information presented in this thesis was intentionally selected to convey the logic behind my research journey propelled by passion from my life experiences and lessons I have learned from graduate studies.

[1] Inuit Qaujimajatuqangit is referred to as Inuit knowledge, Inuit worldview, what Inuit know, or Inuit traditional knowledge, further defined on p. 18

I use decolonizing and Indigenizing frameworks to conceptualize an Inuit Qaujimajatuqangit framework. I use multiple lenses from critical theories in Indigenous education and environmental education to explore meaning within the participants' stories and my personal reflections. I deconstruct tensions between my personal and professional experience, stories from Kivalliq elders and teachers, and literature to reconceptualize how elementary life science education can have a foundation of Inuit Qaujimajatuqangit. I promote social justice-oriented discourses in Inuit education that honour Inuit ways of knowing, doing, and being. Dialogue from this research is intended to contextualize how Inuit Qaujimajatuqangit have been used in elementary life science education with the support of elders' stories to conceptualize what constitutes Inuit Qaujimajatuqangit. Stories from teachers' experiences offer insight into the lived curriculum from Nunavut classrooms that brings context to the institutional curriculum of the Nunavut Department of Education [NDE]. I close with new understandings that I offer as reconceptualizations for the way in which life science education can be taught with a foundation of Inuit Qaujimajatuqangit in an Inuit context.

1.1 Kinauvit? Who are you?

> *"To know who I am in the world as a person and as a researcher, for some audiences requires a statement of race, class, gender, ethnicity, dominant belief systems, and academic theoretical leanings. On the Inuk side, it requires – most importantly – a knowledge of who my parents are, who my relations are, how many children and grandchildren I have, if any, and what lands I am connected to and associated with."*
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> - McGrath *(2018, p. 233)*

The above quote from McGrath (2018) shows the importance of providing context to your identity and experience that provide impetus for the motivations and intentions behind research. Being explicit about who and where the knowledge came from provides clarity about the subjectivity within the content. Later I will discuss the importance of acknowledging the subjectivity within this research in the methods section. Here, I share details about my identity and experience so that the impetus for my research is positioned within the context that I live.

Firstly, I identify as Kaviq Kaluraq. Kaviq is short for my Inuktitut name Kavisiq. I am named after my mother's aunt's son(aniksaq). I also have English names. My first name is Marjorie, named after my *anaanatsia'naaq*[2] , one of mother's aunts. My grandparents adopted me through Inuit customary adoption. My parents Kaluraq and Taviniq were unilingual Inuktitut speakers who lived on the land until they started having children. I have many siblings, nieces, nephews, aunts, and uncles both biological and adoptive. My family history and my upbringing play a significant role in defining the roots of my identity and shaping my worldview. I identify as an Inuk whose first language is Inuktitut because that is what I was defined as when I was a child. The life of my parents spans from the times when Inuit had minimal contact with missionaries and RCMP, all through the residential school era, to my childhood – a pivotal time in Inuit history when Inuit began to take socio-political control of their society in a colonized Canada. Some of my siblings attended residential school and federal day school. Their experiences contrast significantly from my school experiences where I had the opportunity to learn in my first language in my home community.

[2] Anaanatsia'naaq translates as little grandmother

My school days were spent in my home community learning in my first language during elementary school, later transitioning to English as the language of instruction. I grew up in Qamani'tuaq also known as Baker Lake. My ancestors are known as Harvaqtuurmiut [people from Kazan river and Thelon river region] and Akilinirmiut [people from the Beverly Lake area in the Thelon region]. Collectively, these places are in the Kivalliq region of Nunavut (Bennett & Rowley, 2004). My childhood and foundational learning experiences were spent living and learning around Qamani'tuaq.

After completing high school, I left home to attend university in the south. I was motivated to become a professional in environmental science. My views about the importance of the natural environment and its uses have been shaped largely by my experiences on the land. It is in school where the possibilities of careers around my passion for the environment motivated me to leave home. I had plans to have a career in science, a career where I can make a living while working outdoors.

Today, I live in Baker Lake with my family. Reflecting on the contrast in the upbringing between my childhood and that of my children lends itself as a realization about how disconnected we have become from our Inuit values, ways of knowing, doing and being with the natural environment.

1.1.1 Questions and Motivations

I attended a transitional bilingual school where the primary years were taught in Inuktitut and transitioned to English in the middle years. Our primary years had more family and community engagement in school functions. Elders were regular visitors in the school participating in cultural activities. Most of our teachers were bilingual Inuit. As the years went on school became less engaging for me as we focused more on print-based learning. I faced challenges when I transitioned to full-time English instruction because Inuktitut was my first

language as my mother was a unilingual Inuktitut speaker and Inuktitut was the first language of our home life. Language transition alone resulted in dissonance between language use at home and in school. Some days I was focused and did well in school, some days I dreaded being there and found ways to disconnect by skipping class. Class sizes became smaller as my peers dropped out of school year after year. Some teachers would juggle teaching two classes during one period because there was a shortage of teachers and classroom space. Less student-teacher contact required students to be more independent in their learning in secondary school. The courses I attended became focused on meeting prescribed learning outcomes that were mandated to finish high school. Science learning was heavily textbook-based and standardized. However, science learning activities beyond conventional classes did exist.

There were science camps, science fairs, and other school wide activities; sometimes organized by the Kivalliq Science Educators Community. School clubs beyond sports teams were rare. Some of the challenges our peers faced included dropping out of school to support their families, failing to meet school expectations academically or socially, bullying, and suicide. Some of us worked four to six days a week in part-time student jobs. Although these things might sound like cliché school experiences, they were real everyday life struggles we faced. School completion rates were very low. These experiences led to many questions asking ‘why’. Why was no one finishing school? Why were people dropping out? Why did people feel like they did not belong in the school community? Why was school so boring? Why were we [Inuit students] so disconnected from school?

Outside of school my formative years were often spent with family, usually on the land. My mother was a widow who would hunt, harvest, make clothing, and prepare food on top of holding down a job. Time out of school was usually spent outdoors, on the land. Resources from the land were important to filling the gap in resources that a limited monetary income could not

provide. Every day I woke-up to my mother sewing and mending clothes. Her hands were rarely idle, any down time was sewing time. She would sew our outdoor clothes, and also sewed to top up her income. Caribou and fish were a common source of protein in our diet. Resources from the land were essential, the land was essential to meeting our needs.

Over time I became more interested in working to earn an income to fill the gap. I worked more and spent less time on the land. The land was still important but it became more of a holiday destination. Time on the land was time to get away from the modern world, time to rejuvenate, time to decompress.

Planning for the future was daunting considering the limited opportunities to have a career. Jobs within the community are often filled by people who stay in them long-term while professional jobs often require post-secondary credentials. Aside from Nunavut Arctic College, there are no post-secondary programs in small communities. Even when there are programs, they are not always tailored for professional[3] positions. Initially, I had dreams to go to university but no plans.

I had dreams to change the reality I lived in. Many of us lived in poverty, we lived in overcrowded housing, the lack of food created tension, there was lack of income to meet our needs, and we faced other social problems that overshadowed educational goals. These were also realities that many of my peers faced. I wanted to live with food security, good housing, and the ability to dictate the direction of my life. The inequity reinforced feelings and ideas of being 'less than', as if we had to 'catch-up' with the modern world. These were experiences of being othered

[3] I use the word professional to refer specifically to jobs that require credentials and training beyond high school. Not to undermine people who work in other fields but to make the distinction among employment opportunities to readers more familiar with Western discourses understand the context I am describing.

that were reinforced in places like school. The prominence and proclamation of European power throughout history taught in school reinforced ideas that our [Inuit] ancestors lived in cave man-like societies that were less advanced than European settlers who brought with them more civilized ways of living including superior technologies. Ideas such as this were not explicitly communicated, however they were reinforced in the hidden curriculum[4]. This grand narrative stems from earlier relationships between settlers and Indigenous people where settlers asserted their titles to land under the assumption that Indigenous people were uncivilized without law and order[5](RCAP, 1991, Vol. 1). This grand narrative made it sound like Inuit are inherently less of a human being by default making you less intelligent, less capable, less valued. Jankovic (2014) said;

> Archival footage used in Qallunaat! shows an Inuit man filmed by colonizers as he displays his tools. The narrator of the film informs us that the Inuit are "basically living in the stone age" and that they're quite "happy" about it, reinforcing the stereotype of the blissfully ignorant un-civilized native.

Mainstream ideas that perpetuated Inuit identity as 'less than' were made explicit in times such as the 1970's when the American government banned the social studies curriculum designed

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[4] Hidden curriculum: The term "hidden curriculum" refers to an amorphous collection of "implicit academic, social, and cultural messages," "unwritten rules and unspoken expectations," and "unofficial norms, behaviours and values" of the dominant-culture context in which all teaching and learning is situated. These "assumptions and expectations that are not formally communicated, established, or conveyed" stipulate the "right" way to think, speak, look, and behave in school. Since the hidden curriculum invisibly governs academic achievement, it is vital for every student to learn its lessons. (Boston University Teaching Writing, 2021).

[5] As stated in RCAP (1991, vol 1, pp. 47-49), claims to land were affirmed using European law under the term *terra nullius*, resulting in the creation of laws and policies that turned "*differences* into *inferiorities*". These ideas derived from philosophies such as those articulated by John Locke about social evolution and the historical development of 'civilized' societies, placing Indigenous people at a lower 'stage' of social development.

using the Netsilik culture about social organization and culture called Man: a course of study[6]. Our existence as Inuit was largely absent in school books and lessons about everything from art, history, mathematics, and science. Knowledge we were learning was "from somewhere else". It was as though the histories of our ancestors had no place in school beyond what books had to say about them. The knowledge of our elders and community members about Inuit culture was intended as cultural inclusion but rarely counted to any formal assessment as something learned that was worth crediting.

One memory from my school experience that portrays the disconnect between home and school is one of language and content barriers. When I worked on science projects, I made an effort to translate my material because it was important to me to have my mom understand what I had learned. During one project, I began translating material that included chemical reactions. After the first draft, I read it to my mom and asked if the translation made sense and if she understood what I was trying to explain. She explained that what I was trying to say did not make sense and had no meaning because it was not knowledge she knew, it was knowledge that came from somewhere else. I had dreams to change this reality but no plans and sense of how to do so or why. At the same time, this left me with a lifelong riddle that I had to make sense of, knowledge from somewhere else. It also made me question the positivistic nature of science as absolute knowledge.

School was not all bad. There were instances that brought hope. Sometimes teachers were critical of our context and shared their ideas about why our situation as a whole was inequitable, how we [Inuit/Nunavut students] deserved better, how we [Inuit students] were capable of

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[6]The development of and backlash to the curriculum Man: a course of study is discussed in the documentary Through These Eyes (Laird, 2004). Inuit share how negative Inuit identity construction has affected their communities.

changing our reality. Teachers also respected our [Inuit] identities and made an effort to recognize our heritage in school by including our heritage in our learning activities. Some teachers immersed themselves into the community and did more cross-cultural teaching. Those learning moments when some part of us belonged in a positive way in the learning environment brought hope: lessons where I was able to use my first language meaningfully, include my family in the learning experience, and use the local community as a learning space. These were some of my experiences in my science learning that made it engaging. This is where I found hope.

With vague plans to go to university I was determined to finish high school. My plans became more concrete when a lesson on renewable technologies sparked interest to see it at home. My thought at the time was "here is something better for both the people and the environment that I would like to be a part of". With no concrete plans, I continued to pursue science courses because I knew I wanted a career in science. Hands-on learning made it more attractive than other possible careers. By the time I was finishing high school I had plans to pursue an undergraduate degree in Environmental Science to prepare for a career in science. Throughout my undergraduate degree my learning became more and more focused on things back home. The context I came from played a larger role in my learning. What I knew from experience mattered. More questions emerged about the context of Inuit today. Why were there fewer Inuit pursuing science careers? How can more Inuit take on professional careers in our society? What place does our heritage and language have in our future? How do we fit into our society?

Completing my undergraduate degree was a significant feat. I was the first university graduate in my immediate family. Being away from home was challenging for myself and my family. With the added responsibility of having a child while doing my undergraduate degree it was more important now than ever that I complete my schooling to be a positive role model for

my daughter. Graduating during the global recession while having two children made it difficult to find a stable job that worked for my young family. Science careers in Nunavut were not in demand. My motivations and questions shifted after having children. I had to focus on providing for my family and meeting our needs. How was I going to make sure we had a roof over our heads? How am I going to find a job with my credentials? Will I make enough to feed my family?

After months of looking for employment, I got a job in the Nunavut Teacher Education Program at Nunavut Arctic College. When I took the job, I knew I had no experience as a teacher in the classroom but years of experience as a student. I was optimistic to start teaching using Inuktitut and Inuit culture. I was optimistic to start working with Inuit students. I also knew that I was naïve to know enough to teach all that was expected of me. I spent significant amounts of time learning about things I would teach, preparing lessons and assessments. I used my school and university experiences as models for my planning, studied program structures from other universities, talked to my colleagues, and kept revising courses. I worked very hard to meet the expectations that were set prior to my arrival, and with comparison to expectations at southern universities. Using Inuktitut and Inuit culture in the content was essential to my practice but I faced challenges that made it difficult to do so. Even with the inclusion of Inuktitut and Inuit culture, there was always a feeling of a void, a feeling of incompleteness; an overwhelmed and unsettled feeling that I could not fully describe. The challenges of being inclusive of Inuktitut and Inuit culture led to other questions: are there better ways to do this? What knowledge from Inuit can be used in this setting? What practices meet the expectations of an academic program while still honouring Inuit Qaujimajatuqangit? Can Inuktitut be used effectively in this context? Why is Inuktitut treated like it cannot meet the caliber of English in post-secondary education? What science can we learn from Inuit culture? What do I need to do differently?

I was faced with support and criticism. My colleagues understood my situation and were supportive throughout my work. Criticism was usually based on two factors: my lack of experience as an elementary teacher, and the fact that I am a young Inuk woman. These were things I expected but did not plan for. The more I was faced with these challenges, the more comfortable I was facing them but still unsettled by them. During those years I travelled across Nunavut to teach in smaller communities. Each time I visited a community the people, the place, the context was unique. I knew the importance of being inclusive of their identities but I was unsure of how to best honour it within the curriculum. Looking to local colleagues and the students for support helped me get through these challenges. My determination to be inclusive led me to further focus my work on distance education to increase access to education. Teaching by distance had its own challenges like the inequity in adequate technological capacity in communities and finding ways to be inclusive of the community. Elders have always been an essential part of the curriculum but I would find myself questioning "how will I use what they taught in my assessments?" I found myself making standardized courses with measured space and time for 'cultural inclusion'. By cultural inclusion I am referring to the inclusion of Inuktitut, community culture, and elder knowledge. Yet, it did not feel like enough.

Cultural inclusion is intended to make up for the requirement to include Inuit Qaujimajatuqangit in our practice. We have guiding principles of Inuit Qaujimajatuqangit that we are expected to model in our work both inside and outside the classroom. This has led to the development of various activities that we refer to as IQ days. IQ days are usually filled with cultural activities that include food, games, harvesting, crafting, and storytelling. When we talk about how we are including IQ in our practice we often refer to language and local cultural activities. I found myself asking: is this it? Is this how we honour Inuit Qaujimajatuqangit in our work? Is there more to it? Can we do better at following the principles of Inuit

Qaujimajatuqangit? How can we use Inuktitut more? What can I do better in my practice to use Inuit Qaujimajatuqangit in a more meaningful way?

The Nunavut Teacher Education Program [NTEP] is intended to produce Inuit teachers to increase Inuit representation in schools. As the government works towards English-Inuktitut language of instruction throughout Kindergarten to grade twelve, NTEP is mandated to produce teachers that will eventually fulfill those roles as bilingual teachers. There is disparity in fulfilling this goal because to date Inuktitut teachers teach up to grade four as the primary language of instruction. Beyond those years, language of instruction is primarily done in English. Meanwhile, in a post-secondary program there are students from the transitional bilingual programs, students who do not speak Inuktitut, and mature students who speak Inuktitut as their first language but may not have finished high school. Although most of the students are Inuit, their needs are diverse. All of this coupled with meeting similar expectations as universities in southern Canada makes it very challenging to teach science without addressing language and culture issues. Based on my experience and the stories of teachers in teacher education, it is common for non-science major students to have memories of their science learning as something that started out as fun but that became difficult to complete or disengaging. I faced similar challenges throughout my own education so I can relate to those experiences.

Curricular expectations for science education are derived from the Common Framework for Science Learning Outcomes (Council of Ministers for Education, Canada, 1997). Science was often described as *Qablunaaningaaqtuq* that can be translated into Western or Southern knowledge because the understandings, skills, and values that were taught in science were often derived from Western notions of science and taught using Western pedagogy. Beyond the elementary years the learning activities often had predetermined outcomes that reinforce Western scientific ideas, and assessments were often print-based in the form of reports using the scientific

method or standardized tests, reinforcing known Western science. In contrast to daily journals, standardized science education in my own learning and teaching experience was not enough; I needed to search for something more fulfilling. Although I was unsure of what I was looking for, I knew it had something to do with my identity and culture, Inuit identity and culture. I strived to find answers to ways that I can improve my own practice teaching science education and do better at using Inuktitut in my own practice.

Throughout my teaching experience I have observed how challenging it is to plan science learning activities that are focused on Inuit ways of knowing using Inuktitut. I have also seen how little Inuit culture is used for science planning. One of the common planning tasks that teacher education students are tasked with is making unit plans that are culturally relevant. Without exemplars, models from experienced teachers, and exposure to culturally responsive teaching experience, making such plans can be daunting. Some of my students are already apprehensive about teaching science when they have not had positive science learning experiences or even exposure. This leaves me with some challenging tasks to create a learning environment where students can unpack their experiences and become confident science teachers.

It has been made explicit through mandates, policies, guidance documents and other government documents that Inuit Qaujimajatuqangit guides the work of the Nunavut government. Included within this network is the role of education to enculturate Inuit children into their Inuit culture using Inuit Qaujimajatuqangit holistically (NDE, 2007). This leaves teachers with the task of making explicit how they use Inuit Qaujimajatuqangit in their practice and within the content they teach. As I have observed throughout my career, this usually results in cultural activities such as land trips to go fishing or harvesting, elders' stories, or lessons that include cultural artifacts such as Iglu building or Qamutiik construction. IQ can be used in a

number of different ways when examining contexts where some form of traditional culture is involved. Less frequent among these are discussions of the wisdom of Inuit concerning the science of weather, ice, snow, and engineering of technology. The focus tends to be on historical knowledge rather than contemporaneity of IQ as something that is lived and acquired through experience. I recall a teacher candidate who critiqued the tendency of research to focus on IQ as something that is traditional when she read an article about using IQ when teaching science. The article she critiqued focused on content from IQ about Inuit culture that was traditional and possibly something that Inuit children today might struggle to associate with if they have not experienced being in an Iglu, wearing clothes made from skins, and using traditional technology. The labelling in research of what is IQ in science education from research sparked conversations from translating into measuring your "Inukness". Although most IQ research does not explicitly provide guidance on how to quantify Inuk identity, the lack of current content or lack of experience with one's heritage can leave a person doubting their identity as an Inuk, reinforcing ideas of less than. This results in a romanticized and fossilized expression of what it means to be an Inuk and what constitutes IQ. In my experience, students who speak Inuktitut or those who have more traditional Inuit families are confident about what IQ means in their planning, whereas students who may feel disconnected from their heritage are challenged to express it and even hesitate to use it because of feelings of inadequacy. Teachers in Qikiqtani elementary schools expressed similar sentiments of feeling inadequate when planning to teach about Inuit culture as expected in curriculum documents such as Inuuqatigiit (Lewthwaite et al., 2010). Additionally, as educators we have a responsibility to assert the first language of our students which is Inuktut; but a common perception I have observed is that science cannot be done in Inuktut because it is assumed that Inuktut lacks the comprehensibility needed for communicating scientific knowledge. My experience as a student interpreting my science projects for my mom

and as an instructor hearing about barriers to teaching science that is culturally relevant and in Inuktut, created tension. The optimism I had when I first started my career became unsettled by thoughts about IQ. I had feelings of doubt about what IQ means. I was left with more questions: are we actually using IQ in our practice? Is this IQ or is it something else? How are we supposed to use IQ? Are we appropriating IQ? As I experienced tensions about the meaning of IQ in the workplace and within communities, my understanding of IQ became more ambiguous and that led to inaction, and silence on my part as an educator. These questions propelled me to re-examine what I knew, how I teach, and the learning goals I had to continue my work.

1.2 Statement of Purpose

There is a lack of research in science education in a Nunavut context. This study aims to reconceptualize the elementary life science education curriculum to one that is founded upon Inuit Qaujimajatuqangit by learning from teachers' stories of experience and elders' wisdom. As McGregor (2013) stated, the Inuit context does not always parallel the First Nations context where there has been more research done. Higgins (2013) also reminded us that Inuit ways of knowing science and Western ways of knowing science are not dichotomous, they are not mutually exclusive and research is needed to understand where Inuit knowledge resonates with other ways of knowing and where there is dissonance.

This research is positioned in the philosophy that scientific knowledge is not an epistemology independent of culture, such as western culture, but rather a component or discipline in all cultures, just as visual art, music, and language are components of culture. Inuit engagement in research is of paramount importance when discussing forces that influence Inuit communities and realizing goals (Gearhead & Shirly, 2012; Healy & Tagak Sr., 2014; ITK & NRI, 2006). Qualitative methods such as conducting interviews and engaging in focus groups

have been used in science and science education research in Nunavut (Gearheard & Shirley, 2007; Healy & Tagak Sr., 2014; Higgins, 2011; ITK & NRI, 2006; Lewthwaite et al., 2010; Lewthwaite & Renaud, 2009). School documents such as mission statements, legislation, curriculum guides, teaching and learning resources (NDE, 2014b) are all documents that will have to be explored to understand the theoretical underpinnings of science education in Nunavut. These public documents will also allow the researcher to understand what the goal(s) of science education is and what resources are available to implement those goals. Exploring both institutional narratives and teacher narratives is an opportunity to find resonance or dissonance between two forces that influence the delivered science curriculum.

Elementary education offers more flexibility in cross-curricular education because students begin to specialize in science courses in secondary school. Elementary education is also a foundational stage where students learn primary skills that contribute to their interest and success in secondary school science. Elementary science education that bears relevance and interest to the lives of students is a key pathway to further science education that can lead to science careers. Inuit culture is strongly rooted in a relationship with the environment (Healy & Tagak Sr., 2014; NDE, 2007; Wenzel, 2004). The significance of elementary education and the environment for both education and Inuit culture make them logical positions to start dialogue from when discussing science education that is rooted in Inuit culture. There are more Inuit teachers in the elementary school stream and almost no Inuit teachers of secondary school science so for practical reasons this makes the Elementary sector a favourable one to study.

The NDE (2007) has made explicit their intentions to reconceptualize education in Nunavut as education that is founded on Inuit Qaujimajatuqangit while preparing students to be fully functional in mainstream Canada. Curriculum guides have been reconceptualized into integrated strands (NDE, 2007). Science now falls under the Iqqaqqaukkaringniq strand that

integrates math and science curriculum (NDE, 2014b). The strand combines the Western and Northern Canadian Protocol [WNCP] (2006) Common Curriculum Framework for K-9 Mathematics and NWT ECE (2004) Science and Technology Curriculum. There is no indication of revised curricular expectations and outcomes from an Inuit Qaujimajatuqangit lens being instituted as revisions, and there is no indication of the integration being reflected as combined cross-curricular instructional time into themes. These are examples of curriculum development from the top down, institutional to instructional. There is no clear indication of how much teachers' experience in classrooms is informing reconceptualizations of curriculum. To date, science curricular revisions appear to be superficial in that there has been reordering and renaming of curriculum with new direction given to teach culturally relevant science education. Several teaching and learning resources are approved for classroom use as Inuit and Nunavut-specific material, but there is no indication of how teachers design curriculum to meet all these prescribed expectations while still meeting the goal of delivering student-centered education that aims to 'create an able human being' (NDE, 2007). Therefore, there are two primary messages: a) meet prescribed institutional expectations and outcomes so that students gain skills and knowledge to enter the Canadian workforce; and b) deliver culturally relevant education that is founded on Inuit Qaujimajatuqangit, including knowledge and values so that students have strong roots in their culture and sense of identity. These two messages are neither mutually exclusive nor inclusive. What is manifested in the Nunavut Inuit context is education that is straddling to meet expectations of a Canadian mainstream that are regarded as colonial and colonizing, and expectations of Inuit communities that are working towards self-determination through realization of a new educational reality that upholds Inuit epistemology, ontology, and axiology.

It is evident that there is a lack of research that involves stories of experience, particularly teachers' experience, and lack of research in science education in a Nunavut context. The experience of teachers through their stories may offer insights into how straddling educational goals manifests itself successfully in their classrooms. Pedagogy, knowledge, language, and processes that work through layers of student, teacher, school, community, and institutional curriculum can emerge out of teachers' stories.

1.3 Terminology

The list of definitions below is intended to clarify the meaning behind the terms used within the body of the text.

Inuit Qaujimajatuqangit:

> Inuit Qaujimajatuqangit embraces all aspects of traditional Inuit culture, including values, world-view, language, social organization, knowledge, life skills, perceptions and expectations. (Nunavut Social Development Council, 1999 as cited in NDE, 2007)).
>
> Inuit beliefs, laws, principles and values along with traditional knowledge, skills and attitudes are what the Government of Nunavut and Elders refer to as Inuit Qaujimajatuqangit. There are a number of papers, summaries of conferences and working sessions that give a much more thorough explanation of how Inuit Qaujimajatuqangit is understood. (NDE, 2007, p. 22)

Science: "knowledge about or study of the natural world based on facts learned through experiments and observation" (Merriam-Webster's Learner's Dictionary, 2016).

Education: this term is recognized as both method and process. Institutional or formal education refers to teaching and learning in an institutional setting such as a school. Informal education

refers to teaching and learning that is not institutionally imposed such as teaching and learning outside of school.

Eurocentric, Western, Southern: Eurocentric and western are used to refer to mainstream culture in Canada that has colonized Indigenous people (Berger, 2009; Higgins, 2013; Lewthwaite et al., 2010). For the purpose of this study, these two terms are interchangeable with 'Southern' that references Canada south of the sixtieth parallel (McGregor, 2011). This is a term often used in the north to refer to the institutional south.

Nunavummiut: people or citizens of Nunavut.

Inuit Nunangat: translates into Inuit lands. This term has emerged in literature to refer to places where Inuit are Indigenous such as the Canadian arctic.

Life science: the study of living things such as in the fields of biology, ecology, and botany.

1.4 Background

> *We owe it to the world, and especially to ourselves, to articulate who and what we were in the past, who and what we are today, and who and what we want to become in the future.*
>
> - Jaypeetee Arnakak *(Arnakak (2002), as cited in NDE, 2007)*

Prior to the introduction of schools, Inuit learned from their families and within their community in a continuous learning relationship that prepared them for an independent life. Families ensured that children learned the skills, knowledge, and values needed to survive (NDE, 2007). This relationship between families, and the environment was initially disrupted by the development of residential schools. Initially, residential schools were run by missionaries both out of self-interest to indoctrinate and government mandates to assimilate through education (Legacy of Hope Foundation, n.d.; Pauktuutit Inuit Women of Canada, 2019). Kusugak (2012) provides a glimpse into the life of being an Inuk child with your family on the land one day, then uprooted to attend residential school. Additionally, the women who authored Inuit experiences in education in the book Sivumut (2015) share the impacts that colonization has had on Inuit through education. Significant discord has been perpetuated through schools where home lives as Inuit often do not mirror the expectations of school life. Kuniliusie (2015) shares how life in school did not reflect her language and culture. Two notable changes were a change in diet where Inuit food became distasteful and the use of spoken English over Inuktitut (Kuniliusie, 2015). Arguably, these changes are still occurring as I can relate to this experience. Into high school, and with a steady job, English became the primary language of instruction and my diet had significantly shifted to processed foods. Today, many Inuit rely on store-bought foods and are challenged to access country food[7]. Country food is significant because you have to know the land and have the skills necessary to harvest food. Understanding the biology, ecology, geography, and meteorology are essential to being able to do something as basic as harvesting berries or catching a fish.

[7] Country food: Country food is a term that describes traditional Inuit food, including game meats, migratory birds, fish and foraged foods. (The Canadian Encyclopedia, 2025).

As the momentum for emancipatory education grew and transitioned into multicultural education, Inuit were engaged in regaining control of their children's lives. McGregor (2011) explains how control of education transitioned from federal to territorial with an emphasis on Indigenous language and identity and multiculturalism. The year 1982 was a significant year for Inuit both locally and nationally. In 1982, local education authorities were established to give local control of education to communities that included control over language of instruction models and curriculum reform (McGregor, 2011); at the same time Peter Ittinuar had the federal government agree to the creation of Nunavut during discussions in parliament (Heaps, 1991). Eventually, through land claim negotiations, Nunavut was created as a new territory to represent Inuit who represent the majority population. Similar to provincial control, the territory was now tasked with the responsibility of education for Nunavummiut[8]. The significance of this contrast is that education was given back to Inuit locally in the 1980's then it quickly transitioned into systemic control of education through the creation of Nunavut in 1999. Nunavummiut were tasked with creating visions, missions, and defining goals for education that reflect who Inuit are, where we came from, and where we want to go. The earliest political changes are reflected in Pinasuaqtavut: the Bathurst Mandate (GN, 2000) and Pinasuqtavut 2004-2009 (GN, 2004). The goal has been to rewrite curriculum with new expectations "within the context of Inuit Qaujimajatuqangit" (p. 14, NDE, 2007), where students are bilingual in Inuktitut and English, and capable of pursuing post-secondary studies to meet the Nunavut workforce requirements (NDE, 2007). Inuit Qaujimajatuqangit are the "beliefs, laws, principles, values, skills, knowledge and attitudes" (NDE, 2007, p. 20) of Inuit; historically referred to as Inuit traditional knowledge.

[8] Nunavummiut are residents of Nunavut, this does not limit identification to Inuit, similar to saying Albertan in Alberta

Karetak, Tester, and Tagalik (eds., 2017) define it as "a worldview shared with differences in detail, by Inuit across the circumpolar world" (p. 3). While Inuit Qaujimajatuqangit is knowledge that is shaped by lessons from the past, it is applied to the present in ways that are relevant and meaningful. It binds the past with the present with the intention of providing people with what they need to live a good life, with harmony in their relationships to people and nature. The goal of applying Inuit Qaujimajatuqangit to the development and education of children is to prepare them to become capable and wise (NDE, 2007).

Within Nunavut, many lifestyles require science education. A hunter who has wisdom of the land and life on it is capable of providing for their family and community. Additionally, Inuit wisdom of the land provides contextual knowledge to scientific careers. We have seen this in work from the Nunavut Wildlife Management Boards regulations and management of wildlife, and the project certificates and decisions from the Nunavut Impact Review Board, to name a few. This chapter weaves a Nunavut context of science education into educational theories that reflect the realities of science education in Nunavut.

1.4.1 Significance of Science Education in Nunavut

Science education can be both liberating and marginalizing. Students with cultural epistemologies, axiologies, and ontologies from Indigenous communities are often alienated by Western science curricular expectations (Aikenhead & Elliott, 2010; Aikenhead & Mitchell, 2011; Aikenhead et al., 2014; Battiste, 2013; Friesen & Ezeife, 2013; Pedretti, Bellomo, & Jagger, 2015). However, science education that marginalizes Indigenous students' identities and culture in schools can be decolonized and Indigenized by designing science education that is more relevant to students' lives to foster interest in learning science (Aikenhead & Mitchell 2011, Aikenhead et al., 2014; Lewthwaite & Renaud, 2009; Lewthwaite et al., 2010; McMillan,

2013). Inuit across Inuit Nunangat[9] in collaboration with others have been decolonizing education particularly within the elementary stream (Lewthwaite & McMillan, 2010; Lewthwaite, Renaud, McMillan, Hainnu & MacDonald, 2010; McMillan, 2013; H. McGregor, 2015). However, Berger (2009), Higgins (2013), and McMillan (2013) argue that education in Nunavut is still dominated by the Western curriculum. Research done to date shows that the science education in Nunavut is varied and dynamic between Western and Indigenous curricula.

Among the Western curricular influences is the Common Framework of Science Learning Outcomes, K to 12: Pan-Canadian Protocol for Collaboration on School Curriculum for use by curriculum developers (1997) that identifies expected learning outcomes in the K-6 Science and Technology Curriculum Guide (Northwest Territories Education, Culture and Employment [NWT ECE], 2004) that is used in Nunavut elementary science education. Inuuqatigiit (NWT ECE, 1996) is the curriculum guide from the Inuit perspective that is used to contextualize the curriculum into themes and learning outcomes that are relevant to Inuit ways of knowing, doing, and being. Inuuqatigiit was published prior to the creation of Nunavut and is not subject-specific but theme-specific to allow for cross-curricular planning that fosters holistic learning (NWT ECE, 1996). Important among these guides for institutional curriculum are the foundation documents, Inuit Qaujimajatuqangit: Education Framework for Nunavut Curriculum (2007), Ilitaunnikuliriniq: Foundation for Dynamic Assessment as Learning in Nunavut Schools (2008), and Inuglugijaittuq: Foundation for Inclusive Education in Nunavut Schools (2008) that were developed by the Nunavut Department of Education. These resources constitute some of the prescribed and planned curricular resources in elementary science education.

[9] Inuit Nunangat is a term used to refer to Inuit regions in Canada collectively

The transition of control of education from the federal government to Inuit within their own self-government puts Inuit education in the spotlight. Inuit education becomes an opportunity for learning and innovation for Indigenous and decolonizing education. The socio-political control through new legislation, new acts, policy frameworks, and curricular expectations make it sound like there is continuous momentum for changing in Inuit education. Curriculum reform in Nunavut has a growing audience because it is transforming into a model of education designed by Inuit; it is rare in the case of Canada to have Indigenous people take over this much socio-political control of their education with full financial support. Additionally, "the curriculum is also understood as a political and social agreement that reflects a society's common vision while taking into account local, national and global needs and expectations." (Stabback, 2016, p. 6). Indigenous educational reform of this extent begs the question, what does Indigenous education look like in a modern context within a first world country? Although the case of Nunavut is one of the latest forms of land claim agreements, long after other treaties in Canada, it is one of first Indigenous jurisdictions to have this extent of power and control over educational reform that is comparable to fully funded provincial control. What happens with Inuit education in Nunavut territorially will demonstrate the initial stages of what is possible within a fully funded Indigenous education system. Conversely, First Nations reserves in Canada do not all receive funding in the same manner. Reserves that opt out from using a provincially mandated curriculum are forced to work with limited funding; barely enough to build facilities and pay wages. Aikenhead et al. (2014) refer to this as neo-colonialism. Band schools are undermined by receiving less per capita funding than provincial schools, as well as being expected to adopt a curriculum with Euro-Canadian content to replace Indigenous knowledge, resulting in the erosion of Indigenous student identity (Aikenhead et al., 2014). I had the opportunity to visit a reserve in July 2015 and we discussed the realities that this reserve faced

with education. Since the band opted out from using the provincial curriculum, they were forced to limit on-reserve education to grade three. The band receives approximately $3000 per student from the federal government to operate the local school. After grade three, children are expected to continue their education in the nearest county school that is operated by the province. However, the band must pay approximately $10,000 per student from the reservation to the province to attend the provincial school. More recently, I had the opportunity to visit the Yukon. I learned that the outlying communities around Whitehorse have schools that operate up to grade eight. Grades nine to twelve are offered in the city of Whitehorse where children are sent to live in student residences. A student peer-mentorship program was created to deal with some of the issues of leaving home and the identity issues that come with leaving home before maturity (Stasyszyn, 2011). As I heard these stories I was unsettled mentally and emotionally. My initial thought about these stories was that they are modern forms of residential school. I cannot speak for the people that attend these models of school but I can speak for the significance that learning at home played in my own education and identity. The continuous use of Inuktitut, the relationship to the land through hunting and harvesting, the people that formed my relationships all played a significant role in my aspirations to pursue a science career. These relationships also guided the direction I would eventually take with my career. I had the opportunity to learn science until grade twelve in my home community, to learn science from the land that I consider home. Learning science at home made the learning opportunity more meaningful, more relevant, more engaging, and motivating. A common denominator between First Nations education and Inuit education in Nunavut is that the secondary curriculum is derived from provincial curriculum.

In Nunavut, students take courses designed by Alberta Education to have their grade twelve diploma recognized nationally (NDE, 2015). Science education makes up a minimum of

ten credits of the one hundred credit requirement to receive a grade twelve diploma (NDE, 2015). The curricular outcomes are predetermined and require standardized testing in grade twelve. This has been the case for education in Nunavut since the days when education was administered by the Northwest Territories. Based on my experience as a student, everything is standardized from the lessons to the assignments and assessments where 50% of your grade is based on teacher assigned work and 50% from the results of departmental exams. There is very little room for variance in the course expectations. The departmental exams were made up of two parts, 50% based on multiple-choice questions and 50% based on short- and long-answer questions. Stabback (2016) describes this model of education where "the textbook became a *de facto* syllabus" (p. 19). This experience reinforced my mother's statement about knowledge from somewhere else. There is very little to no space to take ownership of your learning when there is no space to infuse your knowledge and identity. However, the secondary curriculum has changed in some respects such as with the introduction of the Nunavut Cultural Studies component that is equivalent to the Career and Technology Studies component and the northern based science courses developed by the NWT Government (NDE, 2015; 2016). The themes of the Nunavut Cultural Studies allow excellent opportunities for culture-based science education. Still, science education in Nunavut continues to be dominated by imported curricular expectations that meet national expectations for science education (Higgins, 2013; Lewthwaite et al., 2010).

The tension between having control to reform education to be social justice oriented and the desire to fit in with the norm of a national curriculum has to be examined because "despite gaining greater control in education, [Indigenous] students still face challenges in their goal to achieve parity with [non-Indigenous] students" (UNESCO, 1997 as cited in Friesen & Ezeife, 2013, p.65). Common indicators for Indigenous student success involve student performance against expected outcomes through standardized tests (Friesen and Ezeife, 2013). However, the

focus should shift to measuring the "cultural validity" of assessments used in science classrooms (Friesen and Ezeife, 2013). We need to shift our focus from problematizing student identity to problematizing curriculum and assessment overall. The experience of teachers in the classroom and capturing their experience through their stories is an opportunity to look at the science curriculum more holistically. Using standard measurements such as student performance based on summative assessments and gauging relevance to prescribe outcomes and pedagogy, give us a two-dimensional view of what is happening in the classroom. We have the dimension that is captured as print in the form of assessment, and the dimension of imposed expectations from prescribed outcomes. Through stories we can bring depth and dimension to our understanding of what science education is by adding layers of dialogue, emotional expression, relationship dynamics, by exposing beliefs, biases, and meaning through the agency of the participants and what they want us to think and know from their stories.

1.4.2 Nunavut Curriculum Resources

There is some contrast between the elementary and secondary curriculum. The theoretical framework for subjects taught in school has been changed in Nunavut, mostly at the discourse level. Subjects have been replaced with strands; strands are now made up of combined subjects (NDE, 2016). However, the extent to which schools' timetable with strands rather than subjects is not clear; many schools still use subjects rather than strands. Science as a subject now fits under the Iqqakkaukkaringniq strand with Math (NDE, 2007). Iqqaqqaukkaringniq: "The curriculum strand for math, science, technology, and innovation" (NDE, 2008).

Iqqaqqaukaringniq

> …is a study of being aware of the universe; not just reacting to a situation, but thinking about a response to a situation. It involves exploration, analysis, and meaning making based

> on how Inuit approach problems, how they react to a situation, reflect upon the problem and then act to improve their life situation (NDE, 2002, p.3).

The strand is defined as

> an integrated core curriculum that focuses on ways in which we describe and improve our world. Concepts in mathematics, analytical and critical thinking, solution-seeking, innovation, technology and practical arts will be explored (NDE, 2023, p. 11).

Louise in McMillan's (2013) study shares a list of activities under different strands related to her theme plans for "Return of the Sun". The process they used in McMillan's (2013) study resulted in the development of a revised version of Louise's theme plan called Light (CRYSTAL, 2008a).

Within the math curriculum, there has been territory-wide standardization (NDE, 2016). Schools use published math-supporting resources designed around curricular expectations from the Western and Northern Canadian Protocol for K-9 Mathematics [WNCP] (2006). One of the intentions behind standardizing the math curriculum is to provide quality assurance for what is taught in Nunavut classrooms (NDE, 2014a; NDE, 2014c). A standardized math curriculum can be an easier sell to the public with the allure of "standardized" that can focus on problematizing students and their learning rather than the curriculum and instruction. Environmental science has been placed under the Nunavusiutit strand (NDE, 2016). Inuuqatigiit (NWT ECE, 1996) is included in the Nunavusiutit strand but not the Iqqakkaukaringniq strand for approved resources (NDE, 2016). The NDE (2007) describes the four strands as integrated curriculum that "transcend subject-specific content areas" (p. 47). The NDE (2007) lists the principles of each

strand. Drawing from the Nunavut Approved Teaching and Learning Resources 2016-2017 (NDE, 2016), the topics and subjects for each strand are outlined as:

Table 1: Nunavut Curriculum Strands

Strand	Uqausiliriniq	Iqqaqqaukkaringniq	Nunavusiutit	Aulajaaqtut
Subject Areas	Language Arts Art Education	Mathematics Science	Social Studies (Inuuqatigiit) Geography	Health Physical Education Movement
Topics	Communication Language Creative & Artistic Expression Reflective & Critical Thinking	Mathematics Innovation & Technology Analytical & Critical Thinking Solution-Seeking	Heritage and Culture History Geography Environmental Science Civics & Economics	Wellness & Safety Physical, Social, Emotional & Cultural Wellness Goal Setting Volunteerism Survival

The elementary curricular expectations and teaching resources have less restrictions. Teachers are able to use a variety of resources to teach elementary science. The Inuuqatigiit (NWT ECE, 1996) planning guide is also a significant piece of planning material. The themes in Inuuqatigiit (NWT ECE, 1996) have many commonalities with the life science theme in the elementary science planning guide. The Inuuqatigiit Curriculum is divided into two sections, Relationships to People and Relationships to the Environment (NWT ECE, 1996). The section of Relationship to People in the Inuuqatigiit Curriculum is significant for life science learning as it initially outlines Inuit Qaujimajatuqangit about the environment and life science. Projects aimed at creating culturally relevant material include environmental glossaries published as themes, CRYSTAL Science units (2008a, 2008b), and Nunavut Bilingual Education Society's Classifying Vertebrates (2006) and Science Ideas for Nunavut Classrooms: Amphibians and Reptiles (2005) (NDE, 2016). Among these resources includes the unit plan resources created by the Baffin Divisional Board of Education [BDBE] in the 1990's (McGregor, 2010). The BDBE

created modifiable units with lesson plans and worksheets in Inuktitut for a variety of themes (McGregor, 2010). It is unclear how many teachers across the territory have access to these or are aware of their existence, therefore there is no clear picture as to how much these modifiable Inuktitut teaching resources are used. Also, the modifiable science units in Inuktitut are not referenced in the list of approved teaching resources (NDE, 2016).

By the start of grade seven, students are taught using textbooks exclusively designed for science grades seven to nine. The NDE (2016) has made adaptations to this middle years' curriculum by developing a Nunavut Adaptations of Science 7-8-9 Program of Studies with the latest publication released in 2014 (NDE, 2016). Other resources have also been created adapting science learning material to a Nunavut context such as: Diversity (7-8-9) (2006), and Nuulluni Qaujisarniq "Learning science away from the classroom" (NDE, 2016).

In grades ten to twelve, students are streamed into different science courses. General science courses that have been adapted to a northern context include Experiential Science courses designed and developed in the NWT with the themes Terrestrial Systems, Marine Systems, and Freshwater Systems (NDE, 2016). For students in the academic stream, science courses are accessed from Alberta Education through their distance education network (NDE 2015, 2016).

1.4.3 Themes in Literature

Themes that have emerged from science education research are generally postcolonial theories that include two-eyed seeing, culturally responsive pedagogy, parallelistic approaches, experiential learning, Indigenization, decolonization, Traditional Ecological Knowledge, place-based pedagogy, and land-based education. Postcolonial theories do not imply that colonization has ended but rather colonization is recognized and confronted in order to challenge and disrupt

colonial power, replacing it with more collaborative power relationships (Aikenhead & Michell, 2011; Aikenhead et al., 2014). Many postcolonial theories are responses to neo-colonial realities that Indigenous communities live. Aikenhead et al. (2014) define neo-colonialism as an action that "uses economic, legal, linguistic, and cultural influences to control or oppress people." (p. 5). Two-eyed seeing refers to a student's ability to comprehend knowledge using two epistemologies, one Western and one Indigenous (Aikenhead & Michell, 2011; Bartlett, Marshall, & Marshall, 2009). Lewthwaite et al. (2010) reconceptualized the concept of two-eyed seeing with Inuit teachers as *Piqusiit tamainnik katissugit* – combining the views of both worlds. Traditional Ecological Knowledge [TEK] refers to Indigenous knowledge of the land and in the land both in a historical and present context (Kimmerer, 2013; Longboat et al., 2013; Wenzel, 2004). Indigenizing education is about "recentring indigenous [SIC] world views as a starting point for that transformation and it's a process of institutional decolonization" (Pete as cited by MacDonald, April 6, 2016). Friesen and Ezeife (2013) describe this form of science education as a reverse action where Western science is integrated in Indigenous science therefore privileging Indigenous knowledge over Western science. Culturally responsive pedagogy is focused on the selection of teaching practices and content that is culturally representative of the students in the classroom (Erikson and Mohatt, 1982). Culturally responsive pedagogy includes experiential learning emphasizes the value of learning about one's culture through experience. Dewey (1938) is often cited as the educator who conceptualized a theory of experiential learning. However, experiential learning is practice that most cultures practiced prior to the development of state-run schools. Contextually, these concepts can be used to develop place-based pedagogies. Place-based pedagogy emphasizes situated learning where the local context become the unique characteristics of general outcomes, or connecting the local with the global (Smith, 2002).

1.4.4 Significance

Mitchell (2018) reminds us of the RCAP[10] recommendation to strengthen culture-based education in order to "counteract the impacts of colonization." (p. 10). Groups including Indigenous people are underrepresented in science careers as a result of a lack of engagement and cultural relevance in science education (UNESCO Education Sector, 2010). As a result, "we need to take steps to explore reasons for such inequality and move to remove barriers to participation." (UNESCO Education Sector, 2010, p. 13). Indigenous people in Canada represent less than 2% of the labour force in STEM-based occupations (Conference Board of Canada, n.d.). Nunavut as a new territory has a large imported workforce; based on the February 2019 Labour Force update only 44.3% of the employable Inuit population were employed in the workforce compared to 90.2% of non-Inuit employed (Nunavut Bureau of Statistics, 2019). There are many careers in health, environment, industry, and research that are largely filled by non-Inuit who have post-secondary credentials, often obtained in the south. Based on my experience, Inuit are tasked with educating the incoming population about the context in which we live to better prepare the labour force to meet the needs of Nunavummiut, but there is minimal reciprocity in preparing Inuit for these professional careers in science as these forms of opportunities often rely on southern support that can require relocation and dislocation from one's community to receive equivalent qualifications. The lack of access to science education to meet the standards of science careers within Nunavut alone is a significant indicator that we need

[10] Royal Commission on Aboriginal Peoples "was mandated to investigate and propose solutions to the challenges affecting the relationship between Aboriginal peoples (First Nations, Inuit, Métis Nation), the Canadian government and Canadian society as a whole" (Government of Canada, 2021)

to do better at providing accessible science education for Inuit. Also, the science education we deliver needs to be contextualized for life in Nunavut in order to maximize its utility for science careers in Nunavut. Hence the significance of Indigenous knowledge in science education.

Indigenous knowledge can be understood as the local knowledge of Indigenous people within a place. Indigeneity is situated in a people-land relationship that can be defined as:

> Local and indigenous knowledge, as defined by UNESCO's programme on Local and Indigenous Knowledge Systems (LINKS), refers to "understandings, skills and philosophies developed by societies with long histories of interaction with their natural surroundings." For rural and indigenous peoples, such knowledge allows them to make decisions about fundamental aspects of everyday life (UNESCO 2011a). Local and indigenous knowledge is synonymous with terms such as traditional ecological knowledge (TEK), indigenous knowledge (IK), local knowledge, and rural peoples' and/or farmers' knowledge. As is clear from these synonyms, local and indigenous knowledge is not necessary [SIC] restricted to knowledge owned by people officially recognized, or consider themselves, as Indigenous People. Rather than associating knowledge with a group of people, it is useful to consider the characteristics of local and indigenous knowledge, which typically originates and maintained within a community; disseminated orally from generation to generation; owned collectively; develops and changes over generations; embedded in a community's way of life. Local and Indigenous knowledge takes diverse forms, such as stories, songs, folklore, proverbs, cultural values, beliefs, rituals, customary laws, language, and agricultural practices.
>
> (Hiwasaki, L., 2011, p.40)

Within the context of Inuit Indigeneity, we refer to Inuit Indigenous knowledge as Inuit Qaujimajatuqangit. In the Inuit context, Indigenous knowledge or traditional knowledge is called Inuit Qaujimajatuqangit (Healy & Tagak Sr., 2014; Higgins, 2013; Kublu et al., 1999; Lewthwaite et al., 2010; McGregor, 2011,2013; McMillan, 2013; NDE, 2007; Tester & Irniq, 2008; Wenzel, 2004). It should be noted that the words 'traditional' and 'Qaujimajatuqangit' are not intended to imply that Inuit knowledge from the past and of the past is only regarded as Inuit Qaujimajatuqangit but also includes current knowledge, current experiences that have informed the present and rooted it in past experiences and knowledge (Kublu et al., 1999). Inuit knowledge

of science is positioned in an epistemology of Inuit Qaujimajatuqangit (Higgins, 2013). Battiste (2013) describes it as recognition of life and a world in "constant flux" (p. 122).

Science education is often the discipline that alienates many students whose epistemologies do not correlate with Western scientific interpretations and can create ethnic barriers of access to science education (Aikenhead & Michell, 2011). Kimmerer (2013) argues that Indigenous students feel alienated in science learning "because they experience it as wither irrelevant or antithetical to cultural values." (p. 52). It is not the science itself that is alienating but the scientific worldview that is imposed that is alienating (Kimmerer, 2013). In Nunavut few Inuit enter the work force to work in science careers. According to the Government of Nunavut's (2016) March 2016 Employment Statistics, Inuit make up 50% of the workforce but their representation in professional fields that require certification in scientific disciplines is well below that, for example only 6% in Health Sciences. Although correlation studies have not been done to determine why, it is common among Indigenous students to avoid and abandon science careers due to a lack of science education triggered by alienation and lack of relevance (Aikenhead & Michell, 2011; Pedretti, Bellomo, & Jagger, 2015).

Science education in Nunavut faces two significant problems. Firstly, the small number of students gaining an education in science limits access to science careers and the ability for Inuit to become skilled professionals in science careers within Nunavut. Secondly, the lack of Inuit Qaujimajatuqangit in science education fosters a perceived lack of relevance and thus alienation within science education, further exacerbating the struggles to meet curricular expectations within schools, while trying to maintain a strong sense of Inuit identity in culture. Inuit identity and culture are significant to the struggle to personal and professional growth because dilemmas are created where schools as institutions are constructed within a Western paradigm, with minimal infusion of Indigenous knowledge. The challenge of transforming

schools from an Indigenous paradigm becomes the focus of problematizing the system rather than the student. Within the school system, there are many aspects of schools that we can look at from the curricular expectations, language of instruction, pedagogy, and assessment to name a few. However, if we look at the narratives of people who interact within this system, we can examine how these aspects are expressed through human interactions in the form of relationships, the social construction of schools.

2 Literature Review

Inuit language and culture tends to set little value on generalizations. Not the movement from the specific to the general, but, inversely, the movement from the general to the specific is what is important. One should be precise in statements, specifying time, place, subject and object. General statements are viewed as vague and confusing, whereas specific statements are seen as providing much more interesting information. In Inuit society, we are dealing with a completely different tradition of knowledge. All knowledge is social by nature and the idea of objectified true knowledge holds little attraction or fascination. Elders have always been held in high respect in Inuit society. Their knowledge and experience was supposed to guide the younger generations. This knowledge was highly personal and rooted in practice. It would be a mistake to assume that we are dealing with a body of objectified knowledge about which all elders agreed. Each elder had his own knowledge and experience and was prepared to acknowledge the value of different opinions and experiences related by others.

(Kublu, Laugrand, & Oosten, 1999, p. 9)

The circumstances of my life experiences are placed in a time when Inuit were becoming more involved in educational reform and affirming their rights to land through the Nunavut Agreement[11]. This leads me to conceptualize a framework that is related to my experiences thus far. An Inuit worldview that I have come to understand is often referred to as Inuit Qaujimajatuqangit. Inuit Qaujimajatuqangit is a contemporary term that encompasses many things about Inuit epistemology, ontology, axiology and methodology. It is also the subject of my research because this research was motivated by my bewildered thoughts about how to put Inuit Qaujimajatuqangit into practice in science education. Inuit Qaujimajatuqangit felt

[11] The Nunavut Agreement, formerly called the Nunavut Land Claims Agreement is the treaty between the Inuit of the Nunavut Settlement Area the Queen in the right of Canada that gives Inuit political jurisdiction over what we call Nunavut, as well as land entitlements over parcels of land referred to as Inuit Owned Lands.

like the essence that grounded my life, and the source of my conflict. These tensions led me to pursue graduate studies.

During graduate studies, I engaged in new relationships with new people, new ideas, and new understandings. These transformations in my way of knowing and being were sometimes entirely new, and sometimes new light and new angles on past experiences. The things I brought with me into this learning experience and the new things I encountered during this learning experience form the theoretical framework I used to carry out my research. First, I conceptualize a paradigm of Inuit Qaujimajatuqangit by contextualizing decolonizing and Indigenizing frameworks from postcolonial theories. The experiences of other Inuit and my own ground this theoretical framework and also situate myself for reflexive research.

Prior to field work, I needed a research question that would encompass the themes that were at the root of so many of my questions; questions about what Inuit Qaujimajatuqangit is, how we use it, how we use Inuktut, how these are used in science education, and how they contribute to Inuit identity in a contemporary context. Initial reviews of literature led me to critical and Indigenous theories about Indigenous cultures, science and environmental education, pedagogical approaches, and identity. These theoretical concepts relate to my research in preparation for doing field work. I use them again to deconstruct meaning from stories, and reconceptualize how elementary life science education can be taught using Inuit Qaujimajatuqangit. Critical and Indigenous theories offer language that I use to explain shared meaning from the stories compiled during this research. These theories are conceptualized into a metaphor of an Iglu. An Iglu is used metaphorically in the NDE (2007)

curricular framework, however I use it in the context of this study to represent the theoretical foundation that this research is based on and processed through.

2.1 Theoretical Framework

Initially, this story is situated in a colonized context where Inuit were colonized. Cote-Meek (2014) articulates a colonized context for Indigenous people as ongoing, and violent where the colonizer engages in othering and ownership of colonies, usually land. The other is treated as a problem, a threat that requires domination to protect the power of the colony (Cote-Meek, 2014). Stereotypes are normalized that in turn problematize the other rather than the system (Cote-Meek, 2014). We can see this perpetuated in recent student experiences such as this one from an Iqaluit High School student: “Alone and in school, they do not address that it is OK to be Inuk. Inuit are constantly treated lesser than their southern peers. These southern peers develop ideas and preconceived notions of Inuit being less human, less intelligent, less capable, and are ‘ghetto,’ and are told they will not get anywhere in life.” (Nunatsiq News, January 16, 2019). Berger (2007) reminds us of the context of schools as being colonial here: “The assimilation of Inuit students continues because the schools remain dominated by southern Canadian curriculum, resources, and teaching methods, and because the norms and values of Qallunaat culture are embodied in both the structure of Western schooling and the ways of being of the Qallunaat teachers, who still comprise the majority of teachers in Nunavut.” (p. 2). The power dynamic is hegemonic and lies within the colonial regime of a Canadian education system.

Contrary to the colonial context that schools are currently operating in within Nunavut, acts of resistance and reform are taking place to decolonize education. Decolonization is a counter-hegemonic process that aims to counteract colonial processes and promote self-

determination (Battiste, 2013; Cote-Meek, 2014). Battiste (2013) defines decolonization as "not a singular or total theory, but multiple theories, strategies, and struggles" that involves "reframing education and knowledge to the context of people's lives" (p. 107). Smith (2012) discusses four directions and four tides in an Indigenous research agenda. These directions represent processes as decolonization, transformation, mobilization, and healing (Smith, 2012). C. McGregor (2015) discusses the decolonization of Nunavut education through a process of curriculum reform.

Decolonizing education in Nunavut has involved re-centering educational policies and mandates to assert an Inuit worldview of Inuit Qaujimajatuqangit. Smith (2012) refers to "reframing" as the act of taking control of the focus or frame of a lens on Indigenous issues; reframing is about "retaining the strength of a vision and the participation of a whole community" (Smith, 2012, p. 155). The vision of this project is to contribute to the reframing of science education in Nunavut where Inuit are taking control of their education at a time of rapid socio-political transformation. "Restoring is a project which is conceived as a holistic approach to problem solving." (Smith, 2012, p. 156). The goal is to restore Inuit knowledge through elementary science education in the form of language, relationships, cycles, and technology because, "It involves the returning of lands, rivers, and mountains to their Indigenous owners. It involves the repatriation of artefacts, remains, and other cultural materials stolen or removed" (Smith, 2012, p. 156). Battiste (2013) describes the decolonizing process as a counter-current; as if you are paddling against a current to counteract its force, in this case, power relationships that are maintained by the "keeper current" (p. 107). Constructs of power are deconstructed and reconstructed to represent more social and equitable constructs like curriculum that is based on the ways of knowing of the people who are learning it.

As the power constructs are being deconstructed, there is another process of Indigenization taking place. Castagno & Brayboy (2008) define Indigenous people as "those who have inhabited lands before colonization or annexation; have maintained distinct, nuanced cultural and social organizing principles" (H. McGregor, 2015, p. 11). Indigenizing education is about "recentring indigenous world views as a starting point for that transformation and it's a process of institutional decolonization" (Pete as cited by MacDonald, April 6, 2016). Battiste (2013) describes how Indigenization is not hegemonic as it supports multiplicity by recognizing the Indigenous as diverse, dictated by the unique relationships between people in land, which are diverse in and of themselves. Indigenous epistemology of science operates from a belief that both the world and reality are in constant flux (Battiste, 2013). Longboat, Kulnieks, and Young (2013) discuss the need to redirect environmental education that includes science from learning about nature to learning in nature. Indigenous people do science as a way of life (Battiste, 2013; Kawagley, 1995; Kimmerer, 2013). Higgins (2011) posits that Inuit knowledge of science is not mutually exclusive with Western science. However, Frisen and Ezeife (2013) argue that "Western science needs to be one way to understand our world, but not the only way." (p. 69).

2.2 Inuit Qaujimajatuqangit as a Theoretical Framework

Inuit ways of living are closely connected to land and relationships with land (Healy & Tagak Sr., 2014; Wenzel, 2004). Therefore, the goal of this study is to put Inuit Qaujimajatuqangit at the center of the research and focus on teachers' stories of teaching life sciences and wisdom of elders in hopes of reconceptualizing life science education for elementary students in Nunavut.

Inuit Qaujimajatuqangit is "all aspects of traditional Inuit culture, including values, worldview, language, social organization, knowledge, life skills, perceptions and expectations" (NSDC as cited in NDE, 2007, p. 20). It is the knowledge that Inuit have acquired over many generations in relationship to their environment and their social organizations within the family and community. The laws, values, and beliefs have been shaped by our relationship with the land, diverse, complex, and enduring. The elders in "Inuit Qaujimajatuqangit – what Inuit have always known to be true" (2017) share stories of cultural practices with how to teach children to interact with the land, how to be prepared through the seasons, how to interact socially, how to address conflict, and use stories to illustrate how the laws, values, and beliefs were practiced prior to colonization. Their overarching message that Inuit Qaujimajatuqangit has sustained us through many challenges and must continue to be practiced is captured in the intent of the Inuit Qaujimajatuqangit framework for education. The Inuit Qaujimajatuqangit framework for education aims to develop children to develop their isuma (mind or wisdom) to become inummariit[12]. Inuit Qaujimajatuqangit is also diverse as the environment that Inuit live in is diverse. While Inuit traditionally encompass the circumpolar arctic, their local environments vary, shaping their way of life and language. As an example, in Uqalurait (2004), the terms for months are illustrated for different Inuit regions in Nunavut. The different terms used for each calendar month are dictated by the conditions of the climate and patterns of the environment and animals during that month. While there are many similarities in Inuit language and practices throughout the arctic, they are still diverse and unique to each local context, shaping Inuit Qaujimajatuqangit that is relevant to Inuit where they live.

[12] Capable people who can act with wisdom (NDE, 2007)

To support the implementation of Inuit Qaujimajatuqangit as a framework for teaching and learning in schools, as well as curriculum, the NDE (2007) identified four elements shaped by Inuit Qaujimajatuqangit, the learning continuum stages, cross curriculuar competencies based on the IQ principles, integrated curriculum strands, and foundations of instruction (p. 36). Each of these components comes together as a block shaping each stage of learning, forming a circular structure like the base of an iglu, progressing into a towers spiral structure, an iglu through each stage of learning.

2.3 Themes in Literature around Indigenous Science Education

Based on a review of literature, research of science education in Nunavut is limited to Berger (2009); Higgins (2013); Lewthwaite et al. (2010); Lewthwaite and McMillan (2010); Lewthwaite and Renaud (2009); McMillan (2013). This set of literature does not include dissertations or current research projects that may be taking place in science education in Nunavut. The data for the literature mentioned above came out of four separate studies. It is evident that there is a lack of published research in Nunavut science education that contextualizes what science education founded on Inuit ways of knowing is, how science education underpinnings influence the way teachers teach science, and how teachers, as the primary person constructing curriculum in the classroom with students, negotiate and balance multiple ways of knowing science while trying to meet institutional expectations as set out in curriculum and institutional guides.

Science is defined as knowledge that articulates natural and physical phenomena through systematic processes such as experimentation. Therefore, this study posits that any culture that uses a methodological process to observe and experiment makes scientific observations. The Declaration on Science and the Uses of Scientific Knowledge as cited by Battiste (2013) states:

> Traditional societies many of them with strong cultural roots, have nurtured and refined systems of knowledge of their own, relating to such diverse domains as astronomy, meteorology, geology, ecology, botany, agriculture, physiology, and health. Such knowledge systems represent an enormous wealth. Not only do they harbor information as yet known to modern science, but they are also expressions of other ways of living in the world, other relationships between society and nature, and other approaches to the acquisition and construction of knowledge. Special action must be taken to conserve and cultivate this fragile and diverse world heritage, in the face of globalization and the growing dominance of a single view of the natural world as espoused by science. A closer linkage between science and other knowledge systems is expected to bring important advantages to both sides. (pp. 117-118)

The statement above signifies the need to engage in relationships that foster networks and communities that harbour Indigenous knowledge. The presumption that Indigenous knowledge is not scientific is evident in academic literature; scholars often make the distinction between Science and Indigenous knowledge, positioning science as an independent epistemology from cultures such as Indigenous or Western cultures. Arguably the language has to change to be Western and Indigenous science (Kawagley, 1995). Battiste (2013) asserts

> Like Indigenous knowledge, Eurocentric science draws from a complex array of experiences, ways of collecting, adopting, and sustaining old knowledge (oral and written), and gaining new knowledge (ceremony as experimentation). However, Eurocentric science, like Indigenous science, ultimately is socially constructed, meaning that it is contingent on variables involving language, values, thought, and reality. There is no neutral knowledge system. All knowledge about nature is socially constructed. (p. 119)

The subjectivity of science is embraced in the statement above. However, the subjectivity of science, especially Eurocentric science, is not challenged in science education (Aikenhead & Michell, 2011). Excluding other knowledge systems "subjects students to selective silence and collective ignorance." (Battiste, 2013, p. 121).

2.3.1 Decolonizing Science Education

Colonial education in the context of Indigenous peoples is usually referred to as Eurocentric (Aikenhead and Elliot, 2010; Battiste, 2013), Western (Cajete, 2000; Kawagley, 1995; Lewthwaite and McMillan, 2007), or neo-colonial (Aikenhead et al., 2014). Eurocentric science values objectivity by relying on measured data and information that is tested through models, and assumes that the facts and understandings that are derived from their interpretation is devoid of influence from the knowers and interpreters' reality that is "grounded in their particular social, cultural, and religious context" (Battiste, 2013, p. 123). This results in a discourse in science education where Eurocentric knowledge is privileged, canonized, and hegemonic. It displaces Indigenous knowledge and results in marginalizing educational experiences where what is and has been known by Indigenous peoples is silenced, discredited, and devalued.

Decolonizing science education counteracts the power, legitimacy and dominate voices in mainstream education that have been perpetuated through mandated curriculum that privileges particular forms of knowledge, processes, and ways of knowing derived from Eurocentric worldviews (Battiste, 2013). It aims to recognize and legitimize "educational pluralities, multiplicities, and diversities" (Battiste, 2013, p. 107). In order to begin decolonizing science education, an ethical space has to be established where multiple cultures can come together to respectfully share, critically consider, and recognize different ways of knowing and their

limitations that are shaped by their values and beliefs, and challenge the privileged content, processes, and values that are taught in science education. An ethical space allows for "dialogue of the assumptions, values, and interests each holds" (Battiste, 2013, p. 107). Through this form of ethical engagement, there is an opportunity to redistribute power; for Indigenous people, this allows for self-determination and sovereignty over their education. Ethical engagement also allows for new understandings, reshaping of values and beliefs, and the opportunity to challenge our own limitations of what we know and understand about the world that we live in and how to do it better, to live more equitably.

Engaging in a decolonizing process is necessary if Indigenous people are going to reconceptualize science education for Indigenous people because "a post-colonial framework cannot be constructed unless Indigenous people renew and reconstruct the principles underlying their own world views" (Battiste, 2013, p. 68).

2.3.2 Indigenous Knowledge in Science Education

Indigenous people "derive from place and their homeland, which are central to their notions of humanity and science, passed on in their own language and ceremony" (Battise, 2013, p. 69). If science education is going to be reconceptualized to integrate Indigenous knowledge, it requires Indigenous participation and leadership to actualize it. It is essential for this reconceptualization because integrating Indigenous knowledge into science education allows for more equity and social justice to address issues of under-representation, marginalization, and continuous oppression of Indigenous people in science-based careers and school science (Aikenhead & Michell, 2011). The integration of Indigenous knowledge can be articulated as Native science (Cajete, 2000). Cajete (2000) explains how the paradigm of Indigenous science is rooted in a relationship with the natural world, where knowledge is gained through lived

experience through participation with nature. This relationship with nature shapes Indigenous ontology, epistemology, methodology, and axiology. Indigenous science a "way of understanding the world… the natural processes of the world. In this perspective, every culture has science" (Cajete, 2000, p. 3). Native science is similar to what the subject of environmental science or ecology are as Western disciplines (Cajete, 2000). Native science is "the evolutionary interrelationship of Native people with nature" (p. 58) that asserts that the earth is alive, providing the energy necessary for life, shaping who Indigenous people are, how they live, their languages, their art, their technologies, their cultures within a cosmology that provides the "contextual foundation for philosophy" (Cajete, 2000, p. 58). This Indigenous paradigm is largely absent in mainstream education (Aikenhead & Michell, 2011; Battiste, 2013; Cajete, 2000; Kawagley, 1995).

In order to make space and time for Native science or Indigenous science in education, Indigenous knowledge has to be recognized as a legitimate form of knowledge that has its own validity and credibility to be included in learning science (Aikenhead & Michell, 2011; Battiste, 2013).

Aikenhead and Michell (2011) explain how Indigenous knowledge is not generalizable, but rather "place-based, monist, holistic, relational, mysterious, dynamic, systematically empirical, based on cyclical time, valid, rational, and spiritual" (p. 73). In order for school teachers to bring in Indigenous knowledge into science learning, they need to bridge these ways of knowing nature (Aikenhead & Michell, 2011).

Bridging Indigenous knowledge with school science learning creates space for Indigenous students to be included, and allows for a more equitable learning environment that allows for the transboundary sharing of knowledge, potentially advancing our individual

understanding of science. Kawagley (1995) explains how mandating a Western science education has proven to be unsuccessful for advancing Yupiaq student learning and creates an ontologically discontinuous learning experience because "the curricula, teaching methodologies, and often the teacher training are based on a worldview that does not always recognize the Native notion of an interdependent universe" (p. 104). Similar to the framework in Inuuqatigiit (NWT ECE, 1996), Kawagley (1995) explains that "students can first learn their language, learn about themselves, learn values of their society, and then begin to branch out to the rest of the world" (p. 101).

In the context of Inuit in Nunavut, Indigenous knowledge has been articulated as Inuit Qaujimajatuqangit (NDE, 2007). The philosophy behind Inuit Qaujimajatuqangit, coupled with the Inuuqatigiit curriculum (NWT ECE, 1996), provide a framework to start from when integrating Indigenous knowledge in science education within an Inuit context, particularly in relation to nature, or life science.

Aikenhead et al. (2014) show how bridging Western and Indigenous knowledge can be done using examples from the context of Saskatchewan schools. Kawagley (1995) refers to the bridging as a pathway towards Yupiaq education. For Inuit in Nunavut, Indigenous knowledge in science education published research is limited to research done by non-Inuit (Higgins, 2013; Lewthwaite et al., 2010; Lewthwaite and Renaud, 2009; McMillan, 2013). Kawagley (1995) argues for science education based on culture as "ethnoscience" (p. 115) where the curricula, language, and people involved in the teaching are from the local community. In earlier research, Indigenous knowledge in science or science education was referred to as Traditional Ecological Knowledge.

Traditional Ecological Knowledge is defined by Burkes (2001) as "a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment. A subset of indigenous [SIC] knowledge, which is local knowledge held by indigenous peoples or local knowledge unique to a given culture or society" (p. 109). However, Kimmerer (2013) argues that "the term "TEK" does not accurately capture the nature of the living, evolving practice of knowledge generation, in which knowledge is more than a body of information, it is a suite of relationships" (p. 50). While the term TEK resonates with the knowledge that is being researched for Inuit knowledge in science education, based on the limitations of the term being specific to ecology and static knowledge from the past, the term TEK will not be used explicitly in this research.

2.3.3 Parallelism

Kirkness (2013) argues that "we must overhaul the existing system and seek more appropriate materials and strategies for teaching" (p. 20). A potential theoretical framework where Indigenous education is delivered in parallel but exclusive from mainstream education is using a parallelistic approach (Kirkness, 2013; Nguyen, 2013; Gorman, 2013; Friesen & Ezeife, 2013; Stonechild, 2013; Goulet & McLeod, 2013). Cairns (2000) describes parallelism as "[Indigenous] and [non-Indigenous] communities travelling side by side, coexisting but not getting in each other's way" (as cited in Widdowson and Howard, 2013, p. XIV). Parallelistic approaches challenge the assumptions of multicultural frameworks that aim for equality while perpetuating colonialism (St. Denis, 2013). Parallelistic approaches reflect culturally appropriate models of delivering education at any or all stages of learning from early years to post-secondary education. These models use Indigenous languages, Indigenous culture, local spaces, Indigenous material, Indigenous pedagogy, and involve Indigenous people in all areas of development and

delivery, with the participation of elders. Nguyen (2013) shares examples from early years programs that were nationally funded. Widdowson and Howard (2013) describe parallelism as a model where [Indigenous] education is delivered independent from public school as a means to exercise Indigenous self-determination and to realize the potential of Indigenous communities. Gorman (2013) argues that educators need to "emphasize being rather than doing; address the past and present rather than only the future; and promote harmony with nature, rather than subjugation of nature" (p. 62).

Friesen and Ezeife's (2013) parallelistic example uses the implementation of Traditional Ecological Knowledge into science education where the content and processes learned are revised to reflect Traditional Ecological Knowledge and to the extent that the assessments are also revised into culturally valid forms of assessment. Goulet and McLeod's (2013) example implements the use of cultural camps for teacher candidates where the courses aim to affirm students' cultural identity. Evering and Longboat's (2013) example demonstrates how they have done this with the implementation of an Indigenous Environmental Studies program.

To further promote parallelistic approaches, Indigenous people have established mechanisms and processes to recognize and accredit Indigenous educational programs through partnerships such as the World Indigenous Nations Higher Education Consortium[13] and the Indigenous Institutes Consortium[14]. Parallelistic examples from Nunavut include Piqqusilirivvik and the Pirurvik Centre. Piqqusilirivvik operates exclusive of the academic structures of Nunavut Arctic College to reflect content, processes, and expectations that are derived from Inuit culture

[13] https://winhec.org/

[14] https://iicontario.ca/about-iic/

locally. The Pirurvik Centre also operates exclusive of academic programs and emphasizes the restoration and revitalization of Inuktut and Inuit Culture. Both programs aim to program enculturation and cultural reclamation at the post-secondary setting. For early years learning and children, there are limited options for parallelistic education. One program that would resonate with parallelistic education for Inuit youth is the Young Hunters Program[15] that partners with Nunavut schools to take youth out on the land throughout the year to learn on the land.

Parallelism aims to provide access to equitable educational opportunities that respect the diversity of people and promote Indigenous self-determination. Parallelism detaches Indigenous education from mainstream schooling and reforms learning by using Indigenous languages and cultures as the basis for the curriculum.

2.3.4 Integrationist Approaches

Integrationist approaches fit within the paradigm of multiculturalism. St. Denis (2013) argues that multiculturalism is a political strategy that silences other interests under the disguise of equality through a common education that leads to a universally beneficial outcome that is derived from and downplays colonization and the systems used to integrate it. Within a multicultural framework, cultures that do not identify as the mainstream or common culture are labelled as others that are encouraged to be integrated as a means to tolerate alternative identities with the intention of making others feel included in a common education system with the hopes that it will encourage them to see themselves as a part of the whole with potential to achieve the expectations of the system or have a future from receiving a common education.

[15] https://arcticonnexion.ca/

Multiculturalism causes non-Indigenous teachers to assume that they are being respectful and inclusive of Indigenous worldviews while they trivialize it and use it as enrichment, and assumes that their efforts for inclusion are sufficient to meet the needs of Indigenous students and expectations of Indigenous communities (St. Denis, 2013). Within a multiculturalism framework, Indigenous knowledge is integrated into the common education system with finite time, space, and content, enough to assume inclusion without compromising the Western educational requirements.

Integrationist approaches are influenced by liberalism and the political economy perspectives whereby Indigenous self-determination in education should be achieved by being successful in the common Canadian education system by addressing socio-political factors that marginalize Indigenous people (Widdowson & Howard, 2013). Integrationist approaches promote universal education based on scientific and humanistic education (Widdowson & Howard, 2013). Supporters of integrationist approaches tend to use socio-economic factors derived from the national standards and expectations to promote the need for Indigenous students to be better integrated into the mainstream education to improve their standard of living and achieve individual autonomy. To illustrate what this looks like practically, Kirkness (2013) describes it as "the process of having Indian students attend public schools… a process of assimilation where Indians are being absorbed into the non-Indian society" (p. 10). Kanu (2011) shares a model for integration that is intended to be more inclusive of Indigenous perspectives by considering integration in various levels of education: the philosophical underpinnings, curriculum, instructional strategies, and student learning outcomes. One of the pedagogical approaches to integrate Indigenous and/or minority students into mainstream education is to use culturally relevant pedagogy.

2.3.5 Culturally Relevant, Responsive Pedagogy and Culture-Based Education

Culturally relevant pedagogy is derived from multicultural educational theory. Ladson-Billings (1995) defines "a theoretical model that not only addresses student achievement but also helps students to accept and affirm their cultural identity while developing critical perspectives that challenge inequities that schools (and other institutions) perpetuate." (p. 469). St. Amant (2014) as well as Bell and Brant (2015) share practical examples of how culturally relevant pedagogy can be applied in Indigenous education in Canada. The examples range from using Indigenous languages, stories, materials, activities, as well as assessments and managing emotional learning experiences. However, culturally relevant pedagogy has also had its criticisms as being insufficient to meet the goals for Indigenous self-determination.

Culturally relevant pedagogy reflects what Kirkness (2013) refers to as "parts of our culture into the curriculum rather than having culture as the basis of our curriculum" (p. 17). The identities of culture of students are considered and included in the learning process and acknowledged, however, the expectations from the mainstream curricula are maintained. The intention of using culturally relevant pedagogy is to provide a sense of inclusion and belonging, as well as to bridge the students' knowledge with the curriculum in the hopes that students will be more academically successful, while developing a critical consciousness that empowers them to address inequities.

During the time when the responsibility of local education for Inuit was transitioned from the federal government to the territories (McGregor, 2011), Inuit took the initiative to develop curriculum from an Inuit worldview, Inuuqatigiit: The Curriculum from the Inuit Perspective (NWT ECE, 1996). The intention behind the curriculum was to aid in the integration of Inuit knowledge into schools. However, implementing the use of the curriculum has had its

challenges. Teachers have expressed fears of presenting Inuit knowledge in schools due to feelings of inadequate preparation to do so and fears of appropriating Inuit knowledge (Aylward, 2010). Teachers in Aylward's (2010) study expressed resistance to implementing Inuuqatigiit (1996) curriculum because of their lack of familiarity with the content in the guide or presumptions that it does not apply to their teaching and is not relevant to Inuit lives today.

While culturally relevant pedagogy aims to be more inclusive of student identities, maintaining the mainstream curriculum as produced still results in cultural discontinuity. Cultural discontinuity is the disconnect between the home culture and school culture, that contributes to difficulties in classroom learning, basically setting up that child for failure (Kanu, 2007). Culturally responsive education aims to tailor teachers to be more sensitive to this context by infusing more culture from the student's culture. This theory has been tested on the academic success of Indigenous students and showed that there is much more needed than culturally responsive pedagogy to see positive trends in the achievement of Indigenous students academically (Kanu, 2007). Ladson-Billings (1995) distinguishes culturally responsive pedagogy based on Erickson and Mohatt's (1982) research where the focus of adaptations, inclusion, and engagement improve the responsiveness to home/community and school relationships. St. Amant's (2014) example of a culturally responsive teaching experience is of a teacher who revised the music curriculum and developed it with local support as a thematic unit on drum making and drumming. The emphasis of culturally responsive pedagogy is being inclusive of the students' home and community life in the school learning experience. This can be achieved by including family information in the learning experience, including locals in the teaching, revising products and assessments to reflect the community-based content. Culturally responsive pedagogy is a partial attempt at fully decolonizing without sacrificing all current cultural customs in education. Tuck and Yang (2010) might define this as "moves to innocence".

Culturally responsive pedagogy is more an action to "build bridges" as defined by H. McGregor (2015). Culturally representative pedagogy involves revolution of the educational system in its entirety. An educational revolution to be culturally representative of an Indigenous culture has to be done by involving informed decisions made by Indigenous people. Current academic literature would coin this as "Indigenizing" education. Indigenizing education is the active implementation of culture-based education. Aikenhead et al. (2014) argue that "culturally responsive science teaching (CReST) is a postcolonial activity" (p. 6) that involves the integration of Indigenous knowledge into science education and a transformation of the pedagogy of science teachers from an ethno-centric to a ethno-pluralistic cross cultural practice. They share a Cross Cultural Competence Continuum that can be used to understand the stages of a teachers decolonizing practice where you go from acceptance, adaptation, and integration (Aikenhead, et al., 2014). These situational positions a teacher might find themselves in apply to both Indigenous and non-Indigenous teachers, Indigenous teachers may also face these tensions in their practice if they have internalized oppression.

St. Amant (2014), Bell and Brant (2015) also share the theory of culture-based education. Culture-based education is a transformative approach where the heritage language of the students, the pedagogy, curriculum, and values are based on the culture, in this case Indigenous culture, locally developed, and community based (St. Amant, 2014). Bell and Brant (2015) share a Maori example where this form of educational transformation to establish a culture-based education has to happen at all levels related to education; at the state, administrative, societal, community, and school level. In the Inuit context, specifically in Nunavut, the government began reforming the theoretical framework for education to reflect Inuit philosophy with the publication of the Inuit Qaujimajatuqangit framework for education (NDE, 2007). Prior to the development of the Inuit Qaujimajatuqangit foundation documents, Inuit developed the

Inuuqatigiit curriculum. C. McGregor (2015) explains how Inuit education transitioned from culturally-responsive and relevant education with earlier curriculum development, then transitioned to culturally-founded education. Culturally-founded education is synonymous to culture-based education. While C. McGregor's (2015) study focuses on the social studies context of curriculum, it should be noted that the Inuuqatigiit curriculum includes the section "Relationship to the Environment" that thematically scopes and sequences Inuit life science.

If cultural transmission is the goal of this decolonizing process, cultural pedagogy that socializes is necessary. Inunnguiniq: Caring for children the Inuit way has been published (Tagalik, 2010). Focused on cultural child rearing beliefs and values as described by Tagalik (2010),

> A key focus within Inunnguiniq is the need to teach what Inuit refer to as deep thinking skills. Inuit often refer to the main difference between pedagogies; while mainstream education focuses on instructing the brain and thinking on paper, Inuit believe that thoughts actually originate in the 'heart' (or are generated by emotion) and that real learning only develops through doing and experiencing." (p. 3)

and "the pedagogy that supports Inunnguiniq is grounded in a worldview focus on knowing and experiencing" (p. 3). It is a socialization process (Tagalik, 2010) focused on using experiential learning pedagogy.

To illustrate how these theoretical models differ, we can use a spectrum of integration for decolonization. If we were attempting to decolonize by integrating Indigenous knowledge into education, you can think about culturally relevant pedagogy as a model that initially attempts to revise the learning experience with the intention of inclusion by adding cultural content but

maintaining the mainstream expectations and overlooking the benefit of including the home/community, with a focus on improving student academic success. To further decolonize and integrate into the curriculum, you might adopt culturally responsive pedagogy where you emphasize the involvement of the home/community in the school learning experience, and begin to make revisions to the mainstream curriculum to allow for more diversity and inclusion. Then to decolonize and actualize on Indigenous autonomy, you may transform education to be reflective of a culture-based education where all areas of education are revised to reflect the community.

2.3.6 Two-Eyed Seeing

The Mikmaq concept of two-eyed seeing was articulated by Marshall and Marshall as:

> *bringing knowledges together using the guiding principles of Two-Eyed Seeing. Two-Eyed Seeing refers to learning to see from one eye with the strengths of Indigenous ways of knowing and from the other eye with the strengths of Western ways of knowing and to using both of these eyes together.*
>
> (Hatcher et al., 2009)

The concept was applied to the integrative science program at Cape Breton University, where students were taught both Indigenous and Western science with the intention of empowering them to see the world from both knowledge systems and focus on their strengths (Hatcher et al., 2009).

Similarly, Aikenhead and Michell (2011) explain the process as bridging cultures and provide a comparison between Indigenous ways of living with nature and Eurocentric science. In addition to articulating contrasts between Indigenous knowledge and Eurocentric science, they

share how science learning can be improved to meet Indigenous student learning styles (Aikenhead & Michell, 2011).

In Nunavut, through the CRYSTAL project, Lewthwaite et al. (2010) rephrased the concept as "Combining the views of both worlds: piqqusiit tamainik katisugit" (p. 1). Their research provides resources, materials, and strategies to create a culturally responsive science learning experience (Lewthwaite et al., 2010).

2.3.7 Place-based Education

Place-based education is a decolonizing theory that aims to situate teaching and learning in the local community geographically, ecologically, politically, socially, and economically (Gruenwald, 2003b). The intention behind place-based education is to improve learner engagement, allow them to relate and draw on their own experiences, and empower them to be active in their community (Gruenwald, 2003a). This theoretical approach draws on Freier's (1970) conceptualization of situationality, whereby the situations that people find themselves in are spatially and temporally located within a place that will likely have its challenges and if they consider their situation critically, they will act on it (Gruenwald, 2003a). Gruenwald (2003a) argues that place-based education is insufficient as a theoretical framework on its own as it generally means to contextualize the learning based on the local social and ecological environment. Instead, Gruenwald (2003a) argues for a convergence of place-based education and critical theory to conceptualize a critical pedagogy of place to infuse the politics of place with the intention of decolonizing and reinhabiting the situations people live in.

Within the Nunavut context, C. McGregor (2015) describes the work that was done by Inuit and Dene prior to the creation of Nunavut as the development of place-based education. Teaching resources that were relevant to the community and based on the local culture were

being developed to supplement or replace imported curriculum, particularly for social studies (C. McGregor, 2015). Card and Burke's (2021) research is the most recently published example of how place-based education has been applied in a Nunavut context through Card's delivery of outdoor-play-based education at Nanook school in Apex for the Kindergarten class. However, the concept of place-based education has not been widely used by Inuit within Nunavut for research.

2.3.8 Land-based Education

Kawagley (1995) states that "the natural sciences are nothing more than the observation, interpretation, and understanding of the interplay in nature. The Native has perspicacious knowledge of nature" (p. 114). Battiste (2013) also states that Indigenous people

> have a science derived from relationships with nature and with the energies within an ecosystem, including their relationships with each other and with their environment. The source of Indigenous knowledge, then, lies within the changing ecosystem, from which Indigenous people develop their awareness and their strategies of living within that ecology. (p. 121)

Kulnieks et al. (2013) view is that learning has to take place in nature, not just about nature. The concept of learning in nature within an Indigenous paradigm is land-based education. Land-based education is not synonymous with place-based education, critical pedagogy of place, or outdoor education as these concepts are derived from anti-oppressive critical theories. Land-based education should be viewed with an Indigenous or Indigenizing lens where the emphasis is on understanding our place and purpose in nature, not as a dominant being but as a dependent being that relies on the knowledge from nature to thrive. Parent (CCUNESCO, 2021) describes it as "a

process that centres respect, reciprocity, reverence, humility and responsibility as values connected to the land through Indigenous knowledges". Wilson (CCUNESCO, 2021) states that

> Indigenous land-based education is its own paradigm based on Indigenous worldviews and beliefs and the passing on of knowledge to one another and to the next generation… It is also a form of understanding our place within, and our responsibility to, the wider universe.

Googoo (CCUNESCO, 2021) describes land-based education as "science that we have done research on for thousands of years in a living lab". Bell (2013) discusses how Anishnaabe Bimaadiziwin values of respect, relationship, reciprocity, and responsibility can inform environmental education. These values resonate with many Indigenous cultures and are demonstrated within each context of different Indigenous peoples and they provide a conceptual framework of what you might look for in land-based education in contract to other critical theories that focus on power dynamics and problems. McDonald (2023) states that land-based education is "Indigenous method for regenerating Indigenous lifeways and thought systems because Indigenous knowledges are relational, and land is key in the knowledge generation and transmission process" (p. 8).

To help provide a framework for land-based education, Michell (2018) articulates it using Cree culture. Land-based education "embraces the rhythms of the earth" (p. 9). Land-based education counteracts the effects of colonization around displacement, occupation, and sovereignty rights by restoring balance in peoples' lives, and providing an opportunity for healing using Indigenous knowledge and experiences (Michell, 2018). Michell (2018) states that Indigenous knowledge systems have a strong connection to the land and "to remove and displace Indigenous people from their traditional territories is to break the umbilical cord that feeds their cultures, languages, values, and knowledge base of individuals, families and communities" (p. 31).

Land-based education reinforces Indigenous identity and languages, it involves experiential learning that is contextualized by seeing and doing on the land, shaped by nature's cycles, and the people involved in the teaching and learning (Michell, 2018). It requires community, elder, and youth involvement with consultation prior to developing the curriculum, where the land is the 'textbook' (Michell, 2018). It provides an opportunity for relationship building and critical inquiry of socio-historical contexts (Michell, 2018). A key point that Michell (2018) makes is that contrary to some environmental curriculum, land-based education is not prescribed curriculum or idiosyncratic. Michell (2018) refers to the land as also being the teacher; Simpson (2014) similarly but from Nishnaabeg culture refers to this concept as land as pedagogy, where knowledge, values, and processes are learned from interacting, observing, and processing with the land.

Kawagley's (1995) land-based education examples is based on learning at a Yupiaq fish camp where Yupiaq values, language, traditions, science, and practices were taught with some incorporation of Western science. Goulet and McLeod (2013) use the example of establishing cultural camps for teacher education students to implement cultural teaching that are organized under the leadership of elders. Mearns (2017) study demonstrates how land-based education can be used to implement Inuit Qaujimajatuqangit into Inuit education. Mearns (2017) study uses the Qaggiq model that was conceptualized by McGrath and Aupilardjuk (McGrath, 2018) that emphasizes the need for land, language, culture, and living histories as pillars to allow for Inuktut knowledge renewal. Snow and Obed (2022) examine the role of land-based education programs for Inuit in public education and how implementing it is critical for decolonizing education and promoting reconciliation. Land-based education provides a significant framework for implementing Inuit based education because "Inuit learning, with and on the land, relies upon being embodied and active, rather than the disembodied and passive approach that often occurs in formal academic settings" (Snow & Obed, 2022, p. 269). Some essential considerations for what

is included in land-based education is that elders are involved as leaders and teachers, Indigenous languages are used for communication, Indigenous technologies and practices are demonstrated, a common pedagogical approach is to teach using stories, and the land and its state dictate what and how things will be taught; this means that if the weather is ideal for teaching fishing, fishing might be done, however, if the weather is not ideal, time might be spent indoors mending nets, repairing tools, prepping for the next trip, making food with a previous catch, or telling stories related to fishing. Both Mearns (2017) and Kaluraq (2020) translate land-based education as Nunami Ilinniarniq which also translates to learning on the land.

Texts such as Uqalurait (Bennett & Rowley, 2004) and Inuit Qaujimajatuqangit: what Inuit have always known to be true (Karetak et al., 2017) provide a glimpse of how important learning on the land is for Inuit and how our relationship with the land has shaped our worldview and the way we live.

2.3.9 An Iglu Metaphor

Kimmerer (2013) states that "Indigenous ways of framing and communicating concepts, through shared narratives, and symbols, effectively engage the power of metaphors" (p. 50). For this study, it was important to find a metaphor that connects Inuit, science, and education. The teachings from Inuit elders in Karetak et al. (2017) are a part of the dialogue that led Inuit to conceptualize a framework for education based on Inuit Qaujimajatuqangit. The elders in Karetak et al. (e.d., 2017) were members of the Elders Advisory Committee for the Nunavut Department of Education, responsible for advising how Inuit Qaujimajatuqangit would be articulated for a transformed education system in Nunavut.

The Inuit Qaujimajatuqangit foundation documents define the philosophy behind Inuit Qaujimajaqtuqangit and use the Iglu as a metaphor to articulate child development and learning

(NDE, 2007). Using the story of Nikanaittuq, the purpose of schooling from an Inuit worldview is explained as a process of developing a child to become an inummarik[16], to develop their isuma (mind/wisdom) (NDE, 2007). In Nikanaittuq's story as told by Angalik, he was an orphan who was taken in and raised by the community, through consistent effort and practice, he was eventually able to climb to the top of the Iglu (NDE, 2007). Metaphorically, each child develops their Iglu throughout their schooling, consisting of the knowledge, skills, and values that they have gained their experience and by the end of it, they should have the strength to stand at the top of their Iglu, supported by those things. Using the terms that were used to describe Nikanaittuq, Inuit strive to raise their children to be Puinaittuq[17] and Nikanaittuq[18], to be independent and proficient. Additionally, the Iglu is used as a metaphor to illustrate the Inuit Qaujimajatuqangit education framework that includes laws, values, principles, curricular competencies, curriculum strands, and foundations of instruction (NDE, 2007, p. 36). It is also used to illustrate the learning continuum with stages of learning that build on each other towards a proficient learner. For these reasons, the conceptualizations of Inuit Qaujimajatuqangit using the Iglu shape make it an ideal metaphor for this study.

Furthermore, McGrath and Aupilardjuk (McGrath, 2018) conceptualized the Qaggiq model for Inuktuk knowledge renewal. A Qaggiq is a communal Iglu used for social and political gatherings such as feasts, performing arts, and dispute resolution during the late winter, early

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[16] A person who can act with wisdom (NDE, 2007, p. 17).

[17] Puinaiqtuq: able to do anything, able to do the impossible by himself or herself, able to carry on any task because of his or her ability through what he or she has learned. One who is multi-talented is Puinaiqtu. (NDE, 2007, p. 58).

[18] Nikanaittuq: one who never changes and is not to be worried about, he/she can take care of himself/herself (responsible). Someone who is able to do anything is Nikanaittuq. (NDE, 2007, p. 58).

spring. McGrath (2018) worked with Aupilardjuk to merge and illustrate the Qaggiq model that reconceptualizes the Indigenous Peoplehood Matrix using an Inuit worldview. McGrath's (2018) matrix connects the sources of vitality "homeland, language, living histories, and culture/ceremony" (p. 293) to Aupilardjuk's categories of the "peoplehood-personhood-livelihood" (p. 293) in a dynamic and relational process that is needed for knowledge to be renewed. Essentially, the sources of vitality are needed to support a person's well-being as an individual, as part of a community, and to be productive. These also relate to what Inuit were raising their children towards, using a theory of Inuit Qaujimajatuqangit, to develop them as an individual, to make them a part of a community, and for them to be productive to meet the needs of themselves, their family, and community. McGrath (2018) argues that through colonization, land was taken from Inuit with the promise of livelihoods (productive), and displaced their language, lives, and culture by forcing them to assimilate through education. Ultimately, the issues of power need to be addressed in order to re-engage the relationships and processes that allow for Inuit knowledge to be used, passed on, and carried into the future (McGrath, 2018). McGrath (2018) and Aupilardjuk interpret renewal in Inuktitut as sannginiqarajaqniq aturnikkut (vitality through engagement). In order for Inuit knowledge, Inuktut to have strength, it has to be used. McGrath (2018) describes the qaggiq as:

> a space for gathering, renewing relationships, building skills through games; it is a place where stories and songs are shared, and community is affirmed. If there are tensions, they will be brought out appropriately, because the well-being of the group relies on harmony. In that sense, qaggiq is a renewal of community. It is a source of strengthening of relationships and knowledge of homeland, language, living histories, and ceremony. (p. 301)

The qaggiq represents a space for sharing knowledge, renewing relationships, revitalizing individual and communal knowledge, values, and skills. In terms of addressing issues of power, the qaggiq can be imagined as an ethical space for engagement.

An iglu as a structure is built from snow in various ways using different types of snow, where the structure eventually dissolves back into the environment when it melts and is rebuilt the following season with new snow. The life-cycle of the structure can be used as a metaphor for a decolonizing process of being constructed, deconstructed, and reconstructed. The process of constructing an iglu can be used as a learning metaphor, for reclaiming the things that are important for Indigenizing. The interactions that happen with the structure itself are the critical process where issues of tension, reality, truth, values, principles are explored; where one's ontology and axiology are explored through introspection and extrospection.

3 Researching Stories

When I was preparing to do field research, I knew that I wanted to involve other Inuit in the research. Since the tensions I faced with Inuit Qaujimajatuqangit stemmed from my experiences and lack of experience in elementary classrooms, I felt the need to engage with elementary teachers. A shared practice between academia and Inuit culture is teaching and learning through stories. It became apparent that sharing stories would become part of the methods for doing research, as well as the source of data for this research. The methodology throughout this research has been constructed using Critical Narrative Inquiry Methods and Indigenous Research Methods. I conceptualize a process for using stories when doing research with Inuit that is guided by Inuit Qaujimajatuqangit and informed by literature from Critical Narrative Inquiry and Indigenous Research Methods.

3.1 Methodological Approach

Wilson (2008) reconceptualizes research in Indigenous communities as ceremony; a ceremonial process to build and strengthen relationships (Wilson, 2008). This study aims to engage in dialogue with teachers and elders about life science education in Nunavut using critical narrative inquiry to understand what current theoretical underpinnings are influencing pedagogy and curriculum in classrooms. Also, to discover themes that can foster resonance between life science education in elementary classrooms with Inuit Qaujimajatuqangit as a foundational philosophy for ways of knowing, doing, and being in a Nunavut Inuit context. It is an opportunity to find resonance and explore dissonance. This research intends to capture some of the intellect and wisdom of Inuit elders and educators who have experience in education and the field of science. Their knowledge is a foundational piece because they have the experience and wisdom needed to articulate a theoretical framework for science education that is based on Inuit

culture. Inuit elders harbour Inuit traditional knowledge that roots Inuit culture. Passing on knowledge to subsequent generations is a part of keeping Inuit culture alive (Kublu et al., 1999).

The aim of the research is to understand how teachers and elders' articulate science education based on Inuit Qaujimajatuqangit. Inuit traditionally value contextualized knowledge over generalized knowledge (ITK & NRI, 2006; Kublu et al., 1999). Narrative research also resonates with story-telling as Indigenous pedagogy (Healy & Tagak Sr., 2014; Kovach, 2010; Wilson, 2008). Critical narrative inquiry aims to examine power relationships in hopes to highlight themes that articulate colonizing or liberating themes within a specific socio-political context by implicating the researcher into the research. Pinnegar and Daynes (2007) describe narrative inquiry as part of the interpretivist paradigm that values particular over general information, accepts alternative forms of information, such as stories, as legitimate data, recognizes that the researcher is implicated in the research in a relationship with the participants, and reject positivistic notions of validity such as truth and transferability for concepts such as authenticity and resonance. Healy & Tagak Sr. (2014) discuss research relationships with principles of Piliriqatigiingniq (working toward a common goal), Inuuqatigiitsiarniq (respecting others and building positive relationships), Unipkaaqatigiingniq (story-telling and sharing experiences, and Iqqaumaqatigiingniq (finding meaning and understanding together in relationships). Kublu et al. (1999) described Inuit knowledge as contextual and valued for depth and detail. Kublu et al. (1999) also discusses how Inuit knowledge of the past was intended to inform the present and be prepared for what the future has to offer. An integrated position that incorporates the theoretical positions above will guide this study by implicating the researcher into the research relationship, allowing for flexibility to negotiate research relationships with participants, and focusing on highlighting, not generalizing common themes of experiences from teachers and elders' narratives.

Elders are considered integral participants in Indigenous education because they are traditional knowledge keepers who pass on cultural knowledge through relationships and practice. Inuit elders play a significant role in teaching and learning in Inuit culture (Kublu et al., 1999; Owlijoot, 2008). They offer contextualized knowledge of life that enriches the experiences of current generations so that they may be better equipped to deal with what the future has to offer (Kublu et al., 1999).

Indigenous languages are the medium for communicating Indigenous knowledge (Aikenhead & Michell, 2011; Battiste, 2013). Indigenous knowledge is shared using Indigenous languages through the telling of stories (Aikehead & Michell, 2011; Battiste, 2013; Ryan, Every, Steele, & McDonald, 2013; McMillan, 2013). Inuit stories being told in Inuktitut reflects these ideas (McMillan, 2013).

Connelly and Clandinin (1990) define narrative as "both phenomenon and method" (p. 2). Kovach describes it as the process and meaning (as cited in Smith, 2012). Therefore, the researcher will use story-telling as a method for collecting data from participants and the researcher; the researcher will examine the stories of the participants and researcher, and endeavor to find meaning from patterns in the stories collected; this will result in a story constructed by the researcher about the research and the process. Critical narrative inquiry will be used in the study because it aims to a) resist homogenized meaning and collective understanding b) recognizes uniqueness of individuals c) focuses on recognizing patterns in different lived experiences (Trahar, 2009).

Storytelling in Inuit culture has been the main form of expressing cultural knowledge from generation to generation (Kublu et al., 1999; Owlijoot, 2008). Story-telling as research

method and cultural pedagogy provide a point of entry into a research relationship (Healy & Tagak Sr., 2014). According to Kovach (2010) narrative as method in Indigenous research:

> a) it is linked to a particular tribal epistemology (or knowledge) and situated within an Indigenous paradigm; b) is relational; c) it is purposeful (most often invoking a decolonizing aim; d) it involves particular protocol as determined by the epistemology and/or place; e) it invokes an informality and flexibility; f) it is collaborative and dialogic; and g) it is reflexive (p. 43).

According to the researchers guide for "Negotiating Research Relationships in Inuit Communities" (ITK & NRI, 2006) flexibility and transparency are important to building research relationships with Inuit. Owlijoot (2008) set out criteria that should be used when engaging elders in Nunavut communities. The focus of critical narrative inquiry is to implicate the researcher in research to find authenticity, resonance, and trustworthiness in contextualized narratives and examine them through a particular lens (Clandinin & Connely as cited in Pinnegar & Daynes, 2007). Relationality in an Indigenous context considers both the human and more than human form important (Healy & Tagak Sr., 2014; Wilson, 2008). Therefore, critical narrative inquiry lends itself as a research method that resonates with an Indigenous research paradigm, particularly a research relationship with Inuit. Critical narrative inquiry also requires the researcher to be reflexive by documenting their research experience as an autobiography and critiquing their autobiography using different lenses to expose and explore their biases and assumptions.

3.2 Data

Nunavut is Canada's newest territory, inaugurated in April 1999 and with a population of approximately 33,000 people, 85% of whom are Inuit, it comprises over 23% of Canada's land

mass (Hicks & White, 2000). Nunavut's Education Act assented in 2008 (NDE, 2008) with the intent to legitimize education that is based on Inuit language and culture as a step towards actualizing self-determination of Inuit in the Canadian context. The new territory has undergone pressure to reconceptualize education by creating made-in-Nunavut curriculum and resources. Currently approved resources such as Canadian curriculum guides, mostly from the NWT, and bilingual books, have been organized into strands (NDE, 2014b). Inuuqatigiit (NWT ECE, 1996) predates Nunavut and is used to design curriculum from an Inuit perspective. Recent studies show that the science curriculum is still Eurocentric dominant (Berger, 2009; Higgins, 2013; Lewthwaite et al., 2010). Lewthwaite et al. (2010) and McMillan (2013) are context specific examples of reconceptualized science education in Nunavut schools in the *Qikiqtani*[19] region. Researched models that present Inuit Qaujimajatuqangit within an elementary science education context in Nunavut are limited. The only resources that place Inuit Qaujimajatuqangit within a science education context are the Inuuqatigiit curriculum (1996), teaching and learning resources as supported by the NDE (2014), and resources that teachers use at a community level such as elders in the community.

3.2.1 Context

The context of this study is life science education in the *Kivalliq*[20] region. The Kivalliq Science Educators' Community [KSEC] has been delivering science programs inside and outside Kivalliq schools since 1994 with intent to engage youth with science engagement programs (KSEC, 2015). The researcher posits that because of the abundance of science education

[19] Baffin Island

[20] Keewatin, central Nunavut

programming, there are people with science teaching experience in both formal and informal education that have stories to share. Therefore, this study will be conducted in the Kivalliq region with people who have taught in elementary schools and elders in Kivalliq communities.

The curricular focus is on elementary life sciences. The scope and sequence of the NWT ECE (1996) Science and Technology Curriculum Guide is divided into five strands, one for life science, over seven grades. The Inuuqatigiit (1996) curriculum guide is divided into themes that include relationships and environment. There is currently no guide for Iqqaqaukkaringniq (NDE, 2007) to aid new teachers who are expected to deliver a culturally relevant curriculum that is Inuit and Nunavut context specific.

3.2.2 Significance

There is a need for more educational research and more Inuit researchers to work with Inuit communities to learn from past experiences and realize goals. Based on the Nunavut Research Institute's compendiums of research licenses there is no evidence of research in elementary science education in the Kivalliq region with Inuit in the last ten years. It appears that most research in elementary education is government-led or initiated for general education. Doing research with a critical lens from the position of the institution that oversees the delivery of education provides a limited view of what goes on within this context and may be blinded by power dynamics of the hierarchy in data. Collecting data and interpreting it from another position such as a researcher offers different lenses, change in power dynamics, and new tensions to explore. It is also rare to have an Inuk do research as the researcher in Inuit communities. As an Inuk member of the community, this is an opportunity to present research from within the Inuit community by an Inuk. Although the research is limited to the participants' and researchers' interpretation of science education, this research may promote interest in Inuit

communities for other Inuit to engage in educational research in the capacity of a researcher. Focusing on the voices of teachers is an opportunity to bring teachers' voices into academic discourse of elementary science education in Nunavut. Teachers across Nunavut may find resonance in the stories of other Nunavut teachers. Nunavut teachers with life experience of teaching in Nunavut communities may have stories to share that offer ways to improve teacher induction into Nunavut life science education. This study will also add to the literature in the areas of Indigenous science education, Inuit science education, and Inuit Qaujimajatuqangit. This study will focus on the voices of experience from teachers and elders as an attempt to highlight themes that position Inuit Qaujimajatuqangit within science education or science education within Inuit Qaujimajatuqangit.

3.2.3 Research Questions

The aim of this research is to understand current theoretical underpinnings that are being implemented by teachers in school science classrooms and to articulate themes that are regarded as Inuit ways of knowing, doing and being in a science education context.

Central.

The central question that will be addressed by this study is:

"How can elementary life science education be based on Inuit Qaujimajatuqangit and culture?"

Guiding.

The guiding questions listed below will help guide the study; they are:

1. How do Nunavut teachers teach life science in elementary school? How have they taught it in the past?

2. What concepts, processes, or skills are considered as Inuit knowledge? How do people distinguish Inuit knowledge from Western knowledge in life sciences? If so, why do they distinguish knowledge this way?
3. How is science taught and learned in Inuit culture?
4. Why do Inuit label knowledge in science as Inuit Qaujimajatuqangit? And how is scientific knowledge labeled as Inuit Qaujimajatuqangit?

3.2.4 Study Population

This study engaged with people who have taught life science in Kindergarten to grade 6 for a minimum of three years within a ten year period (2006-2016) in Kivalliq schools. Recognizing the high turnover rates in Nunavut, people who have moved onto other careers but meet the above criteria were included in the study, therefore the participants did not have to be current teachers in schools; they may have been be working in the capacity of administrative school staff within the school system. The resonance between life sciences and Inuit knowledge and relationship to land offer a common theme to begin dialogue about cross-cultural science education. The timeframe for teaching experience between 2006-2016 was selected to recognize the era of reconceptualization of Nunavut's education system, specifically with the release of the foundation documents (NDE, 2007, 2008, 2008) and the revised Science and Technology curriculum guide (NWT ECE, 1996).

Each community may have different protocols for engaging with elders for research. Elders are also known for their particular area of expertise. Stakeholders such as schools, DEA's, Hamlets, and elder's councils had to be consulted to identify and engage elders. Elders also by their own will and interest participate without affiliation in the study. The knowledge of Inuit elders is a significant piece to the study. Many elders who lived a pre-settlement life and have

been enculturated with Inuit knowledge that is not fragmented by colonization have passed on. The knowledge of elders ground the roots of traditional knowledge. Therefore, elder participation is a fundamental piece to the study. The openness to share knowledge publicly shows interest in preserving traditional Inuit culture and a recognition that improving access supports Inuit cultural resistance.

3.2.5 Sample and Selection

There are seven communities in the Kivalliq region of Nunavut, four with elementary schools, and two middle schools in Rankin Inlet and Arviat, and three K-12 schools in Chesterfield Inlet, Coral Harbour and Whale Cove. The Kivalliq School Operations and Local District Education Authorities oversee the administration of schools. According to the NDE (n.d)

> The DEA is responsible for making important decisions concerning the delivery of education. Examples of these important decisions include:
>
> - Choosing the language of instruction and language model to be used in the school;
> - establishing the school calendar;
> - developing a registration and attendance policy;
> - developing an Inuuqatigiisiarniq (discipline) policy;
> - issuing suspensions and expulsions;
> - working with Region School Operations (RSO) to hire school staff (including teachers and principals); and
> - providing an early childhood education program that promotes Inuit language and culture.

Each stakeholder was contacted to inform them of the research interest and start participant engagement discussions. The research information, with a call for participants, was shared publicly through radio stations, and online social network sites. The researcher collected names of interested participants. Due to logistical and financial limitations there was limited flexibility in the mode and scheduling of interviews. Due to bandwidth limitations video conferencing was not an option.

Participants in the study were selected using the following criteria:

- Kivalliq citizens
- Who have taught in elementary school between 2006-2016
- For a minimum of three years
- Who have an interest in elementary school life science
- Are willing to share stories about their elementary science teaching experience
- Use Nunavut approved curriculum resources for the Iqqaqqaukaringniq strand
- Would like to contribute knowledge about science curriculum in Inuit communities

Elder participants were recruited using the following criteria:

- knowledge of Inuit teaching practices
- expertise in life systems
- experience in schools
- interest in elementary education
- interest in science education
- elder participants can be recruited by community members and teachers

3.2.6 Data Analysis

The purpose of the study is to highlight themes of Inuit Qaujimajatuqangit in life science education from the stories of teachers and elders. It is important to choose a process that respects Inuit customs of how stories are treated and use a process that is considered rigorous by the academy. Healy and Tagak Sr. (2014) are explicit in the need to include participants in this process. Clandinin, Huber, Murphy, and Orr (2009) refer to texts constructed during this stage as interim texts. Interim texts are initial narrative threads written by the researcher and shared with participants to allow for participants to refine narratives that they shared and begin making meaning of the data (Clandinin et al., 2009). It is also important to Inuit to keep the context in the story (Kublu et al., 1999). The researcher worked with participants to negotiate terms of engagement at different stages of the study including data analysis. It is important that the researcher, in respect of the participants, fosters transparency by sharing interpretation of the data and allows further dialogue between the researcher and participants in the refinement of data. A model that honours the practice of keeping shared stories whole will also have to be negotiated. This can be done by "Iqaumaqatigiingniq" which is to make meaning together (Healy & Tagak Sr., 2014).

It is common in academic research to present fragments of data rather than the whole, out of respect for people who share their knowledge stories need to keep their context and be presented fully in order to respect those who shared their narratives. Wilson (2008) shared a story of misinterpretation of a story from Cree to English where the researcher had to engage in a relationship to correct the misinterpretation and restore meaning to the story that was originally shared. Translations from Inuktitut to English can also be misinterpreted when they are literally translated. The researcher engaged in a research relationship that allowed for meaning to be constructed between the participants and researcher through a dialogic process that is

documented in the researcher's notes. Cross-cultural interpretation between languages can be done using definitions, etymology, and morphology of words.

The researcher's autobiography is also included in the analysis of data. The researcher who is implicated in a research relationship has to model accountability by making their intentions clear, being transparent about what meaning is constructed from the data and being open to explore the forces that shape the epistemology and ontology of the researcher through multiple lenses.

The autobiography has three stages, prior to data collection, during the data collection process, and during data analysis. The construction and deconstruction of the researcher's autobiography will be an iterative process with codes to signify construction of a narrative and deconstruction of a narrative. Wilson (2008) referred to this as two voices of the researcher and distinguished them in written text using two different fonts. A similar approach may be used to code stages in the researcher's autobiography. Ultimately the thesis is a narrative constructed by the researcher using particular narratives from participants. The reconceptualization stage should evolve to be one voice, the voice of the researcher speaking both personally and through other narratives such as literature and participant stories. Wilson (2008) referred to this stage as internalizing the research.

Data analysis phases of data reduction, display, and interpretation has to include participant input. Rather than a linear process, it is recursive. The recursive process allows for the researcher and participants to make meaning of the data while reducing the data. Wellington (2015) refers to themes that are pre-established using sources such as literature as 'priori' categories and categories derived from the data as 'posteriori' categories. Categories can also be

established using both methods of categorization (Wellington, 2015). Coding should also include looking for irregularities and contrast in the data (Wellington, 2015).

3.3 Ethical Considerations

The researcher is a member of the academic community in Nunavut specifically in teacher education. The interest for this study evolved out of experience teaching in teacher education in Nunavut and life experiences as a science student. Since the researcher is a public servant in Nunavut, the findings from this study can go directly back into the stream of education. The researcher was also raised in the Kivalliq region and has taught in teacher education in the Kivalliq region. This can be defined as a case where the researcher is labeled as an 'insider'. Focusing on a voice from an insider perspective changes the position of a lens and can offer new ideas about meaning within a specific context. However, Smith (2012) argues that:

> The role of an 'official insider voice' is problematic. The comment, 'she or he lives in it therefore they know' certainly validates experience, but for researchers to assume that in their own experience is all that is required is arrogant. One of the difficult risks insider researchers take is to 'test' their own taken-for-granted views about their community. It is a risk because it can unsettle beliefs, values, relationships and the knowledge of different histories. (p. 140)

A reflexive process is built into the methodology to help expose the researcher's assumptions and biases about the research and the process. Another component to consider is a support structure for the researcher (Kovach, 2010; Smith, 2012). A support structure provides a space for the researcher to decompress, regain strength and have moments of clarity during the

research because it can become an emotional process. Support structures are also important for participants in the research. The researcher has to be open to recognizing the context participants live in and understand how the research can impact their lives (Healy & Tagak Sr., 2014).

3.3.1 Consent, access, and confidentiality

Smith (2012) states that,

> Consent is not so much given for a project or specific sets of questions, but for a person, for their credibility. Consent indicated trust and assumption is that the trust will not only be reciprocated but constantly negotiated – a dynamic relationship rather than a static decision. (p. 137)

Healy and Tagak Sr. (2014) discuss how Inuit communities commonly build relationships of trust when engaging in a research relationship. This includes the researcher being clear about their intentions, being open with their observations and interpretations, being flexible with time and space around interviews, and willingness to take the time to understand meaning that participants are conveying (Healy & Tagak Sr., 2014); basically, allowing oneself to immerse themselves into the context that participants live in with an open mind.

Confidentiality was assured to all participants that requested it. To protect the relationships and persons from the narratives of teachers, narrative character identities were not disclosed in the stories that are shared. Explicitly sharing identity and negotiating terms for anonymity and confidentiality in participant narratives can be a form of respect for the wisdom, professionalism and autonomy of participants. All transcripts and notes were password locked electronically in the researcher's possession. The researcher cannot guarantee that participants would not exploit the data once it is provided after transcription. To ensure anonymity, data in

the form of transcripts that are shared with participants were initially coded to protect the identity of participants who wish to remain anonymous. Initial coding was coded again for use in the final text.

3.3.2 Limitations and Delimitations

The primary limitation of the study is that the final text is ultimately a narrative constructed by the researcher based on their knowledge and experience both prior to and during a research relationship. The narratives of the participants are limited to their experiences as well. The narratives constructed by participants bear relevance to the experience of teachers and elders and does not include the direct voices of the institution within the context that the teacher work in. The institutional voice is passive in the research in that it is obtained from public documents that have been published and have not been interpreted by people within the institution that oversee these public mandates.

This study is focused specifically on elementary life science education in Nunavut. The narratives constructed cannot be transferred to other teachers or schools but resonance can be explored using comparative analysis. The method used in the study does not focus on homogenized collective narratives but rather focuses on similar patterns in unique narratives of diversity.

Licensing was obtained from the Nunavut Research Institute and the Trent Research Ethics Board. Furthermore, permission was obtained from the Nunavut Department of Education to access teachers as research participants.

3.4 Assumptions

Narrative studies have been done to discuss issues in Nunavut education (Aylward, 2010; Berger, 2009; Lewthwaite et al., 2010; McMillan, 2013). Even fewer studies have used critical narrative research to study education in Nunavut, most of which have been done through graduate studies (Healy as cited in Healy & Tagak Sr., 2014; Higgins, 2013; McGregor, 2013).

4 Making Meaning of Stories

Stories offer lessons both explicitly and in metaphors. It is a common pedagogical approach and one that was favourable for collecting data both in the field from participants, and for capturing my own learning experience throughout the research. To provide a path through the stories and the research experience, the data is presented chronologically. Clandinin (2007) suggests that one method of finding meaning in narrative is to discuss the themes within the stories. The stories themselves, offer many lessons, however the data presented here is limited to the parts of each conversation that relate to the major themes discussed in this thesis.

The chronology of the stories starts with my experience as I prepare to begin field research. This experience came at an opportune time because as I received all the necessary approvals to go into the field, the teachers in the Kivalliq were having their regional teachers' conference. The sequence of interviews began with an elder, followed by three focus group interviews with teachers with ten teachers, with one elder interview in-between, then one last elder interview when I returned home from the trip. The order in which the interviews took place was a coincidence but also a series of lessons unfolded each time the interviews took place. Every interview built onto the next in a way that took me full circle. The spiraling effect of the research experience reminded me of the process of building an Iglu, making the process and shape a favourable metaphor to use within this research. It also resonates the Iglu metaphor used in the Nunavut Teachers Planning Guide (NDE, 2012). My narrative, as it fits into this chapter and the chronology, is not as compartmentalized as the interviews, but rather included as it relates to the lessons by providing both my key learnings, and context to the conversations I had; like the snow used to fuse the snow blocks together in-between the lines. This chapter is a

pathway through the six interviews I did with elders and teachers, and the reflections I did throughout the research experience.

To respect the confidentiality and choices for anonymity of each participant, the elders' names are explicitly shared while the teachers' names are substituted with pseudo names. The teachers' names are replaced with animal names. Although animal names are often used as Inuktitut names; they are not used in this research as a means to link to any Inuit kinship. Instead the names are used to distinguish interview groups using environmental elements of the earth, sky, and sea. Teachers who wished to make their identity explicitly recognized within the research are identified at the front end of the manuscript.

Wilson (2008) weaved his conversations and reflections in a style that makes it easy to differentiate between data and research texts. He used different types of font throughout the text which makes it easier for the reader to both visually and mentally follow the author's narration between the field and research texts. Iannacci (2007) refers to this style as a process of construction, deconstruction, and reconceptualization where the story begins with the narrator's voice and the theoretical framework as separate voices that emerge into a reconciled voice out of a process of reflexing. In order to make the type of texts distinguishable, I use three types of font: non-italicized texts are the continuation of the iteration of this manuscript, *italicized texts* represent my reflections throughout the research journey; and non-serif texts represent conversations with interviewees. Using this style, the voices become distinguishable as research texts, and field texts from interviews and the researcher reflections.

4.1 Beginning the Journey

Initially, my questions centered around the challenge of teaching science bilingually because the NTEP is mandated to prepare English-Inuktitut bilingual teachers. I have been challenged personally to achieve this by combining what we often look at as two different worldviews: an Inuit worldview and a Western worldview. While drafting research questions, it became apparent that Inuit Qaujimajatuqangit and how it is used in education was where most of my questions lay. I find that questions about why we use it focus on the significance or importance of IQ, but we have far less conversations about how we use it. How we use it offers lessons about IQ in action, it becomes mobilized, and brings out the utility of IQ. Conversations about how we use it become practical applications that we can use in our own practice as we relate to them, reflect on them, and reconceptualize them to suit the contexts that we are working with. I also recognized a lack of exemplars about using Inuit knowledge in science education from available academic learning resources. The lack of resources alone makes it challenging to meet the expectations to prepare prospective teachers to use it in their classrooms.

After many years of teaching, I would continue to circle back to the question "is it because of my lack of K-12 teaching experience that I am challenged in this way to use IQ in my practice?" The first test of credibility I often face within the field of education are the number of years of K-12 teaching experience that I have, and teaching in different streams. My formal teaching experience is limited to post-secondary education and I am explicit about that in my practice because the knowledge and experience I bring to this field is unordinary, I have several years of formal teaching experience with adults and none with children but my entire upbringing as a student within the Nunavut Education system. People often follow-up this information with "How did you end up with NTEP? How are you teaching there if you have never been a

teacher?" What becomes obvious to me is how quickly my teaching experience within the program is overlooked, and how the other things I offer in my work aside from teaching hours are considered as less significant than the number of hours spent teaching children.

When I discussed my initial thoughts with my thesis advisors, their feedback and questions helped me narrow the scope and realize some important connections. Some explicit connections between IQ and the science curricular expectations are the outcomes for the life science stream. Inuit life is very much connected to life science processes making it an obvious link between the two. Since I work with prospective elementary teachers, I can link my own practice with what elementary teachers are doing in Nunavut. What has been lacking in my own practice is the ability to offer exemplars of how IQ has been used by teachers in elementary classrooms based on the expectations as set out by the education system in Nunavut; the stories from teachers who are in classrooms about how they have taught become concrete examples of what has been done. Finally, by using narrative, I can deconstruct meaning within the stories and from my own story to reconceptualize new understandings. The direction they gave set me out in a good direction, I felt prepared to start asking more questions.

As I travelled to Rankin Inlet to do the interviews, I was preparing my notes, and my questions, making sure everything was translated. I kept thinking about how I would introduce myself. I kept circling back to my years of teaching experience. I realized how much of my work and what I have observed teaching science would be based on Western curricula, while finding spaces to fit IQ. Using Inuit knowledge and Inuktitut was always secondary. The general outcomes would be based on Western-derived outcomes that prepare students for a Western scientific mindset. While doing so, there is the common practice of compartmentalizing

information based on what is IQ and what is science. Then I would go all the way back to asking "What is IQ again? What does it mean? How do we define it?"

As the researcher, I am positioned as a learner with very little teaching experience in an elementary science classroom, but lifelong experience as an Inuk science student. My experience is limited to teaching adults as a science instructor. The adults I teach will eventually become teachers who teach elementary science so I find it a worthwhile endeavor to learn from the experience of teachers that have recently taught elementary science. What I learn from their stories will contribute to my practice as a science instructor by allowing me to re-examine my practice in the classroom. My experience during this research journey; the questions I have had; and the new understandings I have come to know, are weaved into this research throughout.

4.2 The timeline of Interviews

4.2.1 Tattuinee Interview

The first interview I did was with the elder Jerome Tattuinee. I met Tattuinee prior to our conversation in other situations, particularly as a guest elder when I taught in Rankin Inlet, and during impact assessment when he participated as an elder community representative. Having been acquainted with each other prior to the research lessened my apprehension to ask questions. It was also the first time I visited an elder after my mother's passing. It was a significant step for me in the research process because many of the elders I would have interacted with had passed on. Tattuinee was very generous and kind in sharing his wisdom. He expressed the need for Inuit to be open to sharing with each other so that we [younger Inuit] can learn and carry on knowledge that has been so important to who we are and how we live. By the end of the conversation, many of the questions and unsettled feelings I had about teaching, science, and Inuit Qaujimajatuqangit were settled and clarified. The sense of doubt and hesitancy around the

legitimacy and significance of Inuit Qaujimajatuqangit that seems to be perpetually fueled in the workforce boiled down to excuses that stem from cognitive imperialism. Our conversation surfaced significant and concrete examples of the legitimacy and significance of Inuit Qaujimajatuqangit in science and education.

4.2.2 Qilak Group Interview

The second group of interviews were done with a group of teachers that I will refer to as the Qilak group, meaning sky. The Qilak groups' discussions centered around the place and mode of learning, outside the classroom and hands-on. They emphasized the role of family and the importance of relationships. Many of their stories were on contemporary culture where Inuit Qaujimajatuqangit is learned in integration with Western science. The foundation of Inuit Qaujimajatuqangit in their practice was centred in cross-curricular competencies and instructional strategies.

4.2.3 Atqittuq Interview

Then I interviewed another elder. The interview I did with Atqittuq took place after I had done some interviews with teachers. As I posed the questions about Inuit Qaujimajatuqangit and education, she was very honest in questioning “where is Inuit Qaujimajatuqangit in schools? They say they have it and they use it, but where is it? Inuit Qaujimajatuqangit came from our parents, it was passed down to us. Where are the things our parents and our elders taught us in schools?” As she posed these questions and provided her perspective, more questions loomed in. Many of the examples she shared were related to the roles that women play in Inuit culture. It was a contrast from Tattuinee’s examples on the land, but none the less connected to the land just as much, instead in a home life setting that revolves around the handling of natural resources and food, and knowledge of human biology.

4.2.4 Nuna Group Interview

Subsequently, I interviewed the Nuna group, meaning land. The Nuna group's stories emphasized Inuit elders as a source of wisdom. They shared stories about how they involved elders in their practice, and what they have learned from them. Additionally, their stories show integration of Inuit knowledge by making it place-based, experiential, contextual, on the land, specific, and culturally relevant. They often drew comparisons between Inuit life in the past and today. Their stories show how Inuit Qaujimajatuqangit can shape children's attitudes in school practice in meaningful ways that draw on principles and values established through learning experiences on the land.

4.2.5 Tariuq Group Interview

Later, I interviewed the Tariuq group, meaning sea or ocean. The Tariuq group emphasized how Inuit Qaujimajatuqangit is established in practice by using Inuit knowledge, values, and practices. They made connections to Inuit life prior to contemporary education as being the foundation of knowledge that we draw on that comes from elders. They discussed instructional strategies, the use of language, and how the practice of culture in schools shapes a child's identity and attitude. Key themes include land-based and experiential learning, teaching children to observe and listen, and community involvement in education.

4.2.6 Alikut Interview

The last interview I did was with Alikut. Our conversation seemed to complete the circle of everything that had been shared by the previous interviews. When we discussed what Inuit Qaujimajatuqangit is, just as the other elders said, Alikut stated that "it came from our parents". The explanation he provided described how as we grew, most of our time was spent with our families, learning from our parents. Since colonization began, through residential schools, these

relationships have been disrupted, replacing these family responsibilities with government authorities such as education. He also talked about how through this process of colonization, our values have changed, the ways in which we respect and utilize resources such as caribou have changed. Much has changed to the extent that our culture and values, as they were, have been "buried and frozen". He discussed the need to uncover and resurface Inuit Qaujimajatuqangit because it is a part of who we are and would serve to address many of the issues we face today, such as those in education.

The sections beyond this timeline of events go into major themes that were drawn from the data. The disruption of stories by taking them apart and putting them into themes is not intended to disrespect honouring their stories in their entirety. The themes were drawn by looking for common threads in all their stories. The elders' stories were the initial source of themes, making them the first to appear at the beginning of each section. Each theme draws upon the things I have learned from their stories and the ways I related to their meaning, with connections to educational theory.

4.3 Situating the Learning Context in an Inuit Worldview

In this section, participant responses from their stories are weaved together to illustrate what a learning setting is from an Inuit worldview, outside of school, as experienced by earlier generations, our elders.

> Tattuinee: My name is Tattuinee. I would like to talk about the weather and climate because this is what I learned a lot about from my uncle who was an expert with meteorology. He said that he doesn't love me so he wants to take me outside to look at the sky. Now, I realize that he did that because he did love me very much. When we went outside, the sky was very clear and it was very dark. He took me outside and told me to look up at the sky so I looked up. When I looked up, the sky was covered in a multitude of stars, stars everywhere, they looked like they were touching each other.

> When my neck got tired of looking up, I looked down, then my uncle asked "did you see?" I replied, "yes, I saw, there are lots of stars." He asked "what are they doing?" I replied "I don't know" because I didn't know. He told me to look up again but to pay close attention to what they were doing. I observed them a little while longer and when my neck got tired, I looked down. Then my uncle asked me again "Did you see?" I replied, "Yes I see now." He asked "What did you see them do?" I said "they were flickering like they were blinking." He said "yes." He explained that they are behaving that way because there are strong winds high in the atmosphere and when those winds come down, there will be extreme winds near the surface.

Tattuinee asked to confirm if things like weather were topics I was looking to discuss when I referred to the environment. I said yes and he proceeded to discuss more weather phenomena. Here, he discusses the phenomena of mirages and how they can be used to understand the conditions of the atmosphere.

> Tattuinee: The next time, my uncle instructed me to observe the islands and ice to see if they look like they're going to float or be tall. He told me to observe to see what they're going to do because if the islands we saw in the distance appeared to be taller, higher, or low to the ground but closer than usual, they would tell us about the wind. He was beginning to teach me. He said, "let's go outside." We went outside in the spring time, this time when it's bright. "Nephew, do you see that island over there?" he said. I replied "Yes, I see it." He said "what is it like?" I replied, "I don't know, it's right there." My uncle told me to observe it more closely. As I observed it I realized that this island that usually appears flat looked very high. He told me that this was a sign that there would be strong winds because he wanted me to be aware when strong winds were coming. This is how I became very aware of the weather and developed my knowledge of weather conditions and patterns.

He continued telling stories about understanding signs and patterns of current conditions and wind predictions.

> Tattuinee: Now another time, this island that was close to us appeared to become thin and distant while it was windy, it was a sign that the weather would clear up in the days ahead. Now in the summertime, I'm sharing a story from the summer time. In the summer time the weather was very clear that the water was clear and still while we went seal hunting by boat. Anytime we shot a bullet, we could not hear the shot, the

sound was silent and silenced right away. Another time we went hunting again, we shot a bullet and you could hear it whistling, [long winded whistling sound]. We shot another bullet and you could hear it again, whistling, sounding like it was traveling a far distance. That was a sign that by nightfall the winds would come and overnight we would have strong winds. He knew those things very well so I learned a lot from him.

Tattuinee continued to explain how different type of clouds bring different kinds of precipitation and signal different wind conditions.

Tattuinee: What I had learned had a lot of purpose, I used them all the time.

He finished off these stories by saying that there is so much to learn about the conditions, the processes, and the patterns in the sea, on the land, in the sky; that these things have utility and have to be taught.

Tattuinee: I loved playing outdoors, even in snow storms, making snow blocks, making Igloos[21]. It was so much fun learning how to cut blocks. It was possible to become capable with practice. Even though we were not schooled, we learned by watching, observing. We don't say we were schooled but we did learn a lot by being included and as it turns out we did learn a lot even though we did not see it as being schooled, we were still taught.

…

Tattuinee: Some learn fast and some learn at a different pace, that is how we were taught, those of us from the earlier generations. I don't want people to say that our youth are incapable. They don't know these things and they have not heard of these things, this is why they lack the ability to do or know these things. If they were taught as we were, they would have the ability and knowledge as we do. Now, they are taken on to the land without being taught these things and this limits their ability to do things on the land, they have not been told about these things. We have been taught many things.

[21] Iglu is the proper spelling of Igloo using the Inuit Cultural Institute's standards for writing in Inuktut; however, mixing grammar conventions between English and Inuktut are not encouraged, therefore the English convention is applied in the English sentence.

When considering some of the things that are important to learn in science from an Inuit worldview, Tattuinee discussed wayfinding and the significance of being observant of your surroundings.

> Tattuinee: We would tell them to observe and direct them to features on the land so that when they approach it again, they would be able to recognize it and observe any changes. We would tell them to be aware of their surroundings and study their features. For example, if we see an Inukshuk and approach it, we would observe it so that if we see it from the distance from another angle, we would be able to recognize what direction we were traveling in.
>
> …
>
> Tattuinee: When we're traveling by dog team, we would use patterns on the snow. Qimugjuit (Sastrugi) form from different wind directions. Sastrugi[22] patterns from the north west, the south east, the north east and the south west are made by the wind in different patterns. If we observe the north wind sastrugi pattern that we call Uqaujaut as we head out onto the land and we decided to travel home by nightfall without using the same path, we would travel back home using the same sastrugi pattern but following it in the other direction. These things prevent us from getting lost.
>
> …
>
> Tattuinee: You can look at the stars and locate where you are and determine that you are all the way up here when you were planning to go all the way over there. Those stars like the Akuttujuuk[23] constellation, if you observe them, you can use them to track your movements. You might think to yourself "yes, based on that constellation, I'm over here and the land I'm travelling to is over there." When people don't pay attention to these kinds of things, to their movements while they're traveling, they get lost. You have to observe these things. In the early winter time, after the first snow fall, the grass will bend. The ground will be covered in frost and ice, and the top of the grass will bend in that direction, you will be able to determine what direction that wind was blowing. If it's bending this way, you know that wind was coming from the south east and the wind

[22] Sastrugi also known as Qimugjuit in Inuktitut are

[23] Akuttujuuk are a part of the Orion constellation, specifically the Betelgeuse and Bellatrix stars (MacDonald, 2000, p. 43)

came from the sea. If the grass bends north west, the wind would have blown to the sea... You can use the direction of the grasses bend to know where you are and where you are going.

K: So, observing was an important practice?

Tattuinee: Yes, you had to be very observant from the start to prevent getting lost and understand what direction you started traveling towards, either that way or that way, up there or down that way. If a storm comes like if it starts to snow, you can use those things that you used when you started your journey to find your way.

Learning in traditional settings was diversified, therefore learning opportunities, learning outcomes, and how to meet the expectations of those outcomes need to be diversified. If Inuit Qaujimajatuqangit is going to be foundational to the learning, people who have that knowledge need to have those relationships with students in schools so that students have educational mentors to guide their learning, affirming Inuit knowledge and identity.

Tattuinee: Children would accompany their parents and learn from them. In the spring, we would travel to Wager Bay. My uncle taught me a lot about the weather, about climate… We would learn from the people we were with.

Personal Reflection

I often observed my mother and participated when she harvested, prepared meat, traveled on the tundra, and made clothing. Inuit Qaujimajatuqangit I have learned from Inuit is limited to my experiences with Inuit who taught me. Inuit knowledge is diversified and not treated in the same way as Western knowledge. Inuit elders would often say that they would only discuss things that they have seen or done and would not profess to know things beyond their experiences. This is one of the challenges of sharing Inuit knowledge because when you are sharing with people who are used to knowledge like Western knowledge that is treated as abstract and detached from the knowledge holder, there is an assumption that Inuit knowledge will be shared and treated in the same way. It can

also leave the impression that if we cannot share Inuit knowledge the same way Western knowledge is disseminated, it is treated with lesser value. This is a continuous obstacle that Inuit face when trying to share their knowledge. Western knowledge places more value on universal knowledge whereas Inuit knowledge values particular, experiential, local knowledge.

During a discussion with a group of teachers, Ukpik made a point about the place and mode of learning, outside the classroom and hands-on; the role of family and the importance of relationships.

> Ukpik: when I first started teaching at the school my father had told me that learning doesn't just happen inside the classroom, there's learning going on outside, there's stuff to learn outside as well, not just inside the classroom so from there on he gave me ideas of doing more hands-on and also taking them outside

While discussing how we might use IQ and Inuit culture in schools for science education, Atqittuq responded as such.

> Atqittuq: People who are referred to as being from the sea, and being from the land, their ways of doing and working are not the same. Here, like the people from the sea live in a wet environment. They also make use of seals, pinnipeds; they can use these to teach about the use of the qulliq, about the fuel, the fuel from animals. As for us who lived on land that is dry without a sea, we used caribou fat, that's what we would use. We would render the fat and bone marrow to draw out the oils. We would render fat from the bone marrow, the fat from the meat, intestines, and kikhaut [visceral organs] by boiling them to make punni [rendered fat]. Here [at the sea] they would hammer out the oils from the blubber.

She continued to talk about why it is important for our children to learn from us. Our children need to learn the way we live, what we know, and what we can do because those are the things that allowed us to survive the cold. Reading books and the ability to read has little utility when it

comes to survival skills. These things were learned by observing and learning from our parents' experiences.

Personal Reflection

> *I can relate to her response because I was involved and included when my mother would do anything from harvesting, cooking, sewing, and discussing. I also completed a school experience where much of my time was spent in school learning from books, and as the years went on, this became normal practice. I can see how the way my mother taught me was active and focused on meeting our needs and surviving. Whereas in school, it was not always clear as to why we learned what we did except to say that it would help us find employment in the future. My school experiences were more abstract and not always relatable which created challenges in making sense of what it was we were learning.*

This goes back to Aikenhead and Michell's (2011) discussion around bridging ways of knowing and doing in science learning. A two-eyed, bridged science curricula would bring these two practices together, teaching science within the context of how we live and making use of how our ancestors lived. Validating Inuit knowledge in science requires the use of Inuktitut and Inuit knowledge from the context of Inuit lives, specifically the people we live with and the environment that surrounds us. Our families and the environment where we live are our foundation.

In addition to what elders had to share, teachers shared their perspectives on what the setting was like when Inuit would learn science prior to formal schooling.

> Arviq: Knowing everything from how the weather is going to be and studying its patterns starting from the time you get out of bed, understanding where you are on the land because those things that people have now like GPS devices didn't exist, and they

would travel using dog teams. Dogs know how to get home, even in a blizzard. The Inuk traveller and the land were like one, they knew the land so well when they traveled the land, whether in the winter or summer. For example, us teachers have learned but did not live as our ancestors did; we live as they did, only in some ways. We're not as interconnected with the weather, the land, or the water in ways that our ancestors lived. Even the food they ate, that's not all we eat anymore. Sometimes we eat traditional foods but now that we have stores and the food is more plentiful there, we rely more on them to get food. These things to learn, we learn throughout our life, learning is lifelong, we continue to learn until the end of our life.

A teacher from the same group who was born prior to the creation of settlements added that:

> Qinalugaq: Our grandfathers, our grandmothers were always around and with us because we always had to be with people. Even the person being carried in the amauti were included; some were handheld while others were carried on their shoulders. My father used to carry me on his shoulders. If I wasn't' on his shoulders, he would place me on top of the caribou meat he was carrying on his back anytime we were traveling on the land, if he caught caribou while on our journey.

This demonstrates that everyone in the community was involved in education. Teaching was not limited to a person who was designated to fulfill that role, but rather taken upon as a responsibility by everyone in the group. Elder Alikut contextualized what this would have looked like.

> K: Are there any ways that you were taught before you attended school that you recall that you can share?
>
> Alikut: When we were little, we were treated as sensitive, we were not yelled at, they did not raise their voice so that we would adopt these lifestyles when we got older. What we knew seem to expand as we got older because we would be allowed to experience more, we had to participate. We were given things to do. Boys would follow their father on the land and the girls would stay with their mother. They would always be teaching us, right until we went to sleep. They would always teach us by talking to us. Right from when we woke up, we had to observe everything. We were not allowed to ridicule each other for the tasks we were assigned, everyone had things to do.

4.4 Inuit Qaujimajatuqangit

This section of data articulates the meaning of Inuit Qaujimajatuqangit, provides support for why it needs more equitable value in education, and how IQ principles and values have been used in practice by teachers.

4.4.1 What Inuit Qaujimajatuqangit Means

Here, we focus on defining Inuit Qaujimajatuqangit, highlighting that it is contextual embodied knowledge acquired through specific experiences.

For example, here is part of the discussion of Inuit laws in comparison to Canadian laws.

> Tattuinee: You're from Baker Lake, I'm from Rankin Inlet and if I was a leader in Rankin, the rules we create would only apply to Rankin Inlet. That is how Aivilingmiut followed laws. For example, the people of Hall Beach would not apply laws from Iglulik, they would each have their own laws. Today, we are expected to have Canadian laws. Inuit would have local laws and not apply laws from the outside but now we're expected to follow national laws.
>
> …
>
> Tattuinee: Everything from Inuit life, food, Bearded seals, seals, Beluga whales, fish, everything was not for sale… My mother used to tell me that when we catch something and share, there would be more to catch soon enough. I would hunt so we always had a variety of food.

Consequently, when the NDE worked with Inuit elders to articulate Inuit Qaujimajatuqangit, the elders included an abstraction of Inuit laws. The theory is as follows, Inuit laws come from nature which are referred to as Maligait. Along with outlining the different kinds of Inuit laws, the working group defined eight guiding principles that provide a foundation for Inuit Qaujimajatuqangit. One of these principles is Piliriqatigiingniq. Here is what one teacher had to say about Inuit Qaujimajatuqangit in the context of the principles:

> Amauligaq: I think it's all interconnected, not just in science, but everywhere and I know sometimes I get caught up on it has to be so culturally relevant and like the way Inuit did it but or something along that but if we just look at the principles they're so universal. Working together um it just it's a natural part especially in science because that is where they're discovering that where they're learning you know through demonstrations or experiments, it's -- that's the most natural way of learning right? I find.

Another teacher shared their views and experience with the concept of Inuuqatigiitsiarniq:

> Tarralikitaaq: me growing up in a northern community it really ties in with what my experiences were and I get to share that with my students too, and they get to share with me too because they experienced it themselves too. So, I really liked that um we have that relationship with the IQ principles because I use a lot the IQ principles with the social studies too -- just cuz' Inuit were very social and they um really supported each other to live in a world where it was harsh so I find that social and science were really tied -- ilia that's how I see it with Inuuqatigiitsiarniq.

Amauligaq and Tarralikitaaq's comments go back to Tattuinee's explanation about how laws were universal but how they were applied depended on the context of living in place, time, and social conditions. The principles can be viewed as universal, it is in the 'how' that we contextualize them. The context is shaped by the place, time, social, and environmental conditions. If these Inuit ways of living are shaped by these principles as a foundation, we might ask where does this foundation come from?

> Atqittuq: Our parents were our foundation because they raised us. Today, this foundation is displaced by schools because the foundations of school are not the same as our parents.

Personal Reflection

> *This is where I see the struggle of being two-eyed. We are expected to walk in two worlds of knowing, but because I am one person, my understanding of the world is one whole that combines different worldviews with a merged understanding of the world; an evolution of what was before becoming something new, fused into one mind that*

understands life to be one world differentiated by values, language, and interpretations. My own identity shaped by different worldviews. I can relate to the foundations of home and school being in discord. The values and principles may have been similar at home and at school, but it is in the 'how' to live them that I struggled. Perhaps this is why my questions aim to look at how to marry the two in a more equitable way so that our children's identities in science learning are fostered in a more harmonious and equitable way that values who they are and where they come from because it is there that I found the greater sense of purpose.

Ak&a and Siksik shared the experience of using Inuit Qaujimajatuqangit in practice:

> Ak&a: Like I would say your amauq [great grandmother] or your grandmother, they lived it, if you ask them, they'll answer the same way. Inuit Qaujimajatuqangit is always in use without knowing.

Example of using IQ values to teach attitudes:

> Siksik: going back to your previous question. When my dad was alive, we had no choice to go to the land. During the summers, we had no choice. Um, discipline, that's what he did; discipline. Get up, go out there, come back, there's nothing. Always check. No matter what you're doing, keep an eye out. That's what he did with me and my nephew, discipline. My first year, I was given printable copies of IQ values. There was one student who always acted out every day. So, I tried something with him. I let him stand up in front of those IQ value photos. For about five minutes, he didn't know what he was doing. So, I just told him "pick one" He just did a random one. I forgot what he pointed to but I told him that I see him -- demonstrating that when he's trying. And one of them was discipline. He started thinking along the way "I should try improve my behaviour" He thought of that all by himself. After that, his behaviour calmed down a lot.
>
> K: so that student -- they had some responsibility and they were able to – what -- identify with values that you shared in the room?
>
> Siksik: he didn't see it in himself. He needed someone to show him that he possesses those [IQ values].

K: so, he needed positive reinforcement? is that an important part of teaching using Inuit Qaujimajatuqangit?

Siksik: values, yeah. It's -- the ones I put on the wall in my classroom, all positive values. Yup.

Here, Arviq situates Inuit Qaujimajatuqangit and gives us a rationale for why this knowledge exist.

Arviq: This Inuit Qaujimajatuqangit began long ago but it's new in literature. Inuit anywhere, elders, like in Arviat, Igloolik, Pangnirtung, anywhere, wherever they live have used Inuit Qaujimajatuqangit because that is what helped them live, to survive, to live a life. Knowing everything from how the weather is going to be and studying its patterns starting from the time you get out of bed, understanding where you are on the land because those things that people have now like GPS devices didn't exist, and they would travel using dog teams.

Further, the concept of Ilippalianginnarniq – continuous learning:

Arviq: Children are not the only ones who learn, and the inside of a school is not the only place to learn, there are vast number of things to learn about throughout our lives. This concept, Inuit Qaujimajatuqangit, as a focus of study has so much depth that we can only talk about some of it. However, we can discuss it. There are too many topics related to Inuit Qaujimajatuqangit like hila [weather], just weather alone has so much depth.

The IQ principal Avatipningnik Kamatsiarniq – environmental stewardship

Arviq: So, these are all possible things to learn, in life the living things like animals whether they are big or small are not supposed to be harassed or taken for granted. Um – they will not say, they will not pay back but the offence will come back to us in some way. All these things that are Inuit Qaujimajatuqangit are connected, are linked.

IQ principals Piliriqatigiingniq, Tunnganarniq, Inuuqatigiitsiarniq, and Pijitsirniq intertwined in school practice:

Qinalugaq: Also, there are so many students that we are split into different classes. I'm not the only kindergarten teacher, there's another kindergarten teacher because there are so many students in that grade. Two of us are kindergarten teachers. We don't

teach exclusively on our own, we work together, we plan together; this allows us to expand how we can teach, we come up with different ways to teach. Since we know each other, we don't take on the task of doing everything on our own, we share, we also communicate their progress with each other. There is not only one teacher. There are multiple classes for the same grade, up to two to three classes per grade. You might have two or three teachers for each grade.

K: So is collaboration or working together amongst teachers important?

Qinalugaq: Yes, very much so, and when we were learning to become teachers we were also taught to be prepared if our plans had to change because of unforeseen circumstances. We had to have backup plans to amend our teaching plans if things changed.

Arviq: Also, these teaching materials, if anyone wants to use them, if they're in someone's classroom for example and I ask "can I use these resources?" and they reply "no, you cannot use it because it will get lost". They belong to the students, they do not belong to the teachers, they're for the students.

Rationale for IQ values and principles in relation to the environment and living things:

Alikut: Inuit had a lot of respect for living things because they needed them to survive. Everything that was taught about living things was important. Respecting living things was very important because it is what allowed you to survive.

Summarizing what is IQ:

Alikut: Our Inuit Qaujimajatuqangit is our experiences, we live it and share our Inuit Qaujimajatuqangit. It is tied to where we live and how we live.

Further:

Alikut: [Inuit Qaujimajatuqangit] was in people's hearts like a belief or faith. Animals were treated as if they are sacred, they had many laws related to them even though they were not written down. The fact that we have to take care of the environment; these things have to be brought into schools, starting with the little ones.

Five of eight IQ principles have been discussed in this section of the data. The other values of Pilimmaksarniq, Aajiqatigiingniq, and Qanuqtuurungnarniq will be discussed in other sections related to teacher pedagogy and student experiential learning.

4.4.2 The need to value Inuit Qaujimajatuqangit more equitably in education

Here, participants provide reasons for why we need to value Inuit Qaujimajatuqangit in education.

> Tattuinee: I told a scientist that when their [Western] knowledge and Inuit knowledge start to agree, start to work on the same thing, they will be able to function together. However, Qallunaat[24] do not understand Inuit knowledge so they usually place lower value on it. When they start to give it equal value, they will begin to agree and function together… When Western knowledge and Inuit knowledge begin to work together they have the ability to create a better, expanded knowledge system where they both benefit. You may understand that at first Qallunaat dismissed Inuit knowledge but now that Inuit are becoming educated and able to function in both languages, Qallunaat are beginning to understand what we know as Inuit bring to the surface Inuit knowledge in a way that others understand. Our wise people in the past were unable to communicate with Qallunaat so they would be limited to agreeing to things without clear communication and understanding.

This goes back to the concept of Piqqusiit Tamaita Kati&&ugit.

> Ukpik: one of the things that I found out was to um -- Aupilaardjuk -- the late Aupilardjuk had mentioned it before, Louie Angalik an elder from -- that worked at the department of education had mentioned it as well, and also I've read it in um -- Joan Wink's and I forgot the other author, it's in my notes at home um -- the people -- the theorists, the scientists -- whatever their, which ever they were titled and the elders that we have, even though they never communicated, they never talked to each other, they never had the chance to read, but they were writing about, they never collaborated with the elders, but there was this thing, this idea like um -- Aupilardjuk mentioned that "your eyes and your mind, once they start working together then

[24] Qallunaat is a term used by Inuit to refer to White people, or people of European descent

> there's some action that will produce something and Angalik explained it in a way that "if you had seen it, then you thought about it, and then you take the action" into um -- making it or modifying it or whatever it may be and then in that -- I think in that Joan Wink book it was "see, think, act" so like -- even though they're -- worlds away -- but the same in concept comes together and I think science and Inuit Qaujimajatuqangit, I think that is like why -- that I mentioned that there's -- they go together even though -- even when we don't know, they don't know but yet it's ah -- what Amauligaq had said "it becomes universal" it's not just for Inuit, just for southern people, only scientists will come from the south but there's a lot of scientists up here too that are not just given degrees or recognized like -- they have the same idea and same concept that um -- that makes it/

If we are going to value Inuit knowledge more equitably in education, the practice of placing more value and credit to Western forms of knowledge has to change. We need to accept that common forms of knowledge can be inferred based on different experiences that are situated in life experiences that are flexible and not as linear and sequenced in the ways that are rigid and finite, within the socially constructed limitations of Western knowledge. Atqittuq reminds us that we still need to work on reconceptualizing curriculum from an Inuit worldview.

> Atqittuq: I do hear that people work on developing curriculum resources but I have not understood what kind of curriculum resources they have been making. I say “When they have meetings, what is the purpose behind their meeting? Where are the things they worked on, why haven’t we seen them? The ones that are working for our children, where are they? Where is our language? Where are the words of our elders, their wisdom?” That’s what I think about. Where is the wisdom of our elders who lived on the land? Sometimes I think, they’re gone, they vanished. As it stands, knowledge from the south has replaced the knowledge here, it has filled this land. So where is Inuit Qaujimajatuqangit? Where are they? What do they meet about? Where are the words, where is the terminology? Where is the Inuit terminology for animals? For people. As for me, I think I know the language of my body the most. It seems to be all I know. Starting with the crown of my head ….

We need to include elders, credentialing limits our diversity. The science we have yet to bring into the classroom is in their life experiences

Ak&a: it's always good to include IQ principles. They were the ones that taught us Inuit. Even though some Inuit have not gone to school, they are wise. We cannot assume "they are not intelligent because they're not educated in school", get advice while they're around. That's what I would recommend.

Tuktu: for me I just think that the elders are wise and -- they're the ones that experienced the science. Like the shape of the igloo, warming -- being warm in the igloo, building the sled, making the needle, stuff like that. They're the ones with the most knowledge and we just get to learn from them. That opportunity. And that's not very much now because our world is changing, we can just know about it and we live it but our -- students, our children, our grandchildren need to know about it. There's more to books but it's the knowledge that's not written.

What school practice might look like if Inuit Qaujimajatuqangit was considered more equitably:

Nanuq: When we're going to use Inuit Qaujimajatuqangit in out teaching practice, we have to plan for it for the whole year. Inuit Qaujimajatuqangit is used as a foundation and we plan for how we're going to practice it. When we're doing our year planning, we plan to include Inuit Qaujimajatuqangit throughout the year, we decide how it will be incorporated into our plans. Also, this fits well with themes like environment, weather, climate in grades Kindergarten to…, I mean all the way. In grades Kindergarten to grade two, we can use it in activities like when they go outdoors, or in the summer, fall, or winter. For older children there are also responsibilities for boys and girls, a teacher can work with another adult and teach outdoors together. At the fall camp or spring camp, when they return to school, they go berry picking. These are things that I know have been done as well.

Natsiq: It was strong when I was in school, in high school. When I look at it today, it's not used very much in the school anymore. When I was in school, they were recognized all the time and we would do them and learn about them. Many of our elders have passed on. We are beginning to lose these things, as if it's dying. We have elders in the school we work in but what we do is not as it used to be, we don't seem to have the same effort and money is sometimes a barrier. But I know that if we want to do it, we will. We need to try harder each year to doing things like having a fall camp and taking students on the land to learn at a fall camp or spring camp. They don't change much, we often do the same activities so we need to plan different activities and diversify. When we were taught, we were divided into groups and taught many different things, right down to life skills. These things are no longer done, only those who want to do them

participate. This is the change I have seen looking back and seeing what is done today, looking at how Inuit Qaujimajatuqangit has changed.

Situating the status of IQ in Nunavut schools since the creation of Nunavut:

Alikut: It hasn't even been a quarter of a century that Nunavut has been around so it's [Inuit Qauimajatuqangit] is new in schools but the younger generation are disconnecting from the environment and forgetting quickly so it needs to catch up.

To use IQ more equitably in schools:

Alikut: We have to start when they are young so that they will carry Inuit Qaujimajatuqangit in their lives. It is a way of living, it is our way of living as Inuit.

4.5 Language of Instruction – the significance of Inuktut

Here, it is argued that the use of Inuktut as a language of instruction is a significant factor when considering elementary life science based on Inuit Qaujimajatuqangit. Participants share their views about why it is important and how it may be used.

K: If we were to teach children as Inuit did in the past, how would we teach them?

Tattuinee: If we taught Inuit children as Inuit did in the past, they would be able to speak Inuktitut today. There are younger children who are taught speaking Inuktitut, I know they have because I have seen it in the school. But older children, youth often do not speak in Inuktitut. The children that have been taught to speak Inuktitut in the early years are more prepared to use it when they get older.

Here a teacher shares how it relates to science curriculum.

Ukpik: even terminology, keeping up -- keeping our terminology like for example different types of snow

The knowledge is context specific both in space and time, Inuit scientific understanding has also shaped our language. Science as specific, rather than general, keeps to the qualities of the knowledge according to Kublu et al. (1999).

Ukpik: but what I'm saying is there's stuff that -- terminology -- for example the terminology hasn't changed in our dialectal differences. We still use the same terminology that is used by our group of people and we're learning more from others by sharing. um -- the good thing about being able to write in both languages is they -- it's available to everybody and anybody who's willing to learn can learn different types ah -- different terminology from different areas as well.

…

Ukpik: and radio plays a big role too where they also share "this is how we say it but it's this way in another place". um -- as an example that Inuktitut terminology for the months

K: mmhm

Ukpik: and which we use in our classrooms.

K: So, going back to that terminology for the months and how they're different in each community -- um -- why do you think it's like that? Is it because of the weather or...?

Ukpik: the -- the way of life in that particular place and area there -- their environment, their -- what was important to them. Like for um -- in Arviat some terminology for the months is based on more on the caribou whereas in the north Baffin where they do um - seal hunting, they might have more of -- not more but one of the months is Avunnivik[25], Nattiat[26] -- if that makes it clear.

K: So, a lot of the language had to do with their relationship to the land?

Ukpik: yes, and their surroundings, their environment.

K: yes

Ukpik: where they are and the practices of that particular place.

Amauligaq: describing what happens in that month. It's a very descriptive language like – you know --. If we look at the word February I wouldn't even know where to start. What does that even mean? Is it a root of – from Greek or whatever – you know what I

[25] February

[26] March

mean, they're so [scientifical] things that of course if you're going to be studying that thing you know what it is cuz' your, that's your field but to me it's just like -- February is February -- whatever it's a month, right?

K: yeah.

Amauligaq: But in Inuktitut terminology, the language it's so descriptive to environment, to the area of where you live so…

Personal Reflection

Displacing Inuktut with English, even in science learning, has disrupted how we pass on knowledge about the environment. The continued use of Inuktitut names for months allows Inuit to situate knowledge within a timeline using observable patterns in nature. Aikenhead & Ogawa (2007) refer to this as cyclical knowledge, rather than linear. Similarly, Michell (2018) refers to this as circular rhythms of the land. This very much applies to Inuit Qaujimajatuqangit because we are less concerned with years as we are with situating a sequence of events and understanding patterns in relation to the environmental conditions, using the daily, month, and seasonal cycles as units of measurement.

Although Indigenous languages may be understood as being verb-based, they still have logic. In fact, they are more interested in active knowledge (verb-based) rather than static or stationary (noun-based) which is often the case for western science. Verb-based is specific and situated, in both place (here or there; with me, with you, with us, with them) and time (past, present, and future). This does not make it primitive, it is a quality of the knowledge.

Ukpik: when we were doing that liquids, I was showing them different types of liquids. Like some liquids like soup we can eat um -- soap that we use for our clothes or for our dishes and then water of course; all shapes of-- all different forms of liquids and they were starting to come up with "skidoo oil, oil, gasoline" like stuff like that; stuff that

> they had seen and known that when we explain -- when I explain that things that you can pour, kuvihuqtut, that made it more um -- it helped them to broaden their brainstorming. And with solid we -- I use the word tigujuulluagavu cuz' I explain to them "I can't take the water because it just -- what does it do? It drips or it just goes through, and I can grab a pen, tigujuuluagara" so um -- explaining and demonstrating what each one does. And used a balloon to show when it's full of air is it lighter, when it's full of liquid water, which one is heavier? And if it's full of solid, like I put -- I was going to put sand but we didn't have sand so I put an artificial sand. And just get them to feel each balloon, how -- "just be careful, don't break it, just squeeze it or touch it, just feel it". So we passed it along and um -- it was a good experience and also generated a discussion amongst the students where um -- they were able to see liquid, solid, gas -- and using the balloon thing was quite interesting for them. And we were going to try the -- ah -- from the Internet I pulled out that experiment on vinegar and baking soda.

Here are some words of wisdom from Atqittuq and my reflections on those conversations:

> Atqittuq: Yes, Atqittuq, my name is Atqittuq, now they call me Monica Ugjuk…. I'm not exactly sure about what I'm going to talk about because words have different meanings in different communities. As for me, I recall being born ____ of Uqhuqtuuq [Gjoa Haven] on the land, at a river, at a place called Angutalik. Now, if the records are correct, I am 80 years old…. But first, we lived on the land. When I became an adult and I started having children, we moved to Rankin Inlet. Prior to that, we lived on the land north of Baker Lake. Now I can say I'm from Rankin Inlet.

Personal Reflection

> *Atqittuq being forthright about the complexity of Inuktut gave me a sense of relief and a realization about how Inuit conduct themselves differently when faced with the linguistic discourse of dialectal differences. It was obvious with elders that they are confident speaking their language, the dialect they were raised with. As for young generations, there is apprehensive behaviours like delayed time to speak, checking in frequently with the listener if they understand what they mean, defining words mid-sentence to ensure the listener understands what they mean. However, elders seldom exhibit those behaviours, they are very comfortable speaking Inuktitut as they know it. There are also sometimes*

tension amongst younger Inuit whereby they excessively correct speakers or blatantly tell them to speak their dialect. I've experienced these forms of language discourse. My experience using Inuktut across Nunavut has taught me that Inuktitut used within context is very important. It also relates to our identity. The language we speak signals the listener to understand who we are, in turn developing the context we are speaking in based on location and culture.

Atqittuq goes on to talk about many different body parts by saying "I can name my body parts from the top of my head to the bottoms of my feet", and explains that Inuit have lots of terminology to identify and describe their body, their environment, their surroundings.

Personal Reflection

When I attended the Indigenizing Education Conference hosted by the CMEC in Vancouver in 2017, I joined a discussion session about how we may begin to Indigenize education in Canada. There were participants from all over Canada from different fields of education. As we circled the group to share, I asked "how is it that when we have such rich and sophisticated languages from our mothers, we fail to pass it onto our children? How can we get past that struggle to pass on our language?" My question was both very personal and professional because I struggle as a parent to pass on Inuktitut to my children and yet I use it in my professional practice. An Anishinaabe elder answered my question: "when we teach our children our language, we start with ourselves, we start with our body. Once we can talk about our body, then we can move beyond that because then we can relate to things." With only a short response, I had a sense of clarity about where we should begin, with ourselves.

Throughout my tenure, I have taught Human Biology and using Inuktitut terminology about the human body has always been a significant part of my practice. Throughout my life experience, I often filled the role of being an interpreter for either my mother or other community members. I have done consecutive interpretation for people, usually in medical settings. These experiences have taught me that even though non-Inuktitut speakers don't comprehend Inuktitut, Inuit have sophisticated language about the body, about the environment, about physical processes that are often discussed in science. The contrast between language use in English and Western science to Inuktitut is that English and Western science are often standardized and abstract, used as universal languages like the periodic table of elements; in contrast, Inuktitut science is used in context. The context of how the language is used is significant to drawing meaning from words, words independently have little value but carry a lot of meaning when they are strung together within context. Kublu et al. (1999) explained this before proceeding to share the stories of elders who told their stories within context. This also demonstrates why using stories are so important for passing on information.

> Atqittuq: I didn't learn this language by being instructed explicitly, I learned it by hearing it. I didn't learn them in the way instruction is done in schools using documents and paper, but by hearing the language. I can say now, for me, I did not learn language using print, but I learned it using my mind, from what I saw, what I heard; so that is how I learned. I didn't use documents and paper. Through this, I would say this is Inuit knowledge. Not through print but by talking, using our voice, using our eyes, using our ears. This is how I can give meaning to it…… [continues to name various body parts]. All these terms, children no longer know them.

Later adding:

> Atqittuq: It may seem as if we have turned our backs on our children, we haven't given them the language, we have given them to the school system, that's what I think sometimes.

Personal Reflection

In relation to language use for meaning making, I recalled my mother's analogy that "the government is raising our children" when we talk about language development. Our children spend a significant amount of time in schools, making the influence of school language significant in their language development. Therefore, if schools are operated by governments and governments decide how to use language in schools, they essentially decide the language that is given value in child learning and development.

The significance of using Inuktitut as a language of instruction cannot be overlooked. If Inuit knowledge is shared and given meaning using Inuktitut, we must also value it in schools in ways that are meaningful and taught within context. Subsequently, we discussed how we might use Inuit Qaujimajatuqangit in schools. These themes can be used to envision Inuit science curricula, done in Inuktitut. Furthermore, in order to communicate knowledge from an Inuit worldview, it is best to do it in the language that was used to articulate it. When that knowledge is communicated in another language, it gets filtered through a lens shaped by the values, beliefs, and principles that share the other language, which can lead to misinterpretation in semantics.

Atqittuq: sometimes when I hear my children speaking in English, I ask, "why are you guys speaking in English, you know that I don't understand?"

Personal Reflection

When I was learning science through projects in school, I would often try to include my mom by attempting to explain the meaning behind the project and the process. I would struggle, often coming up with new meaning. It was frustrating for my mom because even if I said everything in Inuktitut, the content lacked meaning for her. She once said "I don't understand and I don't know because that knowledge came from somewhere else." That was the end of our conversation as I began to try and understand what she meant. It

wasn't until I began teaching that her statement made sense. If the knowledge we impart in school is not relevant to what our people know and the language they use, it lacks meaning.

K: Those terms about the human body that you were talking about, would those be useful in schools?

Atqittuq: Yes, they would, they carry the meaning, they are identifiers. If I want to make meaning in my language. Those are the words I would use if I want to use my language to communicate, so if we're going to use our language, they should be used.

K: How would they learn those words?

Atqittuq: They learn them by using them.

Personal Reflection

We also talked about the language used for different animals and plant. She explained that children had to be very observant and that children learn language best at a young age. Language development is best done while children are young. As I recall, Inuktitut was my first language because it was the language we spoke at home but I eventually transitioned to English being my primary language spoken as my school experience required more use of it. This had a significant influence when I began to raise my children because I eventually adopted the use of English and their first language is English whereas Inuktitut is now their second language.

The language that is validated and recognized in school signifies what knowledge, in what language, is valued. This can inadvertently replace Inuktitut, perpetuating language attrition. With Inuktut language attrition, Inuit knowledge is replaced by other forms of knowledge, primarily Western knowledge.

The experience of a teacher teaching using Inuktut:

> Nanuq: If I understand um – people from the Kivalliq, Baffin, Kitikmeot, this Inuit Qaujimajatuqangat was developed by elders through an elders' advisory committee. Elders from all these places would be brought together to meet and that is how they put it together. The meaning – I mean, how shall I say this – even though it has one meaning it can be said differently, we can use different words. The meaning can remain the same but said differently using different words. As long as the meaning is the same but said differently, I wouldn't say they are saying it wrong. Since I'm from the Kivalliq, I'll understand them but other Inuit from other places um – I would try to understand how they say things differently. I would reason that the meaning behind this [concept] is this word but add that it is said differently in other places, and be proud of the languages.

These accounts from participants show that using Inuktut as the language of instruction is significant and can be done in science education. Considerations for Inuktut language of instruction will be discussed in the discussion.

4.6 Inuit participation in science education

Here, the participants stories show why it is important for Inuit to be involved in the delivery of science education.

> Tarralikitaaq: it really is helpful with what they shared that we can still use today especially for young hunters. It's important for them to learn those things [weather and weather predicting] because we don't really have elders to speak up about those things anymore. I find it's like a tool that they can still use.

Similarly:

> Atqittuq: The environment can become dangerous. They have to learn to be aware and cautious in their environment. In the spring when the ice begins to break up it can be dangerous [discusses different ice conditions and their risks], they have to learn about the tides and the risks. If children live near lakes, they need to be taught the risks with being around lakes. They have to learn to be aware and be safe.

Awareness and safety are key learning outcomes that need to be achieved before children can participate in a learning exercise. This is done in science experiments; this is also done in Inuit

culture. Children initially interact with their environment, and learn to be aware, develop language to give meaning, and learn to be safe. This resonates with the practice in teaching Western science.

> Tuktu: the late [elder] also mention that when they're [caribou] migrating, they use the same route for how many years. And form that road that they created. He thought they were starting to go a different way.

Knowing the environment and patterns systematically was not for the sake of knowing, it was utilitarian. Knowing the patterns systematically allowed them to be able to respond to predicted changes. This example uses food preparation and the connection to environmental conditions

> Ak&a: back then Inuit lived off food like caribou and fish. When there's an abundance of caribou in the spring, they would prepare food before the bugs were out, before the flies came out. Like they don't like to waste it, before the maggots could grow, they would just cut thick dry meat and freeze them. If they get meat in the summer, they would slice them thin when the flies were out and maggots could grow [to dry faster and avoid spoiling meat].

New technology is not always advantageous. It may bring the allure of progress but traditional knowledge provides resilience. Example of the disadvantage of storing caribou skins in a freezer vs outside

> Tuktu: [elder] used to prepare caribou skins and I asked her "how, where do you store them summer time? If there's no freezer, where do you store them?" So, she said, on the ground under the house it's the best, better than a freeze. And I wondered "how does she know?" Turns out that the land is cold and it will keep it cold and not degrade the skin like freezers dry it up. So, I thought "that's interesting" outside on the ground it's better to keep it there rather than in the freezer.

> Tuktu: People who were sewing, they were told if their stitches weren't good, they'd throw it back to them to redo it. <giggle> I've heard people say that. While they're sewing, when the stitches weren't good enough, so the mother or grandmother would throw it back at them. Took the stitches off first and threw it back at them to redo. So, they didn't do it carelessly; they had to do it -- not perfectly but you know -- like precisely so that it can be warm when you're wearing it outside.

This knowledge from Inuit about the environment, physical processes and qualities, physical and natural phenomena has been developed out of experience over many generations, resulting in detailed, sophisticated, and precise understanding about these phenomena.

> Arviq: In schools we often observe how plants grow, Inuit also use it as an analogy saying that a person is like a plant. If the roots of the plant are watered, the plant will grow well. If the soil is good, the plant will grow, if we take care of it, if we water it, give it light, give it warmth, and tend to it well, it will grow well. Life is just like tending to the plant, a child will grow healthy if they are fed, kept warm, and speak good things to them…. We do it for our children. We aim to learn things that we can pass on to our children. Even though we're Inuit, we don't know everything about Inuit culture so we continuously learn. If I can use this as an example, like they say, if we look at an iceberg we can only see the surface but there's so much more to the iceberg below the surface. So, when we talk about what we know, we know very little, I only know what I see on the surface. I have to continuously learn about it because even one word that seems so small has so much meaning within it. Like if I say snow, snow is not just snow, snow has so much meaning to it. A person will spend their life learning about the meaning within snow.

The extent of Inuit knowledge cannot simply be transferred from experience and wisdom to print text. The knowledge transmission also needs to be in keeping with the ways it has been done.

> Arviq: Even students who don't' regularly attend school come to school when they find out that there's going to be an excursion on the land because they enjoy it.

Additionally, students are motivated to learn in ways that are familiar and have meaning to their lives.

> Alikut: The knowledge that we used prior to colonization has to be prioritized so that we can carry it on. That knowledge is what we lived every day, that was our science. It is because our ancestors had that knowledge that we are here today, that is why we are able to survive in minus 40.

The participation of Inuit elders in the education process is of value to both teachers and students. Elder involvement honours the value and appreciation that they are wise and have lots

to share with younger Inuit generations. For example, when a teacher was talking about teaching a unit on earth and space science, they said this:

> Nanuq: Our elders have lots of wisdom about these things, although we're the teachers, we don't know all there is to know about them, we're still learning about them because we are lifelong learners. I can say that teachers involving elders is important.

4.7 Inungnguiniq and Pamiqsainiq – how Inuit raise children

This section draws on participant stories that relate to Inuit theories for *Inungnguiniq*[27] - development and *Pamiqsainiq*[28] - training children. These provide examples of how children can be taught when learning science so that the relationships they develop reflect Inuit values and beliefs. Specifically, in relation to Bell's (2013) conceptualization of the four R's, relationships, respect, responsibility, and reciprocity; these are embodied in different Inuit values and principles that are demonstrated in these stories.

> Tattuinee: When children misbehaved or did something wrong, they were spoken to. Children were not yelled at or disciplined by raising one's voice because if you speak to them, they will hear you, if you raise your voice, they begin to stop listening as they get older… If they did something wrong, they were corrected and spoken to as a way to correct their behaviour.
>
> …
>
> Tattuinee: Boys would accompany their fathers and girls would accompany their mothers. The young man would learn from his father about everything from the conditions of the snow, how to travel, harvesting, weather.

Furthermore,

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[27] To raise a child (with love and caring) to become a good human being with great wisdom, skills, and knowledge (a community responsibility). (Karetak et al., 2017, p. 227)

[28] Training or raising children (Karetak et al., 2017)

K: From what I have heard, children were told to go outside and observe the weather as soon as they got out of bed. Is this true, what is the purpose of doing that?

Tattuinee: It was used as a learning strategy. If you got up and you were asked what the weather is like and you had not gone outside, you would say “I don’t know”. If you got up and went outside, you might say that it’s snowing, that there’s poor visibility or there is light rain. It was used by children to learn about these things.

Angalik (2017) puts this into the context of developing respect and responsibility; discussed further in the discussion. Angalik’s (2017) explanation about how children were taught to be active learners with a positive mindset apply well to science learning. The concept of Qanuqtuurniq is expressed here:

Amauligaq: It's like little kids, little babies, they'll learn by discovering, putting things in their mouth and -- or by watching. Like when my panik wanted to learn how to sew, she'd get frustrated right away "can you do this for me" so I'd just "watch me do this" then let her try and then we discuss so it's modeling. It's such a -- it's the natural way of learning, that's what it was like; there was no school for Inuit in the past. You watch by -- you know -- you learn by watching and by having people explain and trying and failing and trying again and it was -- you know that building that resiliency in our kids and it’s still the same way today. You [Ukpik] said your experiment failed on you the first time and yup, it probably didn't go -- maybe there was not enough baking soda or too much of something -- you know -- whatever the reason was. It's not the failure that -- that we focus on, it's the getting up and trying and doing it again and having fair tests whether it's demonstrations and doing it multiple times and -- and then explaining that based on their results and -- you know -- like it's the way -- it's so natural just to learn by baby steps. We're not going to get from here to here and the first time I sewed my first parka <laugh> you know -- like -- I probably cried a million times and I was away and didn't have the support and -- but now I can do it no problem like -- science is such a -- the most natural way by discovering, creating, trying, building, and -- at least that's what I get out of it, that's what I want my kids to do, my students and -- and that's just the way it was, so natural for Inuit, the way we lived and survived was by passing on those skills and you know -- making them -- everyone had success by scaffolding, by building. You didn't go from here -- you know -- here to here instantly, it's just -- you gradually -- you know -- build them for success and keep that end in mind.

Tarralikitaaq: mmhm, and her story [parka making] -- it made me remember when one of my instructors taught me that it really helps to teach students by um -- "tell me, and then

show me, and then involve me". That's what I really like from one of my instructors and I really use it for my lesson planning now because I find that it's better to prepare them and the way Inuit were, they were very observant. Like they wouldn't ask questions, they would just observe if they were interested so they were just like self -- what?

Amauligaq: self-learners, self-taught

Tarralikitaaq: mmhm, yeah, self-learners, mmhm

These Inuit teachers exemplify how to teach from an Inuit worldview, their responses relate to what elders have said in Inuit Qaujimajatuqangit (Karetak et al., 2017). Their stories need to be shared to begin to add Inuit ways of teaching into what we know in education about teaching and learning from an Inuit worldview

Tarralikitaaq: I find that Inuit are very patient and respectful so I find that they really observe the person and see how they can help them instead of -- saying you can't do this kind of thing. So, I find that Inuit are very supportive that way. Trying to understand individuals and trying to relate their situation, and how can we do best to help them.

Ukpik: mmhm, and I think when you're teaching you have to know different strategies. Like if I'm trying to teach just using paper and pen all the time I'm not going to get through to some of the students. They're going to get tired of it but if you have different ways and different strategies while you're teaching then you like -- you mentioned we have to know the students and also um -- that -- I'm not sure which textbook it came from, it goes from seeing the pictures, or seeing a movie, and then doing it hands on, then finally text like there's a process that is explained somewhere, I cannot really remember how it goes but it does go -- like we do not go to the text right away we have to introduce it gradually and getting to the text part is sort of the last part. As a teacher you need a lot of strategies and patience, and caring, and like you need to be um -- open-minded, not "this is what I'm teaching, this is how I'm going to teach it". You have to find ways to meet the student's needs.

If we want to know where these practices come from, we have to look back to the Inuit context prior to the introduction of schools.

Atqittut: As I said earlier, the foundation for children are their parents but when they part from them, this foundation is displaced; that's what I think children go through when they

just start school. They're happy to go but I this is what I am saying, they always have to keep their parents in mind, do not forget about their parents, do not forget about their families, they need to continuing loving their families. This is what they need to be taught so that they can learn in a good way.

Personal Reflection

I began to think about how we might achieve this and I was reminded of Bell's (2013) discussion around relationships, responsibility, respect, and reciprocity. I think we need to build collaborative relationships with students' families and earn their respect so that when we teach their children, they can also reciprocate that sharing by helping us understand who our students are and what they would like to achieve with their education, collaboratively building a foundation for their children.

Atqittuq: we still carry some of our ancestors' Inuit knowledge. If I use myself as an example, I can sew traditional clothing, I make mitts, pants, boots, and coats. I still carry these things. However, those things like the ability to make Iglu's, their ability to collect fuel sources from plants, their ability to use rocks, I don't practice those anymore. I still practice making clothing and carry those with me. But those things that they struggled to survive with, I don't have to do them to live. I think that's how we live now. I see that we no longer practice some things like collecting fuel, making skin tents, traveling on the land; we don't seem to practice and think of those things as often anymore. When people came, they didn't know what we know and we didn't know what they know: this caused a barrier. When we came across this barrier to understand each other, it seems that we became unsure about how to go forward together. I wonder, how can we work together in a good way? But I think through love, compassion and caring, by sharing. They want our land, we also want things, when we come to an agreement, then we can move forward together.

Why it is important to demonstrate good practice:

K: are those things, like making clothing and handling animals, still important?

Atiqttuq: if we tend to them well, they are still very useful. However, today the way the skins are handled is not always good. Sometimes when they harvest caribou, they'll leave the skin behind, when they harvest seal, they don't cut it and handle it properly. If these

things are done right and handled properly, they still have lots of use.

This statement gets to the essence of practicing values and principles. Avatiptingnik Kamattiarniq is practiced by doing things well. In science, this would be understood as precision and accuracy. Inuit also required precision and accuracy, not just as a way to improve the quality of information or results but also to demonstrate respect. We can say that a scientist's respect for the knowledge in their profession and the use of it propels them to practice precision and accuracy. Inuit also practice precision and accuracy to show respect for the sources of survival, the living things and the environment. The practice of precision and accuracy can be demonstrated in life science by harvesting and creating products from that harvest, either in the form of clothing, tools, or shelter. The lack of precision and accuracy reduces the quality of the product, as would the data in science. This would result in less confidence, as would our ability to survive. This would require us to improve our practice, both in the things we construct and the information we create.

Avatiptingnik kamatsiarniq – environmental stewardship as a lens; using reflection and modeling to teach about respect and responsibility; making it comprehendible for children.

> Tuktu: what did I do again? okay. One -- one science class um -- I was on recess duty and I decided to take some snow in and show my students that I brought snow in. And I left it in a really clean glass and they forgot about that snow. So, the next day I was showing them tap water and snow, I mean that [it] was melted. I was showing them that I have this glass and I asked them "is it safe to drink?" They said "yeah, it's water" and then I said "how do you know? where did I get it from?" And then they remembered that I got that snow. And they said "you melted that snow!" I said "no the snow melted in our classroom, so is it safe to drink?" They said "yeah!" at first and then I said "I just got it from the porch from outside. People walk on it, maybe people spat on it. People were around it. So, is it safe to drink?" So, they were looking at the water thinking "it's clean" but is it safe? And they looked at both glasses, the tap water and the snow, I mean the melted snow. And they wondered why it was both clear and I told them that "It might not be safe because there's oil spills from machines or Hondas, and trucks and people walking on it, and spitting on it"

so they started understanding then that the water that they drink might not be safe so they should always test and be aware of where they get that water from so. I just wanted to share that with the students and they realized that it was interesting that snow that is melted becomes water and some people could drink it and some people refuse to like if they get it from the land it could be safe, if it fresh especially. But, because we got it from right outside, they didn't really want to drink it <giggle>. But, I didn't let them, I just wanted to show them that water might be unsafe if we don't know where it comes from and if we don't take care of our land like showing the importance of cleaning up our yard and -- stuff.

Tuktu: probably. Like you're respecting your environment and -- I just saw that today like "you respect your environment" and I thought "how could we respect that?" and I remembered when we're polluting we're not respecting, and I was told before that even if you had a gum wrapper you would have to put it in your pocket when you were a kid but today you see the pollution when we go out fishing in the water, and everywhere. And here they really respected the land, they picked up their bullets, and kept it until they got back to town. Just recently I heard a story about a person catching a fish and they gutted the fish and out of that fish there was a chip bag <giggle>. So, I thought "yeah, we need to respect that land too". How could we live in an environment if -- it's not going to be not respected? How could our children or grandchildren or future enjoy as much as we do now if we don't take care of it?

Trial and error as a step towards mastery was necessary for survival. Similar to precision and accuracy in experimentation.

Siksik: when I was a kid I once asked my dad how did he learn. He took a string, gave it to me, he took another string and said "copy me." So, I was copying him. I couldn't do it, he took it away from me, "try again" Showed me again, I couldn't do it. He took the string away from me, "try again" He did that until I got it. So that's my experience.

Finally,

Alikut: Our parents had lots of responsibilities. They had responsibilities to teach us about relationships, the environment, how to survive, how to harvest, how to make a shelter. My father would still be talking as I fell asleep and I still carry the things he said. Even things I was told 50 years ago; when I’m about to do something, the things that were said to be come back in my memory as if it was just said to me, fresh in my memory. Our

> parents had to be very responsible and had to teach us so many things. There were instructions for everything, even with preparing food and making clothing.

These stories provide personal connections to the ways in which Inuit raised and trained children.

4.8 Examples of how to Integrate Inuit Qaujimajatuqangit

Here, teachers share how they have integrated Inuit Qaujimajatuqangit into their practice when teaching elementary life science.

> Amauligaq: I think that's just as important, um, I have elders come into my class and it might not be body- related systems but it's, you know, something that comparing traditional tools of what it was and what we have now and being able to see both sides of things, and recognizing strengths and weaknesses of -- you know, comparing and contrasting and then having to form opinion pieces or, um, pieces for them to explain why they -- what worked best before and what works best now and recognizing those strengths, or the ties, the connections.

IQ is not just traditional knowledge, it is scientific.

> Ukpik: the science and Inuit Qaujimajatuqangit like um -- as an example: if we are learning about ice, getting ice from the ocean, getting ice from a lake – um, just seeing the difference between their, um -- how they are formed and then which ice melts faster or which ice melts slower and then seeing which melted ice is more clear or not so clear and then this has been like even way before we were born was known, and we still have ice up here and then with science just mixing it with, um -- finding out why is it like that, how is it like that, and I think they complement each other.

Aikenhead & Elliott (2010) refer to “wisdom tradition” (p. 325); Inuit Qaujimajatuqangit fits into this knowledge tradition, making science learning experiential and based on experience.

> Ukpik: maybe, um -- for some, um -- I think you mentioned this already but ah for some people they might understand it that we’re just focusing from the past -- getting them -- getting stuff -- going back to the past and just digging out from there, but to some it is, um -- like what {she} was saying universal like what had been practiced and what is still

practiced and in some ways some might be modified or adapted and, um, I think it's for the individual's understanding of their worldview, like if you ask me what is Inuit Qaujimajatuqangit it's our way of life, what had been passed on from our parents or by their parents and like it's just a continual cycle.

Using weather and weather predicting as a theme:

Tarralikitaaq: one of the things I read was ah -- like the sundog where they say there's going to be bad weather coming. So, I try to help my students understand it by letting them draw it out and then tried to explain to them the meaning behind it.

In other science teaching experience:

Amauligaq: in other units and themes -- for example simple machines we had this goal of having a ping pong ball and they learned about simple machines and then they had to take three simple machines and then put them in a specific order, any order they wanted to get the ping pong ball the furthest that they could. So it was building, it was teamwork, it was test -- like test error -- testing and whatever, like going back to fix things and modifying and trying and trying and trying and then at the end of the three weeks we did a final count and it was the best -- like one of the best times I had with my kids cuz' they were so engaged and they just wanted -- you know -- they just wanted try and they were like "don't copy!" and like trying to steal from each other but it was just like the best learning and simple things like "bring toilet paper rolls and cardboard -- like with tape" you know, no limitations but setting criteria like: what does good teamwork need to look like, what does -- you know -- what might a good wedge need, is it going to be super steep? you know, just giving them those -- guiding them, it was just guiding and all I did was have discussions and you know-- and they had so much fun.

Tarralikitaaq: when I was teaching, I mean I'm still teaching, I mean just finishing [teaching about] rocks and mineral. I like to tie in Inuit culture and-- that thing that I thought would be interesting is how they used rocks by building Inukshuks for guides and ah -- using rocks for their shelter and rocks for tools, so I like to bring that up first before I really teach on the curriculum just so it can be from our -- what we know first. Like, I find it's easier to do it that way.

Referring back to life science examples of culturally relevant teaching where Inuit knowledge and culture is integrated:

> Ukpik: like an experiment that an NTEP student, um -- that was teaching science in my class, um -- her theme was polar bears and for science she decided she was going to do how the polar bear doesn't get cold or doesn't get frozen when it's dipped in water that has ice. She used that experiment where you put lard and you put your hand in the ziplock um -- first you touch the water, how cold it is, and then using that as an insulation -- you dip it into the cold water but you don't feel the cold. Her explanation of how the polar bears, how the fat protects the polar bears, it's using today's whatever, what is available today but also connecting it today something that the students already know, polar bears. And I think it's, um -- doable where -- like I was saying you modify, you adapt, and whatever is written in the curriculum you can um -- make it into a northern context or to something that the students are familiar with. Like if I try to explain cold blooded animals or whatever warm blooded or whatever -- like if I try to use an animal that they haven't seen before, they're just going to be wondering "what type of animal?" but using polar bear as an example then they get more um -- cuz' they had seen it, they know it, it's fits into them more, as opposed to being too foreign.

Additionally,

> Ak&a: One time I taught weather as my subject during science. I invited an elder to talk about weather. What they used to do is just look at the -- look out the window. Or when they're outside, when they step out for a bit, they'll look up. They'll know just by looking at the sky, or -- where the winds coming from they would know how the weather will be for the day. And if it was summer time, this man told me "every time it rains, -- every – I mean -- every after the rain that the wind will pick up. Never fails to dry up the land" That's what I've learned about teaching weather too. Although it was just teaching about the -- what we get up north, blizzard, rain, foggy, sunny, windy, hail storm, all that. He began talking about those -- I talked about those but he mentioned about what to expect after each weather. And winter time, south wind will always be beaten by the north wind. And it will be stronger winds from the north, he said that the north wind never likes to lose, it always happens. When I was observing that like after having him in – a person who has not attended school -- I learned from him too. Like inviting an elder, that's Inuit Qaujimajatuqangit about weather. Winter time and summer time is what I learned about too.

Relating back to knowledge from elders from the past used to prepare for the future. Also, the fact that many do not live using these practices anymore is an example of how colonization has impacted Inuit.

> Ak&a: when I'm teaching science like just say about elders used to live it. Like back then there was less houses and less technology and all that but today we do and that they can experiment more. I tell them that, using my parents as an example they lived on the land, they had to go get water, things like that. Or go caribou hunting, only if the weather is nice. And winter time they just look at the sky, if they're traveling home or looking at the qimugjuit[29]. They lived it! Us, we just listen to stories now. I compare when I'm talking to my students even though they're only in grade one.

Examples of life science and technology, linked to Inuit values and culture:

> Tuktu: mmhm. Even the parts of the caribou are used every part and not wasted. Making thread, and needles, and -- tents, everything. Protecting their caribou but they are experimented on through mines and camps and stuff like that.

She continued to talk about the condition of caribou meat today in comparison to the past. An important part of Inuit practice is observing animal behaviour and condition. She talked about white larva in caribou meat that is more common today than in the past. This area is an opportunity to create life science learning about animal behaviour and condition using an Inuit worldview. Additionally, there is a contrast evident in values and practices, where Inuit do not support interacting with wildlife in ways that may be common in biological research because they do not align with the values and principles that Inuit live by. We can extend this to the next story of experiential and land-based learning.

> Arviq: [Elder] went to the school to teach people how to butcher a caribou. They brought the whole carcass into the school. He taught us how to cut and where to cut it based on its use, whether it was going to be used for warm clothes, bedding, or not warm clothing. He named the parts of the caribou, explained the process of the cuts, and purpose as he butchered it. He also cut up the meat and talked about all the body parts and innards. This knowledge that he shared with us, if we keep it and remember it, when we are going to teach we can share it with our students and talk about it. Schools go on excursions on the land but we don't usually take the younger ones far away on

[29] sastrugi

> long distance trips. But we take them on the land and teach them about the land, let them pick berries like cloud berries and cranberries, and other things, and we talk to them about what those things are. We also talk to them about clouds we see, we work with that they know and understand and expand from there. We know that their knowledge is limited so we expand on the things we teach them as they get older because all those things we teach them have purpose. When they're in high school, they begin to practice using the things we taught them by doing things like sewing or going on overnight camping trips and hunting. They are Inuit and these are Inuit ways of living so it has to continue to be done, even after they complete their schooling. When they start living on their own, they have skills to survive, they are taught different things to live. We don't want them to be able to only do one thing and stay home all the time not doing anything, we don't want them to give up and get tired of living so we teach them different things so they have more than one thing to do. These things from Inuit Qaujimajatuqangit are brought into school so that they learn things to live a good life, things that have meaning and purpose. We start from when they are young, we praise their efforts and are proud of them, from when they start until they finish school. Even after they graduate from high school, when they go to university. There is no university here but even when they go to university, they will carry those things we taught them from Inuit Qaujimajatuqangit, from Inuit culture if they are given a foundation and have support around them, from their family, they won't part from what they were taught, they won't suddenly stop being Inuk.

Integrating between worldviews involves collaboration and the community is a source of knowledge to demonstrate that. Seeing these worldviews integrated in practice related to a profession offers insight into how it may be done.

> Arviq: I teach grade one, as she said, she teaches Kindergarten. When I was teaching science, I asked the Renewable Resource Officer to come in and an elder to come in as well. We did these so that the students would learn about and see the parts of a fish. They brought a whole fish and cut it up in the classroom. As they cut it up, they talked about how to cut it if it's going to be dried as pipsi [dried fish], they also talked about the parts of the fish. Some students had never seen the inside of a fish. Students were in awe seeing things like the heart and other parts. We seem to learn better when were able to see things and touch things. Us Inuit seem to learn faster when we experience things because we're not used to working with paper. By seeing and touching, by doing, Inuit seem to learn best. First, we see what they're [teacher] doing then we try to do the same. They could not forget how to cut up the fish after we brought it into our classroom.

Participants often referred back to earth sciences, demonstrating that the current scope and sequence of science curriculum may have to be reconceptualized to follow a thematic approach in a way that does not separate the physical from the natural science as it currently does. The earth and life sciences are often linked together as these natural and physical processes affect life systems.

> Nanuq: And sky as an example of a theme has many things we can learn about. Some of the things we know about it are stars, moon, sun, thunder, lightning, northern lights, clouds, fog. These things are not the same but if we're going to teach them to children, we can separate them into themes. As I said earlier, they don't learn the same thing over and over again. What they learn and understand about them grows as they progress from the early years to high school, even with the same themes because there is so much to learn about from them.

The setting where learning takes place is also influences the content, outcomes, and practices. Both people and place need to be at the front of mind when imagining how to base science learning within an Inuit context. This relates to experiential and land-based learning:

> Arviq: It's challenging to bring all animals into the school. In our community, we live by the coast so we live right by the beach where we get tides. We go to the intertidal zone to see snails, krill, mussels; some go to the dock to fish with a rod. People also fish in the rivers. Sometimes people catch Arctic Char. Once there was a pod of whales seeking refuge and the everyone wanted to see so the whole school went to the beach to see the whales, even the new teachers. Even by taking students outdoors so they can observe. As long as the consent forms are done, students can be taken outdoors on excursions to observe or taken out on the land. We take them outdoors to observe things. If the school has cameras, they can use cameras to capture what they see and display them when return to the school, they get so happy to do this.

Further, connecting land-based learning to classroom learning:

> K: these stories that you are sharing about your teaching experience, would you say that they come from or are related to Inuit culture?
>
> Arviq: Yes, I can also say that these things have continued through songs, and stories. When the [European] whalers came they brought beads with them and Inuit became very skilled at beading. The front sash of an amauti that is beaded has stories. At the beginning of the school year, I take my students on excursions to collect plants and

> other things. We bring them back to the classroom and create art with them by taping and gluing them onto paper. They make any kind of art, things like Inuksuit.

The art lesson can be linked to other outcomes in math by creating patterns, counting, or using geometry, they can also be used for science lessons by learning the different parts by creating diagrams, or classifying, describing the properties of each item; many possible interdisciplinary activities that can be related to their personal use, making learning more holistic. By doing so, learning is done within context using the same material to reach outcomes in different subject areas.

Combining worldviews is exemplifies practicing *Inuuqatigiitsiarniq* and *Piliriqatigiingniq*. Also, even if the content exclusively cannot be linked to Inuit knowledge, Inuit Qaujimajatuqangit can be applied as principles and values expressed in the relationship.

> Arviq: If we have to use both all the time, if we have to do something, we combine them [ways of knowing]. If we have to teach it, we take what Qablunaat put together apart, then we experiment with it because we are also capable. As an example, a radio, how is it made? How are we going to turn it on [referring to circuits and electricity]? Yes, it is made by Qablunaat but Inuit Qaujimajatuqangit like iqqaqkaukkaringniq will be applied, because by thinking analytically, by inquiring that we will construct the radio. Since we are Inuit, it is impossible to exclude our culture in what we do because that is who we are; they always have to be included because that is who we are. We teach what we know, we use knowledge that we have. What will be useful, how we're going to manage behaviour, how we're going to engage and keep them comfortable, these are the things we plan for using what we know. Yes, we will want to emphasize our Inuit ways and what we know even if we use things that came from Qablunaat; by following our culture we will always include it.
>
> K: Would that be by trying to keep them as one, together?
>
> Arviq: Yes, like you have an English name and an Inuktitut name, you have both and you are still you. What is will still be you; your English name that you have and your Inuktitut name that you got from your Inuit identity. Things to learn work the same way, they are both useful.

These stories highlight some of the ways that teachers have integrated Inuit Qaujimajatuqangit into their science teaching practice, emphasizing the need for good working relationships and a consciousness of place where we keep where we are at top of mind when planning curriculum.

4.9 Working towards embodied knowledge to develop Silatuniq

Silatuniq is wisdom, and wisdom is developed through experience. These experiences become the basis of knowledge that are embodied. The knowledge is embodied because it relies on the memory that was developed through experiential learning. The stories from here show how to foster this idea. This next excerpt relates back to Tattuinee's story about playing and cutting snow blocks.

> Ukpik: and actually, having an elder demonstrate or show the students outside. It could be outside of the classroom or a little bit further and just explaining that different types of snow and terminology, that proper terminology for each different type of snow. Like that -- those kinds of stuff that -- some people might feel they're way out there but we can still -- the terminology hasn't changed. The snow hasn't changed that much yet.

The experience of elders is a window on how to foster silattuqpallianiq – becoming wise. They begin from childhood experiences, focused on emergent and communicative knowledge, then transitioning into practicing, as steps towards proficiency. These are in line with the Inuit learning process as outlined in Inuit Qaujimajatuqangit (NDE, 2008).

> Ukpik: with um -- what I also did with my grade 2 students was during the fishing derby um -- our theme was fish as well and when I caught a cod, I brought it to the school and we dissected it together and I used that for our science period. And looking at the contents of the cod and also opening the head and showing them how scientists learn how old the fish is by looking at the little -- I don't know what it's called in English -- that little shell looking -- by the rings or lines of it -- how many years it has lived and showing them where it could be found. So, using stuff like animals that are caught, like my son caught ptarmigan and I incorporated that into um - the legend where the grandmother and granddaughter how -- creation myth story legend, and then by directing it, explaining

-- oh, "this is in that legend that says the grandmother put three, three sticks in the kamik and these are the three bones and um. Kids when they didn't have balloons that the thing inside, they're -- you can blow it up and use -- well similar to a balloon and um -- with their wings and feather um -- is it -- um does water go through it, is it water proof? Like you can do a lot of science experiment -- not experiments, /directing as well as

Amauligaq: /demonstrate

Ukpik: yes, demonstrating what has been caught and what is available and around your community.

Doing the above allows students to relate to the content in a more meaningful way. There is an emphasis of awareness and safety that may be influenced by the goal of surviving. Children were taught to be aware and develop an analytical way of thinking as a way of establishing habits and evaluating situations and planning based on those conclusions.

Tuktu: During my NTEP years I used to visit an elder to get answers to questions that we had. And this elder was saying -- I don't know how you say it in Inuktitut but they used to look out the -- like look at the sky and let us know how the weather would be and they would know which direction to go home. They would look at the big dipper I think -- and he noticed for some reason after looking at it for years that it seemed to be tilted now and he started noticing the weather -- it used to be -- they used to know how to -- how the weather would be but from that tilt. It's a little bit different like it's off, like not quite the way it used to be when he was a child. And I found that interesting because that's when we learned about global warming. So, I started wondering like because the Inuit are observant people and they know because they lived and um -- viewing the weather by just looking out they knew how to be prepared and I just understood that it was tilted because the global warming had started. And then after that, I remember they had a concert, Christmas concert for the kids. And I noticed the weather, it seemed to be warm like it was spring and I thought, "isn't it supposed to be cold, but it was warm" So, I started thinking it's global warming after -- even the elders knew about it.

The sense of awareness and processes of logic were developed through experience in the environment and relationships with people who help make sense of what was observed, and establishing processes to use observations to infer and plan. The teacher continues by saying that:

Tuktu:/ mmhm, yeah. He experienced as a child to view the sky and he was -- he lived it, he knew what the weather would be like. And he was always right but it seems to be a

> little off from that tilt. Like he wondered "if someone were to get lost, are they going to make it safely cuz' of that tilt?" And I started thinking about that. Because back then they didn't have GPS and SPOT devices and -- I was just amazed at even -- he was saying he's young even though he's an elder. I understood the way he said he's young because it wasn't too long ago that we had Nunavut and -- he explained to us that -- what they learned -- how they learned was observational. And nothing is really written.

These approaches are significant and can be summarized by this elder's statement:

> Alikut: As the child's knowledge grows, they learned by seeing, being talked with, experiencing. Like the weather, if we observe the moon, we know what the weather will be like tomorrow. We had to learn about our environment because we didn't have the weather channel.

These teachings and approaches aim to teach Inuit to be independent by reading the environment. They are ways that Inuit raised Inummariit[30] as described in NDE (2008).

4.10 Words of wisdom to consider when reconceptualizing Inuit science education

Above, participant stories demonstrate why Inuit Qaujimajatuqangit is important to Inuit science education, and how we can do that. This last section of the data brings together words of wisdom from the elders and teachers demonstrating what we need to keep in mind as we reconceptualize Inuit life science education. Starting with an elder's experience:

> Tattuinee: I have visited schools to talk to students. I often tell them not to have too many students in the group because when the group becomes too large, students become distracted and have difficulty paying attention. If I can say this, if I had learned to speak in English, I would have so much knowledge to share with them. I value Inuit very much and it is out of my love for Inuit that I share my knowledge. An elder once shared their thoughts with me and said that there should be Inuktitut speaking elders in schools dedicated to be with children, speaking Inuktitut because they are not learning

[30] Inummariit – plural, more than 2 for the singular form Inummarik (NDE, 2007)

> Inuktitut anymore. They want to communicate with youth but they have trouble doing so because they are unable to understand each other, this leaves elders idle. Maybe someone will do this, I don't know.

Learning settings have to be designed in ways that maximize the opportunity for teacher-student one-on-ones, peer teaching, and limit distractions created by overcrowded settings that require more energy spent on classroom management. It is also important to consider who is in the space, particularly, what they have to offer the students; in this case, more Inuktitut speaking Inuit who can share Inuit knowledge and make meaning of science from an Inuit worldview.

Tattuinee moved onto talking about the physics behind Igloo building with everything from cutting the first block, the angles in cuts and how the slightest difference in the angle of the first block sets the entire shape of the dome and affects the heat distribution and inside layer of frost, as well as the chances of the ceiling continuously dripping from poor construction that can cause the dome to be poorly insulated and cold from constantly losing heat. Like a positive feedback loop in the heating and melting process that results in decreasing insulative value and more energy use as a result of poor dome construction. Each process and feature he described was in specific detail but I had trouble making sense of it all without seeing it because I don't have experience building Igluit.

Personal Reflection

> *What Tattuinee discussed in terms of Iglu building fulfills many science outcomes in physics but the fact that he did not communicate it in English, did not use text, and used physics in a context that is not derived from a generic example that is predeveloped to meet such learning outcomes, would most likely result in many educators disqualifying the significance of using Iglu building as learning physics as expected in curricular outcomes.*

This leads me to argue that teachers' lack of knowledge and experience, both in Inuktitut language and Inuit culture, should not be automatic determinants to disqualify Inuit knowledge of physics and lead it to be excluded from science curriculum. Doing so assumes that science and knowledge are finite as well as sets limits as to what is worth knowing or what knowledge has value. Based on his story, the process itself of learning to build an Iglu starts at a very young age, beginning with learning to make blocks and understand the quality of the snow, with lots of trial and error, observation, and explicit instruction. These things themselves take a lifetime of experience and practice to become proficient at and we cannot leave them to outside of school learning simply because we lack the experience ourselves. As educators, we commit to lifelong teaching that is reciprocal to lifelong learning. We are also the "composers of curriculum" (Iannacci, 2009); therefore, we have a responsibility to be open to new understandings and new learning beyond what we have experienced so that we model lifelong learning, either as a practice in science or a life lesson, practicing to be a teacher-as-learner[31] *. Teacher as learner is a pedagogical strategy where the teacher sets and designs the learning environment, teaches, but also participates as a learner. Based on my interactions with educators throughout my career, both as an educator and student, educators can be uncomfortable and intimidated when presented with knowledge and skills that they don't already have but are expected to demonstrate the use of, like Inuit Qaujimajatuqangit. This usually results in behaviours such as: testing the knowledge, not for validity but for legitimacy, apprehension about the use of the knowledge in their practice, and in my*

[31] Teacher-as-learner comes from the Learning by Design theory that posits how teachers in a teaching and learning setting are the designers of the learning environment and process, while both the teacher and students are learners. The teachers also learn from the students (Kalantzis & Cope, 2021)

experience with Inuit knowledge, usually disqualifying it without even trying to understand it. I find these behaviours to be counterintuitive to the idea of teaching as a practice as well as marginalizing. Procedural display is primarily discussed as behaviour exhibited by students (Iannacci, 2006), however, my experience observing teachers' question, doubt, and disqualify other knowledge like Inuit knowledge when they do not possess it themselves, or do not comprehend it, leaves me to wonder if these are behaviours of procedural display from teachers. If so, we need to remind ourselves to be reflective and reflexive to counteract being drawn into teachers' procedural display. This also relates to the practice of teaching science. Some behaviours that may be classified as teacher's procedural display when teaching science or incorporating Inuit knowledge are: limiting knowledge and content derived from textbooks or textbook teaching; maintaining assessment practices with lower-level thinking assessment tools and strategies; avoiding open ended questions; heavy reliance on published material; avoiding discussion and comprehension of concepts and process beyond what is presented in teaching material.

Teaching and learning has to be diversified and responsive to the identity and needs of the students. Inuit children were not taught all in the same way, the way they were taught was determined by their learning stage and style (NDE, 2008; Karetak et al., 2017). Our natural environment is also diverse. Diversity is key, we need to step away from universalism and canonized knowledge in science because those are colonial qualities that marginalize other scientific understandings about our world.

> Tarralikitaaq: yeah, I really learned through NTEP that the curriculum is what you're going to teach but it's up to you, how you're going to teach it. So that was a big eye opener for me to make lesson plans that way. Like I look at the curriculum at what needs to be taught but then how-- what am I comfortable teaching or depending on the students you have -- yeah. I find that really helped me with my planning. How I want to deliver it, what

> I'm comfortable with, and the students I have. Cuz' I used to really stress, how am I going to teach them this? And then they could see that I was frustrated. But then over time, I learned that I can teach it with what I'm comfortable with.

Instead of standardizing science education, teachers should be encouraged to demonstrate embodied knowledge when teaching science. Teachers can use themselves as examples of lifelong learners so that students have models to relate to. Additionally, people from the community can fill the gaps in a teacher's knowledge by participating in science education and demonstrating their embodied knowledge.

Below is an example of the connection between science and how it is shaped by our cultural values. Also, the concept of roles and responsibilities was to ensure that the social group as a whole was supported (Karetak et al., 2017). Roles and responsibilities were not intended as a means to limit identity and ability but to ensure that there was support for the community through shared responsibility, it was often gender specific for Inuit but they were not bound to it (Uluadluak, 2017).

> Ukpik: an example that is always used is um -- how Inuit -- constructed their Iglu, like it's. People see it as a scientific thing and where you really have to know the snow, and the spot, or the area, and then the structure of the Iglu. And then like um -- animals, you have to know how they, how they behave by observing them, you don't want to um -- kill something that you're not going to eat, or you don't want to -- you put an animal down because it looks not well, but yet you're not going to feed it to your family. I think Inuit already had a wealth of science already that they were living day by day and practicing without calling it science, without calling it "this is how we're learning science"
>
> Amauligaq: mmhm
>
> Tarralikitaaq: yeah, I found it really interesting with that IQ, that um - the IQ curriculum, that there were female and male roles that they had to learn as they were growing up. That the boys had to learn about animals and the land, and observing the sky or weather. And the girls had to learn to sew and take care of babies, and cook. So, I found that really interesting how they -- they taught each other to support each other, yeah.

I cannot speak to the gender specific roles as my experience tells me that these practices are not definitive but instead common; with lots of evidence showing that both genders also had to learn the skills taught to the other. What is evident in the statement is that Inuit "supported each other", emphasizing a group role in educating and living. We can find resonance between Inuit ways of knowing with other knowledge systems.

> N: when we modify and adapt it, it automatically becomes IQ, and um -- a lot of -- the more we learn, the more we know. Some more of the things are common and more universal. Even though when we say Inuit Qaujimajatuqangit, it could apply in any other culture as well. And it's applicable, there's similarities and there's um -- stuff that you can connect it to like um -- as soon as you modify it, adapt it, it becomes universal. We might -- it comes from our -- what we know, what has been passed on. But in today's world we communicate more and we tend to find out /"oh, it's the same as our culture as we know it".

Contrary to universalism and standardizing in science, we can aim to diversify science education by making it culture-based. Culture-based science education can be explicit with the values that underpin the knowledge, shaped by the context and values of the people. We can teach knowledge in abstraction using universalized language, but without the ability to utilize it, it feels fossilized and lacking in purpose. When we relate those abstractions in relatable and concrete ways, we find ways to make use of that knowledge and mobilize it. For example, when she talked about using caribou to render fat, I was able to relate because I have participated in doing that. I participated from start to finish, by beginning from harvesting the caribou to finishing the product by separating the rendered fat from the broth and making use of it for food. Our pedagogy should follow this model by actively engaging our students through participation, and put those abstractions into practice from start to finish. I can see the use of caribou as a theme evolving in many different lessons between ecology, and biology. By doing so, we create

a foundation that values Inuit knowledge and bridges it with Western science in meaningful ways.

Atqittuq explained the significance of parents in creating a foundation for children. Their involvement in their child's education is significant in setting them off in a direction where they can live in a good way, *Inuutsiarniq* [to be good and live well]. Inuktut has to be used and valued in school so that students appreciate the value of the language and it's use to communicate Inuit Qaujimajatuqangit. Meaning from Inuit knowledge is done using Inuktut, therefore, it must be included. It can be used to teach about the environment and living things because we already have language for them. The barrier to using Inuit Qaujimajatuqangit may be caused by a lack of knowledge and understanding between language and worldviews. If non-Inuit do not know our language, they cannot recognize the value of the knowledge communicated using Inuktut. Inuit taught their children by actively participating in life. Children observed and had to develop a sense of awareness and language before they could work. Language is best developed in the early years. Also, the values we place on our children will carry on with them if we practice them while they are young. We need them to learn to be safe so that they can interact with their environment in meaningful ways. Inuit had to be precise and accurate because it could affect their ability to survive. This would affect the quality of life they had. These statements resonate with knowledge shared by Inuit elders in Karetak et al. (2017). Similarly, in science, precision and accuracy are valued to the quality of knowledge and information that is generated by practicing science. We need to share language, and knowledge so that we can move forward in a good way.

We use what we know to teach, whereas Western science can feel alienating because it can feel foreign. However, if we relate to our lives and our worldview, it can be engaging. There

is also the need for non-Inuit to learn IQ in order to bring that into their practice with Inuit students.

> Ak&a: I thought, "eeh! I'm going to have to teach science. I don't know about chemicals and all that!" I thought I would have to do that when I became a teacher but it's everything what we do daily like basically. When you focus on it and how you want to teach it to the kids it makes sense. It's fun.

The need to include Inuit elders:

> Ak&a: mmhm, and if there's elders around, make use of them, for them [students] to understand, compare. I'd want to be invited too in the future, as an elder. Even though I didn't grow up on the land but as a person.

Experiential learning is necessary to develop a sense of respect and responsibility.

> Tuktu: going for spring fishing to [place] the jigging things, like this -- being in a tent is what the students are doing right now and we have our ideas because we're older and we understand like it's a lot of work to work on making tents and, ice chisel and, stuff like that and now it's already done for them. Like the holes are there, the tents are pitched up. They need to experience more, like the way our parents taught us. They trusted us to take care of the ice chisel and our jigger, and stuff like that. Now it's I guess -- they -- our students know what jigging is but things are done for them and they don't get to watch or experience on their own now. Fetching water, like we used to fetch water.

This teacher recognizes how students in many ways have been removed from experiential learning through roles and responsibilities that were established for children that prepared them to be responsible, respectful, and engaged. The link to science education might not be obvious to everyone but in fact, this relates to learning science in many ways. The ice chisel and jigger are tools, like scientific instruments; learning about safety on the ice and how to use those tools prepares them to use them responsibly. Handling the tools prior to using them scaffolds their experience before they use the tool. Being given systematic tasks like fetching water and bringing tools in the order that they are used prepares them to use logic. Also, when they catch

the fish or fetch the water, over time they develop a sense of respect for these resources. These are only a few points from the teachers' accounts above. The next teacher shares an experience that is contrary to the accounts above, but they reiterate the ideas shared here.

> Arviq: Students seem to enjoy learning by doing hands-on activities the most in all subject areas, they also seem to learn the most by doing hands on activities. If all they do is sit, be told, and write, what they are taught may be lost because they're not engaged. They may start to randomly leave their seats, go to the washroom, request water breaks or get distracted by doing other things in the classroom if they're not given something to work on. If you give them something to learn, even if it's challenging for them, we talk to them about it and relate it to what they learned at home like "when my mom, dad, and I went hunting…" when they start to relate like that and they start using objects like caribou mitts, they're be able to give it meaning and know what it is. They can recall who sewed, who began working on the project. If you give them a chance to try without treating them like they are too little, some of them quickly become capable. Some of them learn by watching. They also help each other. They can't learn only by writing things down on paper, they would not get to know each other. They learn more by watching each other, they also begin to ask more questions. When they take home homework and bring it back, they often have lots of stories to share if their parents or family members talked to them.

Later,

> Arviq: They're not meant to stay indoors; they're meant to be outdoors. By playing outside or taking them places, they remember their experiences. When we return to the school, we give them worksheets to capture what they saw, what they learned while their recollection is still new by encouraging them to share. If they have challenges writing print, we can use images from things like magazines to communicate using cut-outs of pictures related to what they learned like fish, rocks, anything they saw outside. They choose what they want to show, there is no right or wrong answer because it's about what they want to communicate.

This story brings to mind the concept of authentic learning. When we prepare to teach closed-ended outcomes, they are usually limited to knowledge that is predetermined to have value and focuses on transmission. Whereas with authentic learning, there is the opportunity to relate and reflect, giving the students the opportunity to construct meaning from learning opportunities that

are orchestrated by teachers. In this form of capturing what was learned, the students relate to the activities and lessons offered in a way that has meaning to them. The next teacher shares their experience in modifying lessons.

> Nanuq: I have come to understand -- as an example, let's say I'm going to teach math and the children are all different. I have my teaching plans and I have my goal but if I find out that it's not being comprehended, I change the activity while still aiming for the same outcome based on my observation. Rather than following my plan as outlined, I change the activities and I find this helpful. I have seen, while still using the curriculum guides, for example I had a deaf student and I had to work with the SSA [student support assistant] to make plans to accommodate my deaf student. We come us with ways to help the deaf student understand what we're going to teach about and plan activities to help them learn while still have the same outcome. The goal in the curriculum guide, the objective -- while still aiming for the goal, we change the activity when we're going to teach it.

Establishing relationships to foster learning are important to fostering embodied knowledge.

> Nanuq: Let's say as an example, these students in elementary school at the intermediate level or those in middle school, high school – they have student exchanges or pen pals. Um – down south where they don't get winter or they don't get as cold as we do where as we get very cold weather. Although they are not together, through letters or using the internet, they can exchange information and learn from each other. They can learn about things like trees this way, even though we don't have trees, they can talk to their pen pal and ask them questions about things like trees and learn from each other. This is how I understand it.

The relationships and experiences have always been significant to passing on Inuit Qaujimajaqtuqangit. Current practices are contrary to many Inuit ways of having a foundation of Inuit Qaujimajatuqangit.

> Alikut: They don't go out regularly anymore, they stay inside because they don't have to get their food so they have become accustomed to a non-Inuit way of living. They use to get their values from their parents but it's not like that anymore, now they get their values from schools. We urgently need to bring Inuit Qaujimajatuqangit into schools because it is being forgotten and we are losing the elders who carry it. I began learning

> Inuit Qaujimajatuqangit when I was a child and I had to use it so I carry it in my heart. We have so much to give and we have to give it in a good way. It seems that the only way to do it now is to bring it into the school because children spend most of their time in school. The little time people have after work and school is not enough time to share it. Inuit Qaujimajatuqangit, the environment, relationships, harvesting, taking care of each other, families, everything had rules, were governed, had leaders. It was through good leadership and when they were governed well that Inuit lived well, following these rules. Inuit Qaujimajatuqangit has to be learned by the younger generation, they need to dig it out and let it emerge, the language, because these are the things that let us survive, let us live as Inuit. We have to remember why we got Nunavut. We know that the things that youth learn in schools allow them to live in today's world but we also have to make space for Inuit Qaujimajatuqangit. Inuit Qaujimajatuqangit has to be mandatory in schools and practiced regularly. We can't use it only sometimes on a short-term basis, it has to be ongoing, used continuously.

This can be achieved by research:

> Alikut: We need to make Inuit Qaujimajatuqangit a research priority. The youth need to research it and bring it into schools. Inuit used Inuit Qaujimajatuqangit to survive. Researching Inuit Qaujimajatuqangit has to be funded so that the younger generation can do the research to look at how to practice it in schools.

Many of the stories above may be relate to the cognitive domain of science education, but they are also as important to the affective domain. Inuit have established ways to provide an effective learning environment that accounts for different domains of a person - cognitive, motor, and affective. Here is one example of how this was done. These are conceptualized as Inungnguiniq and Pamiqsainiq.

> Alikut: They were taught more when parents thought the children were ready for more language and more knowledge. Children were given more challenging tasks when they seem to be ready to try them. New knowledge and skills were taught based on the child's ability. Children were praised for their efforts but not praised too much to a point of fostering arrogance. There was not much to do so children had to stay active and play, we learned through that as well. We learned through games and play, like the wolf game. They seem like games but they were like training for other things in the future.

We need to do this because:

Alikut: We have to use both Inuit Qaujimajatuqangit and new knowledge that we learn to live in Nunavut, we have to combine them and use what we learned from combining these worldviews to live in Nunavut today, that is the knowledge we're making.

…

Alikut: Anyone can learn anything if they have the will to learn so others can learn Inuit Qaujimajatuqangit as well. We have to prioritize Inuit Qaujimajatuqangit and make it mandatory, it's urgent now.

…

Alikut: If we teach Inuit Qaujimajatuqangit when they are little and continue to practice it in schools, in life, they will practice it when they become independent. That is how Inuit Qaujimajatuqangit lives, by practicing it, that's why we have to bring it into the school. If we teach them to live Inuit Qaujimajatuqangit, they will practice it and pass it on.

4.11 Concluding Reflections – Fusing the Pieces Together

What I offer that many teachers, regardless of their years of teaching experience, may not have, is that I am an Inuk who was raised with an Inuit worldview, I am bilingual in English and Inuktitut, I have lived within this land for most of my life, and I am a small part of a larger Inuit family system that spans multiple generations, including being a parent. Based on the teachings of Inuit elders, some of these are important parts of how Inuit educated their children and subsequent generations within a non-formal system. I am an educated Inuk who is working to decolonize a formal, imported system that has been constructed from a non-Inuit worldview and value system. This is a challenge that I believe many educators face because we are still trying to find ways to create more effective learning environments that offer the best possible outcomes for our students.

The stories of teachers are a potential place to understand both what is going on in classrooms in general, and how Inuit Qaujimajatuqangit is being used. Teachers' stories are one

piece of a larger conversation that needs to take place about what we are teaching our children and how we are teaching them. Within an Inuit worldview, all members of the community have a responsibility to prepare our children for the future. We cannot let the system do it alone, nor can the system do it without us because the system is not reflective of who we are, where we come from, or strive to be, but rather an interim context that Inuit were forced to conform to, but learning can happen and is a mindset that we should be operating from.

This excerpt from the Qilak group reiterates that challenge we face in using Inuit Qaujimajatuqangit in schools.

> K: yeah. Can you explain about they are way out there? um that it's in the past or that it's disconnected or?
>
> Ukpik: it's in the past, it's already done or should be forgotten -- like some people I find -- feel Inuit Qaujimajatuqangit is ancient and should be buried and not really looked back into cuz' it cannot be adapted into today's world.

In my experience, both Inuit and non-Inuit have expressed these ideas of seeing little to no value of Inuit knowledge in schools. Perhaps this is from a lack of comprehension of the knowledge or a lack of ability to relate. As the elders' stories have demonstrated, Inuit Qaujimajatuqangit in all domains can be applied to elementary life science education. Their stories challenge the existing scope and sequence, and framework we use to deliver science education. Lots of work has been done to decolonize the Nunavut education system by reimaging the framework of Nunavut education, but what we need to work on is Indigenizing Inuit education. Indigenizing Inuit education requires deliberate change in the expectations, strategies, value, and language used in science education. Indigenizing while decolonizing needs to take place in order to fill the space for learning that is being transformed. These are further discussed in the discussion.

5 Discussion

We have to prioritize Inuit Qaujimajatuqangit and make it mandatory, it's urgent now

- Alikut

Researchers have articulated how Indigenous knowledge, Indigenous science has been marginalized in Education (Aikenhead & Michell, 2010; Batistte, 2013; Kulnieks et al., 2013), while others have focused their research on articulating Indigenous science based on their respective cultures (Cajete, 2000; Kawagley, 1995; Kimmerer, 2013). Inuit in Nunavut have not put as much emphasis on articulating an Inuit worldview within the context of Inuit science education for academia, instead they put their efforts into creating Inuktut learning material. The divisional boards of education during the NWT government in the Nunavut region allowed for the creation of Inuit specific teaching and learning material that were developed into theme plans. At the ministry level, Inuit came together to develop the Inuuqatigiit curriculum. Subsequently, there have been projects creating learning resources based on Inuit knowledge such as the Anijaarniq website (n.d.) and other environment related publications. There has been limited research amongst Inuit articulating Inuit Qaujimajaqtuqangit for elementary science education in Nunavut. This research aimed to 1) demonstrate how Inuit Qaujimajatuqangit has been marginalized 2) demonstrate how Inuit Qaujimajatuqangit can be recentered for use in science education 3) and articulate Inuit Qaujimajatuqangit as knowledge, processes, and values that can be incorporated in elementary life science learning. Inuit Qaujimajatuqangit in life science education is an epistemology that is rooted in social, cultural, and environmental contexts that are unique to Inuit and situated based on our relationships to the environment and people, for it is through the processes of these relationships that knowledge is constructed, shared, and acted on.

The discourse of science education for Inuit has been predominantly focused on incorporating Inuit Qaujimajatuqangit into science education that is derived from Western science, analyzing the intersections between the two forms of knowledge. To achieve the aspirations of having Inuit Qaujimajatuqangit at the root of life science education, the discourse needs to be redirected to articulating what life science knowledge, skills, and values are from Inuit Qaujimajatuqangit and how to teach that using Inuit pedagogy, with the application of Western science being a latter objective. This would intentionally put Inuit Qaujimajatuqangit first, and cascade into the other areas of teaching and learning, such as using Inuktut as the language of instruction, exercising Inuit values, and applying developmental theory from Inuit Qaujimajatuqangit such as Inunnguiniq and Pamiqsainiq. Situating elementary life science education within a framework of Inuit Qaujimajatuqangit can be achieved using place-based, locally derived content, authentic assessments, and teaching strategies that are relevant to Inuit. What is also important is that Inuit Qaujimajatuqangit is not intended to be static, implying that the knowledge will change as new understandings are gained and applied to living an Inuit life.

Science is usually presented as a dichotomy of Western science and Indigenous knowledge. However, the wisdom that the elders shared and other sources of Inuit Qaujimajatuqangit leads me to argue that Indigenous knowledge is not void of science, there is such a thing as Inuit science. Battiste (2013) states that "Indigenous people understand the nature in which they live. They have a science derived from relationships with nature and with the energies withing an ecosystem, including their relationships with each other and with their environment" (p. 121). Inuit cultural practices such as harvesting cycles, seasonal calendars, seasonal hunting grounds, seasonal diets, the chemistry and physics behind food preparation and handling, and knowledge of complex ecological cycles in the arctic all informed by the ecology of the arctic. Indigenous science is developed from living with the ecology in a continuous relationship, developing a

complex awareness of the patterns within the ecology that gets transformed into a worldview of both the whole and interconnected patterns from the parts, resulting in cultural and social practices (Battiste, 2013), that change in response to the environmental and social changes.

Tattuinee's[32] statement about how Inuit Qaujimajatuqangit is common but also diverse and unique based on the context of Inuit communities and where they live and the definition for Inuit Qaujimajatuqangit from the NDE (2008) support Battiste's (2013) claims about Indigenous knowledge being a shared worldview that is collectively developed as a repository of knowledge that shape the system as "an internalized law of philosophy, customs, values, beliefs and morals… within their natural context… largely connected to that local context" (p. 121). Battiste (2013) states that "Indigenous science holds that all the world and life is in constant flux" (p. 122). Similarly, teachers from the Nuna group shared that the elders they learned from discussed climate change by observing astronomical shifts in the location of stars, and the condition of living things such as mosquitoes and plants. Inuit elders discuss these observations in more detail in "The Caribou Taste Different Now" (Gerin-Lajoie, Cuerrier, and Siegwart, 2016). This diverse and complex science has intrinsic and societal value.

The research participants shared stories of how they applied Inuit Qaujimajatuqangit principles as cross-curricular competencies, specifically in their expectations of students' attitudes. Anoee (2015) also shares her narrative of how the concept of Tunnganarniq has been applied within the school environment. These stories suggest that the application of Inuit

[32] p. 96

Qaujimajatuqangit principles as guiding principles to set expectations for how people interact in schools has come a long way in being reframed from an Inuit worldview.

Another significant factor in incorporating Inuit Qaujimajatuqangit into schools based on the stories teachers shared is in the use of Inuktut as the language of instruction. Ukpik's[33] example when teaching about matters and material using descriptive words in Inuktitut to support meaning making, and Amauligaq's[34] example of using the name of the months, as well as other examples teachers used when teaching about arctic animals demonstrate that when we use topics or themes that are drawn from the environment and experiences of students, implementing Inuktut language of instruction as their first or maternal language is easier. What makes implementing Inuktut language of instruction more challenging in science education is that many concepts and content are derived from other parts of the world or as ideas that are abstract without literal translation into Inuktut, making the language being used more difficult to comprehend and relate to. However, in my experience learning science and doing impact assessment in Inuktitut, I would argue that Inuktitut is versatile and has expanded in terminology using Inuktitut language conventions to develop more terms related to science. The teachers' narratives in Inuktitut regarding life science demonstrate that there is extensive knowledge and content that can easily be applied to elementary life science learning, the challenge in doing so is developing the curriculum that has a foundation of Inuit Qaujimajatuqangit, and deciding if meeting national science standards remains a primary objective in creating this curriculum.

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[33] pp. 106-107

[34] p. 105

Some insights based on the data and key learnings from doing the interviews suggests the need to further develop and integrate the Inuit Qaujimajatuqangit Education Framework referred to in the Inuit Qaujimajatuqangit foundation documents (NDE, 2007). A framework for curriculum already exists from an Inuit worldview in Inuuqatigiit (NWT ECE, 1996). Within the Inuuqatigiit curriculum, the sections are already separated between the relationship to the people and the relationship to the environment. The relationship to the environment section provides an initial framework that teachers can draw from to develop learning objectives and outcomes based on Inuit Qaujimajatuqangit.

Teachers in Aylward's (2010) study expressed apprehension towards the incorporation of Inuit knowledge into their teaching material, while elders in this study pointed out the lack of visibility and use of Inuit Qaujimajatuqangit in Nunavut schools. Based on literature and key learnings from this research, two things that are lacking are the development of the Iqqakkaukkaringniq strand that is an interdisciplinary strand of the reconceptualized curriculum from an Inuit worldview which includes science, and the lack of teacher training around how to use Inuuqatigiit and Iqqakkaukaringniq within the current educational framework; based on publicly available curriculum the Iqqakkaukaringniq strand has not been implemented beyond defining the concept. What is lacking in teacher supports is the engagement to co-develop resources and a process for sharing these resources to develop and implement elementary life science learning using Inuit Qaujimajatuqangit. During the interviews, while I was learning and gaining new understandings from their stories, the teachers were also relating to each other's stories. Seeing how effective narrative inquiry can be for a method of engagement in research suggests that creating time and space for teachers to engage and have meaningful discussions about their practice would enable teachers to transform their praxis to continue to implement Inuit Qaujimajatuqangit in science education to both decolonize and Indigenize Inuit education

in Nunavut schools. Ilinniaqtitsijit pilimmaksarningat tunngaviliuqtaukpat piliriqatigiingnirmik aajiqatigiingnirmiglu, qanuqtuurungnarningat pivaallirajaqtuq; pijitsirningat, avatimiglu kamatsiarningallu pivaalliqataulutik. Piliriqatigiiktillugit inuuqatigiitsiaqpata tunnganarlutiglu Inuit iliqqusinginnik aturajaqtut. Tamanna atuagunajarniqpat atutuqtauvallialuni ilinniaqtitsijit ilinniaqtitangit Inuit Qaujimajatuqanginnik atuqpaallirajaqtut ilinniarninginni. This statement ties the Inuit Qaujimajtuqangit principles to state that: if teacher development has a foundation of Piliriqatigiingniq[35] and Aajiqatigiingniq[36] developed, Qanuqtuurungnarniq[37] would improve; their act of Pijitsirniq[38] and Avatimik Kamatsiarniq[39] would also improve. If they Inuuqatigiitsiaq[40] and Tunnganaq[41], they will be practicing Inuit culture. If this was adopted as a policy and practice, the students that teachers are teaching would be exposed to more Inuit Qaujimajatuqangit in their learning.

Sharing stories is a strategy that can be used to engage teachers to share their practice and learn from each other; whether this results in a compendium of stories or a process for engaging through story-telling, a key finding is that teachers need an avenue to share their stories with each other to reconceptualize and transform science education for Inuit. These stories can potentially lead to a new iteration of the Inuuqatigiit curriculum, specifically on the section on

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[35] working together

[36] cooperating and collaborating to make decisions through consensus

[37] being resourceful and seeking solutions through creativity, adaptability, and flexibility

[38] contribution to the common good through service and leadership

[39] environmental stewardship

[40] respect others and build positive relationships

[41] be welcoming, open, and inclusive

Relationship to the environment, or the creation of a Iqqakkaukkaringniq curriculum. While the curriculum framework exists and Iqqakkaukkaringniq is defined, there is no collection of teaching resources or guidance on how to apply the theory and stories related to Inuit Qaujimajatuqangit. Engaging to share stories is an opportunity to further implement Inuit Qaujimajatuqangit in science learning and reframe science education.

New iterations of the Inuuqatigiit curriculum can potentially lead to themes that can be taught as Inuit STEM. While this study did not focus and examine what an Inuit STEM education might look like for elementary life science education, the work previously done by teachers who developed theme plans for the Baffin Divisional Board of Education and Kivalliq Science Educators demonstrate that it can be done. The concept of Indigenous STEM education is a more recent concept that was developed as a way to integrate interdisciplinary science learning with Indigenous knowledge, however, it was not initially emphasized in this research. Inuit STEM can potentially demonstrate how to incorporate Inuit Qaujimajatuqangit into elementary life science education. Nunavut already has a framework for creating a learning environment based on what we want our students to know, do and be. General Inuit axiology has been articulated using the Inuit Qaujimajatuqangit values and principles, but what is lacking in school learning is the implementation of Inuit epistemology and ontology. To further integrate Inuit epistemology and ontology, a transformation of learning environments needs to take place where pedagogy that supports embodied learning that is based on Inuit culture. This would involve (1) using Inuktut as the language of instruction, (2) implementing Inuit Qaujimajatuqangit principles as cross-curricular competencies, and (3) having elders participate throughout the educational process. It would also enable teachers to engage with each other and the community to set expectations, share knowledge, and teach. Developing relationships between teachers, communities, and particularly elders and knowledge keepers is essential to

enabling the integration of Inuit Qaujimajatuqangit into life science education. Empowering and engaging in these relationships can potentially enable the processes described by McGrath (2018) in the Qaggiq model, specifically around Inuktut knowledge renewal.

Elders are essential participants in this process as their role in sharing Inuit Qaujimajatuqangit and providing an ontological perspective from an Inuit worldview creates authentic learning opportunities that use Inuit pedagogy, Inuktut, and an expression of attitudes that have been shaped by our relationship to the environment and people. The elders in this research also shared how significant it is to involve parents and families in education as they were the primary educators when Inuit lived a nomadic lifestyle in small isolated groups. Today, we rely on school systems to educate and develop our children into capable human beings. Atqittuq stated that we have given our children to the school system. The school system influences the development of our children. Therefore, in order to bring in Inuit Qaujimajatuqangit into schools for our children, Inuit have to be involved in various capacities such as teachers, leaders, supports, and community members. Inuit being involved in these various capacities enables Inuit knowledge and values to take up space within the learning environment of our children.

When I recall my own learning experience in schools, primarily in the early years, all my teachers were Inuit who taught in Inuktitut. This built a positive relationship between my home and school life, enabled my family to be involved in my education, and supported the development of my first language. I believe that this learning experience supported a path for success in my life as they still shape the work that I do and my identity. The teachers involved in this study shared their experience as Inuit educators who support the development of these positive relationships, however, it is not clear if this is experienced widely within the school

system as it is apparent in research that some teachers struggle to implement these decolonizing and Indigenizing practices in Nunavut schools.

The current education system in Nunavut disrupts the Inuktut systems and Indigenous peoplehood matrix that McGrath (2018) discusses in the Qaggiq model. Alikut's[42] statements about how schools have disrupted these processes for sharing and passing on Inuit Qaujimajatuqangit resonates with McGrath's arguments about how they "disengage Inuktut systems" (p. 294). In order to re-engage Inuktut systems and the passing on of Inuit Qaujimajatuqangit, learning engagements amongst educators need to happen because they would be more reflective of how Inuit engage in knowledge sharing. Reframing elementary life science education with a foundation of Inuit Qaujimajatuqangit is not intended to isolate learning only to knowledge, skills, and values that are identified as being derived exclusively from Inuit, but to create a more equitable learning experience for Inuit as their learning spaces in science have been dominated by Western knowledge, values, languages, and processes that have not shown to be effective for educating our children to be independent and capable. This has been shown in the statistics of Inuit education related to achievement indicators that are derived from a Canadian standard and reiterated in research (Battiste, 2013; Aikenhead et al., 2014; Howard & Widdowson, 2014). While this study did not focus on understanding student achievement in science learning when teachers apply Inuit Qaujimajatuqangit, I can say from my experience, it has contributed significantly to my own success in my career and I have seen how teacher candidates are empowered and engaged when they have the opportunity to use Inuit knowledge in science teaching. Creating an engagement process for sharing stories and participating in Inuit

[42] p. 104 and 138-140

Qaujimajatuqangit activities can be used as an approach to implement equitable approaches for sharing with diversified content, rather than standardizing the content to mirror characteristics of Western science education. Integrating Inuit Qaujimajatuqangit [IQ] into science education in schools bridges Inuit Qaujimajatuqangit and Qablunaat Qaujimaningit[43] [QQ]. Alikut (personal communication, April 2017) explained that we have to bring IQ and QQ together to learn from each other and create a better life, new understandings.

Participants like Arviq[44] from the sea group explained how learning is lifelong and this is also an important concept that is included within the Sivuniksamut Ilinniarniq framework for characteristics of Inuit Qaujimajatuqangit in Nunavut schools. If we can commit to embodying those values in practice, we can create learning environments that are authentic and begin to bring in Inuit Qaujimajatuqangit into the school setting in meaningful ways. As for language, it is important that it is learned in context and diversified to allow for embodied language learning. Some strategies that support this type of learning include place-based learning, land-based learning, hand-on learning, and experiential learning. To make embodied language learning more reflective of an Inuit worldview, more work needs to be done to implement Inunnguiniq and Pamiqsainiq in schools as the context these concepts are currently articulated in have primarily been in traditional Inuit lifestyles outside of schools.

Natsiq's[45] story about a lack of land-based learning experiences in contrast to their experience when they were in school suggests that there is a lack of land-based education in

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[43] Qablunaat Qaujimaningit roughly translates to Western Knowledge

[44] pp. 94-95

[45] p.103

Nunavut. The dissonance between the narratives of the teachers, where they say they apply Inuit Qaujimajatqangit to their practice, and the elders' criticisms where they argue that they do not see Inuit Qaujimajatuqangit applied meaningfully in schools, suggests that there is a lack of culturally responsive teaching in science education in Nunavut schools. However, the teachers' stories demonstrate that they do apply it in their practice, but do not confirm if their practice is consistent with the practice of other Nunavut teachers, or if they are isolated to their experience. Similarly, in my experience, I can demonstrate how I have applied Inuit Qaujimajatuqangit in science education, but I cannot confirm if this reflects the practice of others who teach in the same subject area. The lack of culturally responsive teaching and dissonance between narratives of teachers, elders, and community members was not examined in detail during this study and would require further research to understand the implications to incorporating Inuit Qaujimajatuqangit into elementary life science education.

Recommendations for future research include understanding how teachers have taught themes derived from the Inuuqatigiit curriculum, specifically on the relationship to the environment, and understanding how active Inuktut language learning can be modelled to support life science learning activities. An example of land-based learning that reflects Inuit practices and the development of support material is the Anijaarniq website that uses content from the Igloolik Oral History project where there were engaging learning experiences that were recorded, then subsequently used to develop teaching material. This project demonstrates that using experiential learning activities, storying them, then creating resources from those stories is a potential way to implement Inuit Qaujimajatuqangit into science education. The participants' stories often referred to on-the-land learning experiences that suggest that creating a model for more frequent and intentional land-based education can support incorporating Inuit Qaujimajatuqangit into life science education. What these activities are, the process for enabling

them, and how they meet educational goals related to Inuit Qaujimajatuqangit would require further research. Michell's (2018) research on Cree land-based education provides an example that can resonate with an Inuit model that is based on the environmental and ecological cycles that Inuit live with. For future research, understanding how land-based education designed using Inuit Qaujimajatuqangit to reframe life science learning from an Inuit worldview could be transformative for science learning in Nunavut. Additionally, understanding how to create more culturally responsive life science education in Nunavut would benefit science learning for Nunavut students.

As I consider how this research has challenged me to examine my own understandings, my values, and my practice, the deconstruction and reconstruction of my thoughts, values, and actions was difficult and emotional because it challenged me to examine my practice and experiences with a critical lens and expose experiences that would normally be reserved for private conversations with likeminded individuals in spaces that feel safe. Exposing them in academic research where the audience that would respond to it is unpredictable with unpredictable expectations and criticisms, I am acutely aware of how the discourse of discussing the research I did can be redirected to testing my credibility and the validity with my lack of experience, rather than the substance of how to advance the agenda of integrating Inuit Qaujimajatuqangit in education.

When I reflect on my earlier practice, I recognize how my pedagogy mirrored more traditional science teaching methods from a Western worldview with some integration of Inuit knowledge and language. After going through the research process, I feel more certain and focused on facing the challenge of contributing to the transformation of Inuit education to implement Inuit Qaujimajatuqangit; I also feel grounded in understanding what it is and how to

go about doing it. While I continue to lack experience in teaching elementary science, I have a better sense of my position as a cross-cultural communicator, where I aim to support Inuit advance their interests to recentre education for our children based on our worldview, values, and priorities. What I am left with at the end of the research is questioning how we can address the tensions that Inuit face when they are actively integrating Inuit Qaujimajatuqangit into science education because it comes with frequent and uninformed criticisms that add to the demand of the psychological and emotional demand that comes with doing the work. I believe that failing to incorporate Inuit Qaujimajatuqangit into schools is a neo-colonial form of perpetuating cognitive imperialism in Canada. People need to intentionally create spaces where Inuit occupy the learning environment as experts and create relationships where they support each other in this type of work so they remember that they are not alone, they have Inuuqatik's who are equally committed to realizing these goals so that we can improve education for our children.

As I carry forward in my practice, I feel grounded in the intent behind the work I do with people to incorporate Inuit Qaujimajatuqangit and I am grateful for the participants sharing their stories so that I can learn from them and I hope to continue the conversations that are leading the way to decolonize and Indigenize Inuit life science education. During the interviews Atqittuq stated that our parents laid the foundation for us to use Inuit Qaujimajatuqangit. As I reflect on my experience, I recognize that I had the benefit of that in contrast to Inuit from the generations before me who went to residential schools. I also recognize how neo-colonial practices disrupt and displace Inuit Qaujimajatuqangit in our own learning as Inuit in contemporary learning environments. Through this work, I continue to aim to support more equitable learning environments that legitimize and uphold Inuit Qaujimajatuqangit in our education system for the benefit of our children to become Inummariit. Alikut's statements about how we need to bring these different worldviews together to create new understandings advances the goals of

empowering our children to face the challenges of today and the future in a more equitable and balanced relationship with others and the environment, creating a convergence of IQ and QQ. Tattuinee's statement about how the first block of an Iglu is important for establishing a solid foundation for the rest of the Iglu's construction, it resonates metaphorically to how important it is for us to establish a solid foundation for our children in the early stages of learning so that they may be guided by and embody positive attitudes, Inuit values, and a strong identity that allows them to face future challenges. The stories that the participants shared are rich with meaning and I am humbled by their willingness to share them with me and make meaning from them that is relevant to this research. I hope that the key learnings resonate with them and others are empowered by them to continue the work of decolonizing and Indigenizing science education. Finally, my research should not be used to generalize "what Inuit think" but contribute to what we are learning about how to decolonize and Indigenize Inuit education.

6 Conclusions

As I metaphorically finish the construction of my Iglu of learning through this research and leave it to the elements to be further deconstructed and dissolved into discussions and experiences beyond this research, there is a sense of being refocused and attuned to the challenges and opportunities ahead to demonstrate how to incorporate Inuit Qaujimajatuqangit in elementary life science education. While some of the participants were new acquaintances, some were friends, and some were my former students, our relationships were reformed and renewed. I hope to continue those relationships and bridge new ones with people who are ready to create learning opportunities that legitimize Inuit Qaujimajatuqangit in science learning and support learners who are going through the struggles and experiencing the tensions of neo-colonial forces that disrupt and disempower the use of their culture and their ability to reinforce their identity to be Inummariit.

The resonance between the participants' stories, the Inuuqatigiit curriculum, the Inuit Qaujimajatuqangit education framework, the Qaggiq model, and student-centered land-based education affirm that there are ways we can reimagine how we teach elementary life science. The Inuuqatigiit curriculum and the IQ foundation documents already provide a theoretical framework of Inuit philosophy around teaching and learning with expectations for being student-centered, place-based, land-based, using Inuktut, being culturally grounded, and done in partnership with the community. The stories shared in this research provide a glimpse of how to apply this practically and theoretically when teaching elementary life science with a foundation of Inuit Qaujimajatuqangit. The Inuit Qaujimajatuqangit research with elders needs to be further implemented into school practice by doing research, learning from each other, and reflecting on our own praxis so that we can provide the best possible education for our children. There is

intrinsic, societal, and utilitarian value in further integrating Inuit science into elementary life science education. It is not intended to displace and replace all current forms of science learning, but to find a way to make space for each other, to create "ethical spaces" in science learning.

While science education with Indigenous and Western science is often discussed as distinct knowledge systems and assume a dichotomy, I continue to struggle relating to the divide as my own knowledge and experience that has enabled me to be independent and adaptable is a product of the convergence of knowledge systems. When I think of Alikut's statement about bridging knowledge systems to create a better one, I am reminded of what I have gained in learning different worldviews and feel that our Inuit culture is still powerful in a contemporary context, even when Western implements are adopted. Inuit knowledge has been renewed through each Inuk's subsequent experience and how they apply it to the challenges they face. If Inuit continue to survive and thrive using Inuit knowledge, will be the true test that demonstrates how significant it is in education.

This research did not focus on finding resonance in other theories related to elementary life science education that are embedded in Western worldviews as it was intentionally reframing science education to a decolonizing and Indigenizing lens. Some of the statements made by the elders reiterate that neocolonial forces have dominated learning in Nunavut schools and the integration of Inuit Qaujimajatuqangit has resulted in Inuit Qaujimajatuqangit rhetoric, while the teachers' stories demonstrate that they are active agents of change that are integrating it in their own practice. This shows that our relationships are currently disrupted to the extent that our children are not getting the full benefits of Inuit Qaujimajatuqangit through Inuktut systems. The empowerment we experienced together by sharing stories provides an avenue to continue

collaborating so that we can do better at incorporating Inuit Qaujimajatuqangit for the benefit of our children.

Some of the challenges with continuing this work involve making the time and space to engage in sharing these stories to learn from each other more frequently. Many elders, including two that were interviewed, have passed on, which bears a significant void for the collective in access to Inuit Qaujimajatuqangit and leaves a gap in our own growth as educators who may have had our own learning disrupted and displaced. The educational policies that are intended to address safety while doing excursions can add barriers in access to land. With the rising costs of modern equipment that has replaced traditional technology, the gap students face in accessing land with their families continues to grow and add to the displacement of their heritage. Additionally, Inuit teachers are treated as generalist teachers with equal workloads to non-Inuit teachers who rely on Western curriculum. With the added expectation of Inuit teachers to be agents of change and cultural experts, they usually take on the responsibility of being curriculum innovators and creators which requires more time and energy than is needed to use prescribed curriculum. The roles and responsibilities of Inuit teachers needs to be reimagined to allow for them to be creators and developers of curriculum with respect for the time they need to do this important work.

Looking back to how the research was conducted, I would have preferred to have time to observe the learning spaces that the teachers talked about, bring the elders together, and bring the participants back together when coding the data and making meaning from their stories to confirm my understanding. After doing the field component of this research, my practice began to change where I gained the confidence to orchestrate learning opportunities for my students that are hands-on, experiential, diversified on the land, and brought back to the classroom to

continue the learning. I was apprehensive to code their stories and draw meaning from them without confirming the statements because of the value Inuit place on limiting our statements to what we know and experienced. Saullu (Nakasuk et al., 2017) said “I can be asked what I know. I state only what I know” (p. 103). The elders and teachers in this research also demonstrated this when they shared their stories. While I can participate in more Western practices in science of discussing abstract ideas, applying similar practices to Inuit knowledge feels disrespectful so I aimed to make meaning from the stories as interpretations and not abstractions, finding resonance in our stories and not making generalizations about Inuit Qaujimajatuqangit.

Since I conducted the research, I have become more acutely aware of my environment, particularly on the nuna. I feel more observant of the patterns in nature when I remember what the elders and teachers said about the sky, the land, the animals, and the patterns among them. Failing to bring these learning opportunities to our children is a disservice because their ability to be observant of their environment and respond to the conditions affects their ability to survive and thrive, and fill their sense of pride from their independence and ability to support their relationships. We need to scaffold learning opportunities for our children using Inuit Qaujimajatuqangit because it got us to where we are today and continues to serve us well. Qimirrurnira tukiliurniralu Inuit Qaujimajatuqanginnik ilinniaqtitsinirmi avatiup miksaanut mikiniqsait ilinniarninganni isulitpuq, isumaksaqsiurnikkut igluliugara tukiliurnikkut iniqpuq. My research and meaning making about Inuit Qaujimajatuqangit in elementary life science education has come to an end, the metaphorical Iglu I have constructed in thought through meaning making is complete. I end this process with a sense of gratitude to those who have taught me and continue to teach me and hope these findings benefit our practice as educators and more importantly our children.

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Appendices

Appendix A Research Questions

Below is a table that represents a preliminary scope and sequence of research questions aimed at providing information to answer the central research question.

Central	Guiding	Interview
How can elementary life science education be based on Inuit Qaujimajatuqangit and culture? ᖃᓄᖅ ᐅᒪᔨᓂᖅ ᐊᐸᑎᒥᓄᑦ ᑐᓂᓯᓂᖅ ᐃᓕᓴᕐᓂᖅ ᐊᓂᔪᓂᒃᑯᑦ ᐃᓄᐃᑦ ᖃᐅᔨᓴᖅᑎᑐᑦ ᐃᓕᓴᕐᓂᒃ?	Who are the participants of the study? ᑭᒃᑯᐸᑦ ᐃᓕᐅᔨᓪᓚᑦ ᖃᐅᔨᓴᖅᑕᐅᔨᕆᑎ?	What experience do you have teaching in Nunavut? How would you define Inuit Qaujimajatuqangit? How would you define science?
	How do Nunavut teachers teach life science in elementary school? How have they taught it in the past?	Can you share stories about your elementary science teaching experience in Nunavut within the last ten years? How do you teach elementary life science? Is the way you taught it culturally relevant to Inuit? Why is it or is it not relevant to Inuit culture?
	What concepts, processes, or skills are considered as Inuit knowledge? How do people distinguish Inuit knowledge from Western knowledge in life sciences? If so, why do they distinguish knowledge this way?	How do you distinguish between what is Inuit knowledge and what is not? Why do you distinguish Inuit knowledge from other knowledge? Why don't you distinguish Inuit knowledge from other knowledge?
	How is science taught and learned in Inuit culture?	How do Inuit traditionally teach? How did Inuit learn science before schools? How are Inuit students taught in science class?

	Why do Inuit label knowledge in science as Inuit Qaujimajatuqangit? And how is scientific knowledge labeled as Inuit Qaujimajatuqangit?	Why do you distinguish between what is Inuit knowledge and what is not?

Possible analysis questions:

i) Who are the participants, what is their context?

ii) What themes from literature are relevant to participants' stories?

iii) What themes are participants reiterating in each other's stories?

iv) Is there a comparable pattern between participant experiences?

v) Do any of the participants' stories deviate from others?

vi) What pedagogy do participants employ when they teach science?

vii) Is there resonance of meaning between interpretations of science concepts, processes skills with Inuit Qaujimajatuqangit in participant experiences?

viii) How do teachers assess their practice and student learning? Are these forms of assessment culturally relevant to Inuit culture and science education?

ix) Is the meaning I'm making from the story shared by the participant?

x) What am I assuming from their story?

xi) How are these themes indicative of Inuit Qaujimajatuqangit?

xii) What external forces influence participant practice and views?

xiii) What internal forces influence participant practice and views?

Appendix B Non-technical Summary

Non-Technical Summary

Research Title: Inuit Qaujimajatuqangit in Elementary Life Science Education
Researcher: Marjorie Kaviq Kaluraq, MEd Graduate Studies Student

Affiliation: Trent University, School of Education, Peterborough, ON

Supervisor: Professor Paul Elliott

Research License: Trent University#24517 Nunavut Research Institute# 03 012 16N-A

Region: Kivalliq Communities

Since the creation of Nunavut, Nunavut science education has undergone revisions to make it more relevant to Inuit culture. To date, there are few school studies post-Nunavut curriculum development and post-NWT Science and Technology curriculum reform that have documented and researched changes to science education in Nunavut.

The purpose of this study is to learn from the experience of teachers and elders about elementary life science education. Elementary education is a foundational stage where students learn primary skills that contribute to their interest and success in secondary school science. Engaging elementary students with science that is relevant and interesting is key to maintaining their enthusiasm for the subject into further science education and ultimately to science-based careers. Teachers deliver the curriculum and have a responsibility to design it based on many different factors such as Nunavut-approved curriculum and student needs. Researching teachers' stories of experience offers insight into how teachers teach elementary science and how Inuit Qaujimajatuqangit is a part of classroom curriculum. Inuit elders' wisdom about teaching practices and science in Inuit culture are an important part of passing on traditional knowledge.

Information will be collected through focus group interviews with teachers and independent interviews with elders in January 2017. Elders are welcome to participate in focus groups. The focus groups are intended to be a forum for teachers to share their stories of

teaching elementary science and their ideas about elementary life science education. Each focus group will meet at least once as a group for about three hours in their home community. The length of time and number of times each focus group meets can be negotiated between the participants and the researcher. Interviews will be done in either Inuktitut or English, participants will have the option of using either language. The researcher will also take pictures for the purpose of data collection and reflection on the research process. Participants will have an opportunity to receive information regarding the study as a summary, complete electronic version, or presentation once it has been approved as a master's thesis. Elders will have an opportunity to have a copy of their independent interview in a format of their choice. Any additional use of information and consent beyond the scope of this study will be subject to independent licensing and review beyond this study.

The information collected through this study will be used for a master's thesis that will be publicly available. The findings of the study can also be used to inform current science education in Nunavut for the purpose of research and educational development.

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ᕆᑲᐅᓴᕆᖅᑕᐅᔪᓱᑦ ᐊᑎᓴᖅ: ᐃᓇᐃᓕ ᕆᑲᐅᓴᒪᔾᔪᑎᖅᑎᓴᓂᖅ ᐅᒪᔪᓂᖅ ᐊᓂᒍᑎᓕᒃ ᐊᓂᓴᓂᖅ ᕆᑲᐅᓴᕆᖅᑐᓕᕆᓂᕐᒥ ᐃᕆᕆᑲᕆᖅᑲᐅᑲᓕᕆᓂᕐᒥ ᒥᑭᓂᖅᓴᐃᓕ ᐃᓕᓴᖅᓕᕐᓂᖅᓴᓕᖅ

ᕆᑲᐅᓴᕆᖅᑎ: ᒪᔪᓘ ᑲᐃᓯᖅ ᑲᓇᑦᖅ

ᐃᓕᓴᖅᓂᕆᐃᖅ ᐃᓕᑭᔾᐅᔪᖅ: ᑐᓚᓴᑦ ᓯᓕᑐᑐᓴᕆᔨᔪᐊᖅ, ᐃᓕᓴᖅᓂᐊᖅᑐᓕᕆᓂᕐᒥᒃ ᐃᓕᓴᖅᓂᐊᖅᓂᐃᖅ, ᐱᑕᕗᑭ, ᐊᑲᑎᐅᑕᓘᔪ

ᐃᓕᓴᖅᓂᐊᖅᑎᑦᓯᔨᖓ: ᐃᓕᓴᖅᓂᐊᖅᑎᑦᓯᔨᒪᓚᒃ <ᐅᓇᓯ ᐃᓕᐊᑦ

ᕆᑲᐅᓴᕆᖅᓂᕐᒧᒍᑦ ᓪᐃᔭᑕᑭᑎᖓᑕ ᓇᔭᐅᑦ: ᓯᓕᑐᑐᓴᕆᔨᔪᐊᖅᑎᑦᓂ#24517 ᓄᓇᕗᓴᒥ ᕆᑲᐅᓴᕆᖅᑐᓕᕆᔨᒃᑯᑦ# 03 012 16N-A

ᑕᐃᒪᖓᑦ ᓄᓇᕗᑦᑎᓪᑕ ᕆᑲᐅᓴᕆᓂᕐᒥᒃ ᐃᕆᒃᑯᒃᑲᐅᒃᑲᓚᖓᓂᕐᒥᒃ ᐃᓕᓴᖅᓂᐊᖅᓂᐅᓴ ᒥᒃᓴᓄᑦ ᐊᓯᔨᕆᖅᑕᐅᓯᒪᓕᕐᓂ ᐃᓄᓇᑦ ᐃᓕᓴᖅᓂᐊᖅᑐᓂᓯᓚᖅᑐᓂᖅ ᑐᙵᖓᕐᕕᕆᑲᒃᑲᓂᖅ ᕆᑲᐅᓴᕆᖅᑲᐅᓚᓕᕆᓂᕐᒥᒃ ᓄᑲᖓᕐᕕᕆᑲᒃᑲᓂᖅᓴᐃᓕᓴᖅᑐᓂ ᐃᓕᓴᖅᓂᐊᖅᓂᐃᖅ, ᐃᓕᓴᖅᓂᐊᖅᑎᑦᓯᔨᖓᓂᖅᓴᐃᓕᓴᖅᑐᓂ

ᐅᖏᒃᑕᓪᓗᓂᒃ ᓄᓇᓕᒥᖏ'ᓂ. ᑲᑎᒪᓂᖅᓴᐅᔪᒃ ᐃᓕᑭᐊᖅᑕᐅᔪᒪᓴᒃᑕ ᐃᑲᖏᕐᓂᒃ ᐅᓪᓗᓂᓪᓗᓂᒃ ᑲᑎᒪᖏᖅᑎᑭᓂᒃ ᐃᖅᑲᖅᓴᖅᓯᖅᑐᖅ ᐊᖏᕐᖅᑲᑎᑭᓂᖅ ᐃᓕᓴᕐᓂᓪᓗᓂᒃ ᖃᓄᖅᑲᓂᓪᓗᓂᒃ ᐅᓂᒃᑲᓪᓗᓂᒃ ᐃᓕᓴᕐᓂᓪᓗᓂᒃ ᐊᔪᖅᑐᑦ, ᐅᓂᒃᑲᖅᑐᑦ ᐃᓕᓴᕐᓂᓪᓗᓂᒃ ᖃᓄᖅᑲᓂᖅᑐᑦ. ᖃᐅᔨᓴᖅᑎᑦ ᐊᖏᕐᓂᑲᑎᒪᓂᖅᓴᖅᑐᑦ ᑲᑎᒪᓂᖅᓴᐅᔪᒃ ᐊᑐᓂᖅᑐᑦ ᐃᓕᓴᕐᓂᓪᓗᓂᒃ ᐊᑐᓂᖅᑐᑦ ᐃᓕᓴᕐᓂᓪᓗᓂᒃ ᑲᑎᒪᓂᖅᓴᐅᔪᒃ ᐃᓕᓴᕐᓂᓪᓗᓂᒃ ᐊᑐᓂᖅᑐᑦ

Appendix C Public Notice – Research Interest

Public Notice – Research Interest

Research Title: Inuit Qaujimajatuqangit in Elementary Life Science Education

Researcher: Marjorie Kaviq Kaluraq, MEd Graduate Studies Student

Affiliation: Trent University, School of Education, Peterborough, ON

Supervisor: Professor Paul Elliott

Research License: Trent University#24517 Nunavut Research Institute# 03 012 16N-A

Project Information

Background

Since the creation of Nunavut, Nunavut science education has undergone revisions to make it more relevant to Inuit culture. To date, there are few school studies post-Nunavut curriculum development and post-NWT Science and Technology curriculum reform that have documented and researched changes to science education in Nunavut. Elementary education is a foundational stage where students learn primary skills that contribute to their interest and success in secondary school science that can lead to science careers.

What will the information be used for?

The study will be used to learn from the experience of teachers and elders about elementary life science education. The researcher's central question in the study is "How can elementary life science education be based on Inuit Qaujimajatuqangit and culture?" The information collected in the study will be used in a master's thesis that will be publicly available. The findings of the study can also be used to inform current science education in Nunavut for the purpose of research and educational development.

How will information be collected?

Information will be collected through focus group interviews with teachers and independent interviews with elders in January 2017. Elders are welcome to participate in focus groups. The focus groups are intended to be a forum for teachers to share their stories of teaching elementary science and their ideas about elementary life science education. Each focus group will meet at least once as a group for about three hours in their home community. The length of time and number of times each focus group meets can be negotiated between the participants and the researcher. Interviews will be done in either Inuktitut or English; participants will have the option of using either language. The researcher will also take pictures for the purpose of data collection and reflection on the research process.

Criteria for teacher participation in the study

- Kivalliq citizens
- Who have taught in elementary school between 2006-2016
- For a minimum of three years
- Who have an interest in elementary school life science
- Are willing to share stories about their elementary science teaching experience
- Use Nunavut approved curriculum resources for the Iqqaqqaukkaringniq strand
- Would like to contribute knowledge about science curriculum in Inuit communities

Criteria for elder participation in the study

- knowledge of Inuit teaching practices
- expertise in life systems
- experience in schools
- interest in elementary education
- interest in science education
- elder participants can be recruited by community members and teachers

Only communities with a minimum of three participants interested and available will be included in the study due to logistical and financial limitations.

Why this criteria?

Researching teachers' stories of experience offers insight into how teachers teach elementary science and how Inuit Qaujimajatuqangit is a part of classroom curriculum. Inuit elders' wisdom about teaching practices and science in Inuit culture are an important part of

passing on traditional knowledge. Elder involvement is also important to understand what constitutes Inuit culture and how that knowledge is shared.

Researcher's Information

The researcher is an employee of Nunavut Arctic College currently taking graduate studies in Education. She is bilingual in both English and Inuktitut. She can be contacted directly to receive more information about her work and the study.

Interested parties

People interested in participating in the study can contact the researcher directly. People who wish to participate have options available for anonymity and confidentiality. People who choose to remain anonymous in the research will be treated as confidential by using pseudo names in published data. Participants are also bound to their employer's code of ethics including confidentiality that will be adhered to in the study.

Participants will have an opportunity to receive information regarding the study as a summary, complete electronic version, or presentation once it has been approved as a master's thesis. Elders will have an opportunity to have a copy of their independent interview in a format of their choice. Any additional use of information and consent beyond the scope of this study will be subject to independent licensing and review beyond this study.

CONTACT INFORMATION

Kaviq Kaluraq

Iqaluit, NU, X0A 0H0

(867)-979-3489

marjoriekaluraq@trentu.ca

ᑐᓴᖅᓴᖅ – ᖃᐅᔨᓴᖅᑕᐅᔪᒪᔪᖅ

ᖃᐅᔨᓴᖅᑕᐅᔪᓐ ᐊᑎᖏᑦ: ᐃᓄᐃᑦ ᖃᐅᔨᒪᓕᕐᖃᖏᑐᓂᒃ ᐅᒪᔪᓂᒃ ᐊᕿᑎᒋᓗ ᐃᓕᓴᕐᑎᓂᖅ ᖃᐅᔨᓴᖅᑐᑕᓂᕐᒥ / ᐃᖅᑲᖅᑲᐅᐅᑲᖏᓐᓂᕐᒥ ᒥᑭᓂᖅᓴᐃᑦ ᐃᓕᓴᐅᔪᖏᖑᓂᓂ

ᖃᐅᔨᓴᖅᑎ: ᒪᔪᓱ ᑲᖏᔪᖅ ᑲᓇᕐᖅ

ᐃᓕᓴᐅᔪᖏᖑᑦ ᐃᓚᒋᔭᐅᔪᖅ: ᑐᓴᓪᓕ ᔪᓚᑕᑐᓴᒡᒐᔪᐊᖅ, ᐃᓕᓴᐅᔪᖅᑐᑕᓂᕐᒥᑲ ᐃᓕᓴᐅᔪᖏᖑᑦ, ᐋᑕᕗᑭ, ᐊᐅᑎᐅᓂᖅ

ᐃᓕᓴᐅᔪᖅᑎᑦᔪᓂᖓ: ᐃᓕᓴᐅᔪᖅᑎᑦᔪᓂᓴᖅᑲ <ᐅᓇᔪ ᐃᓕᔪᑦ

ᖃᐅᔨᓴᖅᓂᕕᑦ ᓪᐃᓴᑕᑭᑎᖓᑕ ᓰᓴᐅᑦ: ᔪᓚᑕᑐᓴᒡᒐᔪᐊᖅᑎᑦ#24517 ᓄᓇᕗᓴᒥ ᖃᐅᔨᓴᖅᑐᑕᓂᕐᓴᖅᔪᓄᑦ# 03 012 16N-A

ᖃᐅᔨᓴᖅᑕᐅᔪᓴᒡᒐ ᐱᑦᑐᑎᖓᑕ

ᑕᐃᒪᖓᑦ ᓄᓇᕗᑦᑕᑦᑦ ᐃᓕᓴᐅᔪᖅᑐᑕᓂᕐᒥᖅ ᐊᔪᓴᖅᑕᐅᔪᓚᒪᔪᖅ ᐃᓕᓴᐅᔪᖏᖑᖅ ᐃᓄᐃᑦ ᐃᓕᖅᔪᔪᓐᓂᑐᓂᕐᒥᖅ ᑐᙱᓚᐃᖅᑲᓇᐊᖅᑎᓇᔪᖅᓗᑎᑦ. ᐊᒥᔪᓐᓂᑦᑐᑦ ᖃᐅᔨᓴᖅᔪᒪᔪᖅ ᖃᓄᖅ ᐃᓕᓴᐅᔪᖏᖑᖅ ᖃᐅᔨᓴᖅᑐᑕᓂᕐᒥᑲ ᒥᑭᓂᖅᓴᐃᑦ ᐃᓕᓴᐅᔪᖏᖑᓚᐅᖏᓐᓂ ᐊᔪᔨᓴᖅᔪᒪᓕᓴᐅᑎᑦᓗᑎᑦ ᐊᔪᔨᓴᓂᐅᔪᒪᓕᖅᑎᑦᓗᑎᑦ ᐃᓕᓴᐅᔪᖅᑐᑕᓂᕐᓴᐅᖅᓴᖅᓗᐃᑦ ᓄᓇᕗᒥ, ᐃᓕᓴᐅᔪᐊᖅᓴᖅᓗᑦᓗ ᖃᐅᔨᓴᖅᑐᑕᓂᕐᒥᑲ ᐃᖅᑲᖅᑲᐅᐅᑲᖏᓐᓂᕐᒥᑲ ᒥᑭᓂᖅᓴᐃᑦ ᓄᓇᕗᔪᓂᒃ. ᒥᑭᓂᖅᓴᐃᑦ ᐃᓕᓴᐅᔪᖏᖑᓚᐅᖏᓐᓂ ᐃᓕᓴᐅᔪᖅᑐᑕᓂᕐᒥᑲ ᒥᑭᓂᖅᓴᐃᑦ ᐊᑐᑎᖅᑲᓐᓂᑕᐅᔪᓚᒪᔪᖅᓴᖅᓗᓂᓗ ᐱᓕᒥᓄᖅᑲᓐᓂᑕᐅᔪᓚᒪᔪᖅᓴᖅᓗᓂᓗ ᐃᓕᓴᐅᔪᖅᑐᑕᓂᕐᒥᑲ ᐃᑲᖅᑲᐅᐅᑲᖏᓐᓂᕐᒥᑲ ᐃᓕᓴᐅᔪᖅᑐᑕᓂᕐᒥ ᐃᑲᔪᖅᑕᐅᔪᓚᒪᔪᖅᓴᖅᓗᓂᓗ ᐃᓕᓴᐅᔪᖅᑐᑕᓂᕐᒥ ᐱᓕᒥᓄᖅᑲᓐᓂ

ᖃᑉᓂᖅ ᖃᑎᒌᓚᖅᑕᐅᔨᓚᖅ ᑲᑎᖅᓯᖅᑕᐅᓂᐊᖅᐸᑦ?

ᐅᓂᐹᑦ ᐃᓕᓴᐅᓂᐊᖅᑎᓂᑦ ᓂᐱᓕᐅᖅᑕᐅᓂᐊᖅᑐᑦ ᑲᑎᒪᓗᑎᑲ ᐃᓕᓴᐅᓂᐊᖅᑎᓯᒋᔭᑦ ᓄᓇᕗᑦᓂ ᓴᓇᐊᓗ 2017ᒥ. ᐃᓴᓇᐃᑦ ᑭᓯᒥᐅᖅᓗᑎᑲ ᓂᐱᓕᐅᖅᑕᐅᓇᓴᖅᑐᑦ. ᐃᓴᓇᐃᑦ ᐃᓕᐅᔨᒪᔭᑦ ᑲᑎᒪᓂᖅ ᐃᓕᐅᖅᑎᑕᐅᔨᓴᓇᖅᑐᑦ. ᐃᓕᓴᐅᓂᐊᖅᑎᓯᒋᔭᑦ ᑲᑎᒪᓂᖅ ᐃᓕᓴᐅᓂᐊᖅᑎᓯᒋᔭᑦ ᐅᓂᐹᒃᖢᓇᖅᓯᐊᓕᒃᑕ ᖃᑎᒌᓚᖅ ᐃᓕᓴᐅᓂᐊᖅᑎᓯᓯᒪᓴᓇᖅᑐᑦ ᐃᓕᓴᐅᓂᐊᖅᑎᓯᒋᔭᑦ ᐅᓂᐹᒃᖢᓇᖅᑐᑦ ᐃᓅᖅᑲᖅᑲᐅᐳᖅᑲᓇᓴᖅᑐᑦ, ᖃᑎᒌᓚᖅ ᐃᓕᓴᐅᓂᐊᖅᑎᓯᓂᖅ ᐅᒪᔨᓂᖅ ᐊᐸᑎᓕᖅᑐᑦ ᐃᓕᓴᐅᓂᐊᖅᑎᓯᓂᖅ ᐃᓕᓴᐅᓂᐊᖅᑎᓂᕐᓂᖅ ᐃᓕᓴᐅᓂᐊᖅᑎᓂᕐᓂᖅ. ᑲᑎᒪᓂᖅᑎᑦᓂᖅ ᐊᑕᐅᓂᖅᑐᑦ ᐃᓕᓴᐅᓂᐊᖅᑎᓂᕐᓂᖅ ᑲᑎᒪᓂᖅᑎᑦᓂᖅ ᐃᓕᓴᐅᓂᐊᖅᑎᓂᕐᓂᖅ

ᐃᓕᓴᕆᐊᖅᑎᓯᓚᐅᓪ ᐅᓂᒃᑲᓐ ᐃᓕᓴᕆᐊᖅᑎᓯᓂᕆᔨᒥᓂᒃ ᖃᐅᔨᓴᓪᓕᐊᑕᐅᔨᖏᓐᓇᖅᓯᒪᑦ ᖃᓄᖅ ᐃᓕᓴᕆᐊᖅᑎᓯᓂᕐᓴᖏᓐᓇᓯᒪᓕᐅᕙᓪᓕᖅᑐᑦ ᖃᐅᔨᓴᖅᓯᒪᔪᑐᖅᓯᓂᑦ ᐊᑐᖅᑕᐅᓴᖏᓐᓇᓯᒪᓕᐅᑦ ᐃᓕᓴᕆᐊᖅᓯᖏᓐ ᐃᓕᓴᕆᐊᑲᓴᓂᒃ. ᐃᓴᓇᐃᑦ ᓂᓪᑕᐅᓂᖅᑎᑦ ᐱᓕᒪᓇᐅᖏᓪᓕᑦ ᐃᓄᖅᓄᑦ ᑕᒪᐃᑦ ᒥᒃᓱᓄᑦ ᐃᓕᓴᕆᐊᖅᓂᒧᑦ, ᖃᐅᔨᓴᖅᓂᖅᓯᒧᑦ, ᐃᓄᐃᑦ ᐃᓕᖅᑯᓂᖅᓄᓐᓄᑦᓗ; ᐃᓴᓇᐃᑦᓗ ᐃᓄᐃᑦ ᐃᓕᖅᑯᓂᑎᒧᑦ ᐃᓄᐃᑦ ᖃᐅᔨᓴᖅᓯᒪᔪᑐᖅᓯᓂᖅᓴᖅ ᑐᑭᓯᐊᓂᑦ ᐃᓴᓇᐃᑦ ᐃᓕᓐᓂᑦᓗ ᐱᖓᓱᐊᓂᑦ. ᐃᓴᓇᐃᑦ ᐃᓕᓇᐅᓂᖅᑎᑦ ᐱᓕᒪᓇᐅᖏᓪᓕᐅᕙᓪᓕᖅᑐᖅ ᑐᑭᓯᐊᓂᖅᑎᓂᒃᑯᑦᑎᒍᑦ ᓂᓪᓕᐅᔪᓂᖅᑎᓂᒃ ᐃᓕᓴᕆᐊᖅᑎᓂᒃ ᐃᓄᐃᑦ ᐃᓕᓐᓂᑦᓗ ᐃᓕᓴᕆᐊᖅᓯᖏᓐ ᐊᓕᒪᓂᖅ ᐃᓄᐃᑦ ᐃᓕᓴᕆᐊᖅᓯᖏᓐᓄᑦ ᑐᑭᓯᐊᓂᖅᑎᓂᒃᑯᑦᑎᒍᑦ ᐃᓄᐃᑦ ᐃᓕᓴᕆᐊᖅᓯᖏᓐ ᐊᓕᒪᓇᐅᖏᓪᓕᐅᕙᓪᓕᖅᑐᖅ ᑐᑭᓯᐊᓂᖅᑎᓂᒃᑯᑦᑎᒍᑦ ᓂᓪᓕᐅᔪᓂᖅᑎᓂᒃ ᐃᓕᓴᕆᐊᖅᓯᖏᓐ ᐊᓕᒪᓇᐅᖏᓪᓕᐅᕙᓪᓕᖅᑐᖅ ᐃᓄᐃᑦ

Appendix D Participant Consent form

Interview Consent Form

Research Title: Inuit Qaujimajatuqangit in Elementary Life Science Education
Researcher: Marjorie Kaviq Kaluraq, MEd Graduate Studies Student

Affiliation: Trent University, School of Education

Supervisor: Professor Paul Elliott

Research License: Trent University#24517 Nunavut Research Institute# 03 012 16N-A

Contact Information

Marjorie Kaluraq

Iqaluit, NU, X0A 0H0

(867)-979-3489

marjoriekaluraq@trentu.ca

Professor Paul Elliott

School of Education

Trent University

Peterborough, ON

Research Information

Background

Since the creation of Nunavut, Nunavut Science Education has undergone revisions to make it more relevant to Inuit culture. To date, there are few school studies post Nunavut curriculum development and post NWT Science and Technology curriculum reform that have documented and researched changes to science education in Nunavut.

Purpose of the Study

The purpose of this study is to learn from the experience of teachers and elders about elementary life science education. The researcher's central question in the study is, "How can elementary life science education be based on Inuit Qaujimajatuqangit and culture?" Elementary education offers more flexibility in cross-curricular education because students only begin to specialize in science courses in secondary school. Elementary education is also a foundational stage where students learn primary skills that contribute to their interest and success in secondary school science. Engaging elementary students with science that is relevant and interesting is key to maintaining their enthusiasm for the subject into further science education and ultimately to science-based careers. Teachers deliver curriculum and have a responsibility to design it based on many different factors such as Nunavut approved curriculum and student needs. Researching teachers' stories of experience offers insight into how teachers teach elementary science and how Inuit Qaujimajatuqangit is a part of classroom curriculum. Inuit elders' wisdom about teaching practices and science in Inuit culture are an important part of passing on traditional knowledge. Elder involvement is important when trying to understand what constitutes as Inuit culture and how that knowledge is treated.

How will information be collected?

Information will be collected through focus group interviews with teachers and independent interviews with elders. Elders are welcome to participate in focus groups. The focus groups are intended to be a forum for teachers to share their stories of teaching elementary science and their ideas about elementary life science education. Each focus group will meet at least once as a group for about three hours. The length of time and number of times each focus group meets can be negotiated between the participants and the researcher. If participants and the researcher agree that more time is needed to record stories, the terms of engagement will be negotiated between the participants and researcher. Interviews will be done in either Inuktitut or English, participants will have the option of using either language. Interviews will be recorded using an electronic device such as an iPod, iPad, or computer. The researcher will also take pictures for the purpose of data collection and reflection on the research process. Taking pictures during interviews requires less attention from the researcher than disrupting people speaking during interviews. The researcher will take pictures of people and the setting for later use to describe the location and setting of the research, also to reflect on the

experience of conducting interviews. Pictures that do not have people in them may be published in the study for presentation purposes. After the interviews have been done all the information will be transcribed into written text. Participants will have an opportunity to review information they have provided and make amendments to the information they provided. Once the information has been approved by each focus group the researcher will interpret the information for use in the study. However, if participants do not respond to the transcript confirmation request, the researcher will assume that the information is accepted as is and include it in the study. The researcher will share initial interpretations of meaning with participants if they choose and clarify meaning of the text. Participants will be able to keep a print copy of their individual original data, however the original data of the group will be destroyed within one year of initial data collection. Elders will have an opportunity to have a copy of their interview in a format of their choice. Any additional use of information and consent beyond the scope of this study will be subject to independent licensing and review beyond this study.

Use of information

The information collected through this study will be used for a master's thesis that will be publicly available. The findings of the study can also be used to inform current science education in Nunavut for the purpose of research and educational development. Additional use of the original data beyond the thesis may be in the form of published research papers. The names of participants who wish to remain anonymous will not be shared to protect the identity of participants and people in their stories. However, the names of elders will be published to respect their sharing of knowledge unless they choose to be anonymous. Inuktitut names will not be used as pseudo names to respect Inuit naming customs. Participants may choose to make their identity explicit in the study but the identity of characters in their stories will have to remain anonymous. Pictures will be taken during interviews for the researcher to use when writing about the experience of doing research and describing the learning experience. Pictures of people will not be published in the study, however pictures that do not have people in them can be used later in the study in a published format.

Terms of participation

Participation in the study is voluntary. The researcher can give participants donated gift cards or merchandise as a form of appreciation for participating in the study. Participants may choose not to answer questions asked and may choose to stop participating in the study at any time. The researcher will not disclose the names of participants who wish to remain anonymous to any person outside of each focus group. The researcher will have the data from the study electronically and digitally locked to ensure the privacy of participants. The researcher will also take written notes during interviews that will be accessible only to the researcher and thesis committee. Names of people in the stories and anonymous participants will be replaced with pseudo names. Data will be collected electronically and in written form.

There are minimal risks involved in participating in the study. The nature of the information is not considered sensitive, however this is dependent on the nature of stories that participants choose to share. Participants are bound to confidentiality laws of their employer that will be respected in the study. The focus of the study is on the experience of teachers and their reflections on their science teaching experience. The researcher cannot guarantee that other participants in the study will not share information from other participants outside of the interviews. Additionally, the researcher cannot guarantee anonymity or confidentiality of participants when information is shared electronically through electronic networks such as email or text.

Researcher's limitations

The researcher's potential biases include being a member of the academic community in Nunavut specifically in education, and being an Inuk raised in the Kivalliq region. There is a possibility that the interested parties that want to participate in the study already know the researcher on professional or personal bases. Although these conditions are considered to be conflicts of interest when conducting research, these conditions are also strengths. The findings of the research can inform the researcher's work in Nunavut, the benefits would go to Nunavummiut. Conducting the research does not bear any financial or professional gain beyond academic credit for the researcher. The process of identifying participants is traditional to most qualitative research. Criteria for participation have been set prior to commencement and will ensure that any and all members who fit the criteria will be able to participate equally in the study. The format of interviews as focus groups allows for all members in the research to

contribute equally without dedicating additional time to any one participant. Processes have also been included in the research methodology to have the researcher clearly document their research relationship with participants and allow for documentation of any potential bias in the study.

The researcher reserves the right to amend the data in format and sequence once it has been transcribed. This study has received required licensing from Trent University and the Nunavut Research Institute. Participants will be given a copy of the research information and consent form.

What will be done with the stories and photos?

The researcher will examine the stories to better understand how elementary life science is taught and understand how the curriculum is indicative of Inuit Qaujimajatuqangit. The stories will be published in a thesis that will be publicly available. The researcher will use photos of people to reflect on the interviews and describe the setting in better detail. Photos that do not have people in them may be used publicly.

How will information be shared?

Participants will receive paper or electronic copies of transcripts from interviews. The transcripts they receive will have names replaced to protect the identity of other participants. Participants will have the opportunity to request amendments or clarify information before the study is published. Once the study is published the results of the study will be available as a thesis paper. Participants can receive a paper summary or the entire thesis in electronic forms once it has been approved. The information may also be used in presentations and posters.

Participant Consent

Participation in this study is voluntary. You should feel free not to provide any information you do not wish to share with me or to end the interview at any time. If you wish to end the interview

early, any information you have provided up to that point will be included in the research unless you ask me not to include it. Do you have any questions about the purpose or the process? Is there anything else you would like me to clarify?

If you have any concerns about your treatment or rights as a research participant, you can contact Karen Mauro, Certifications and Regulatory Compliance Officer at Trent University, Peterborough Ontario or Mosha Cote, Manager, Research Liaison, Nunavut Research Institute, Iqaluit Nunavut. Contact information for each officer is provided below.

I, the participant agree that I have been informed about the study and agree to the terms of participating in the study titled “Inuit Qaujimajatuqangit in Elementary Life Science Education” Trent REB License # .

Participant Name: _____(please print)

Participant Signature: _____

Researcher’s Name: Marjorie Kaluraq

Researchers Signature: _____

Date:_____

Anonymity and Confidentiality

Do you wish to remain anonymous? Anonymity: _____YES _____NO

Would you like an original copy of your interview? _____YES _____ NO

Karen Mauro, Certifications and Regulatory Compliance Officer

Phone: 705-748-1011 ext. 7896

Email: kmauro@trentu.ca

1600 West Bank Drive

P.O. Box 4800

Trent University

Peterborough, Ontario

CANADA K9L 0G2

Mosha Cote, Manager, Research Liaison

Nunavut Research Institute

Iqaluit, NU

Phone: 867 979-7279

Email: Mosha.cote@arcticcollege.ca

ᖃᐅᔨᓴᖅᑕᐅᔪᒍᑦ ᐃᓕᐅᕆᔭᒍᑦ ᑐᓴᕋᐅᑎ

ᖃᐅᔨᓴᖅᑕᐅᔪᑦ ᐊᑎᖏᑐ: ᐃᓇᐃᑦ ᖃᐅᔨᓕᕐᑐᕋᖏᑐᕆᓂᓂᒃ ᐅᓕᔪᓂᒃ ᐊᓯᐊᒥᓗᓗ ᐃᓕᓴᕆᓂᖅ ᖃᐅᔨᓴᖅᑐᑕᓚᓂᕆᒥ / ᐃᖅᑲᖅᑲᐅᐳᑲᓚᖏᓂᕆᒥ ᒥᑭᓂᖅᓴᐃᑦ ᐃᓕᓴᕆᔪᖏᓴᓂ

ᖃᐅᔨᓴᖅᑎ: ᓕᔪᓱ ᑲᖏᓯᖅ ᑲᓗᕆᖅ

ᐃᓕᓴᕆᔪᖏᑦ ᐃᓕᒋᕗᐅᔪᖅ: ᑐᓚᓴᑦ ᓯᓕᕐᑐᓴᕆᖏᓚᔪᐊᖅ, ᐃᓕᓴᕆᔪᖅᑐᑕᓚᓂᕆᒥᑲ ᐃᓕᓴᕆᔪᖏᖏᑦ, ᐊᑕᐅᔭᕈ, ᐊᓴᑎᐅᓚᓯ

ᐃᓕᓴᕆᔪᖅᑎᕐᓯᔨᖏᓐᓄᑦ: ᐃᓕᓴᕆᔪᖅᑎᕐᓯᔨᓚᓴ <ᐅᑐᓗᓯ ᐃᓕᐊᑦ

ᖃᐅᔨᓴᖅᓂᕆᔪᒍᑦ ᓪᐃᓴᑕᒥᑎᓕᑦ ᓱᓴᐅᑕ: ᓯᓚᕐᑐᓴᕆᖏᖏᓴᐊᖅᑎᑦ#24517 ᓄᓇᕗᓴᒥ ᖃᐅᔨᓴᖅᑐᑕᓚᔨᖅᑯᑦ# 03 012 16N-A

ᖃᐅᔨᑎᐊᖏᖏᓴᖅ

ᑲᖏᖅ ᑲᓗᕆᖅ

ᐃᓕᓴᕆᔪᖅᑎᕐᓯᔨᓴᓚᓴᖅ <ᐅᑕᓯ ᐃᓕᐊᑦ

ᐃᕆᑲᓗᐃᑦ, ᓄᓇᕗᑦ, X0A 0H0

ᐃᓕᓴᕆᔪᖅᑐᑕᓚᓂᕆᒧᑦ ᐃᓕᓴᕆᔪᖅᑐᑦ,

ᐅᕆᑲᓕᑎᖓᓕ ᓱᓴᐅᑕ: (867)-979-3489

ᑐᓚᓴᑦ ᓯᓕᕐᑐᓴᕆᖏᖏᓴᖓᓕ

ᖃᓚᕕᐅᓴᑯᑦ ᑐᕋᕈᑕ: marjoriekaluraq@trentu.ca

ᐊᑕᐅᔭᕈ, ᐊᓴᑎᐅᓚᓯ

ᖃᐅᔨᓴᖅᑕᐅᔪᓚᔪᑦ ᑐᓴᓚᖅᖏᓐᓂ

ᖃᐅᔨᓴᖅᑕᐅᔪᑦ ᐱᕐᑐᑎᖓ

ᑕᐃᒪᖓᓕ ᓄᓇᕗᑕᕐᕋᑕ ᖃᐅᔨᓴᖅᓂᕆᒥᑦ ᐃᖅᑲᖅᑲᐅᐳᑲᓚᖏᓂᕆᒥᑦ ᐃᓕᓴᕆᔪᖅᓂᐅᔭᑦ ᒥᒃᓴᓄᑦ ᐊᓯᔨᖅᑕᐅᔪᓯᓚᔪᑦ ᐃᓄᐃᑦ ᐃᓕᓴᕆᔪᖅᑐᑕᓚᓂᕆᒥᑦ ᐃᓄᐃᑦ ᖃᐅᔨᓴᖅᑐᑦ ᑐᖖᓴᓄᑦ ᐃᓕᓴᕆᔪᖅᑎᖓᓂ. ᐅᐸᓗᒥᑦ ᑎᑭᓇᐃ ᐊᒥᓯᖖᕐᑕᑐᑦ ᖃᐅᔨᓴᖅᓯᒪᓕᖅᑐᑦ ᖃᓄᖅ ᐊᓯᔨᓕᖖᓴᑦ ᐃᓕᓴᕆᔪᖅᑎᖓᓂ ᐃᓄᐃᑦ ᖃᐅᔨᓴᖅᑐᑕᓚᔨᖅᑯᑦ ᐊᓯᔨᑦᓴᐅᓂᖅᓯᒪᓕᖅᑐᑦ ᐃᓄᐃᑦ ᖃᐅᔨᓴᖅᑐᑦ ᐃᓕᓴᕆᔪᖅᑎᖓᓂ ᐃᓕᓴᕆᔪᖅᑐᑕᐅᑎᓂᒥᑦ ᐊᓯᒪᓗ ᖃᐅᔨᓴᖅᓂᕆᒥᑦ ᐃᓕᓴᕆᔪᖅᑐᑦᓗᓗ ᓄᓇᕗᓯᐊᕐᒥᖖᓴᖅᑐᓂᖅ.

ᖃᑉᐳᓴᖅᑕᐅᔪᒪᔪᑦ ᑐᖅᓴᐃᒪᓕᕆᓂ

ᖃᑉᐳᓴᖅᑕᐅᔪᒪᔪᖅ ᖃᓄᖅ ᐃᓕᓴᐅᔪᖅᑎᑦ ᐃᓕᓴᐅᔪᖅᑎᓯᒪᔪᓐᓇᑦ ᖃᑉᐳᓴᖅᓂᒥᒃ ᐃᖅᑲᖅᑲᐅᐳᑲᓐᓂᖅᓯᒥᒃ ᐅᒪᔪᐃᑦ ᐊᔪᑎᐅᑦᓗ ᒥᑭᓂᖅᓴᐃᑦ ᐃᓕᓴᐅᔪᖅᓯᐃᓐᓂᖅ. ᒥᑭᔪᑦ ᐃᓕᓴᐅᔪᖅᓯᐃᓐᑦ ᖃᑉᐳᓴᖅᓴᓇᐃᖅᓴᓯᔪᖅᓯᒋᔪᖅ ᐃᓕᓴᐅᔪᖅᑕᐅᔪᑦ ᑕᒪᑭᖅᓯᒪᑐᐃᓐᓇᖅᓴᒪᑦ ᐊᓪᓕᑎᑦ ᐃᓕᓴᐅᔪᒪᖅᓴᐃᑦ ᑭᓯᓂᖅᑐᓴᐅᓂᖅᓴᐅᑦᓗᓐᓂᖅ ᐃᓕᓴᐅᔪᒪᖅᓂ, ᐊᖏᑎᓂᖅᓂᖅ ᐃᓕᓴᐅᔪᖅᑐᑦᔪᓕᕆᓂ ᐃᓕᓴᐅᔪᖅᑕᐅᔪᑦ ᐊᐃᖅᑐᓴᖅᑐᑦᔪᓕᕆᓂ ᑭᓯᓂᖅᑐᓴᐅᓂᖅᓴᒪᑦ ᐃᓕᓴᐅᔪᒪᖅᓴᐃᑦ ᑭᓯᓂᖅᑐᓴᐅᓂᖅᓴᒪᑦ. ᐃᓕᓴᐅᔪᖅᑕᐅᔪᑦ ᐊᑐᑎᖅᑐᓴᐅᓂᖅ ᑐᓂᓴᖅᑐᓴᐅᓂᖅᓴᒪᑦ. ᐃᓕᓴᐅᔪᖅᑐᑦᔪᑦ ᐃᓕᓴᐅᔪᖅᑕᖏᑐ ᑕᐅᔪᑎᖅᑎᖅᑕᓕᕆᓂ ᐃᓇᐅᔪᑦᑎᓂᖅᑐᓂᖅᑐ ᐱᓵᐃᑦᓴᖅᑎᓂᖅᑐᓂᖅᑐᓗ ᐃᓕᓴᐅᔪᖅᑕᐅᔪᑦᑎᓂᖅᑐᑦ ᖃᓄᖅ ᑭᑦᓯᐊᓂᖅᑐᓴᖅᓴᐅᔪᖅᓯᒪᓕᕆᓂ ᐃᑲᔪᑎᖅᑐᓂᖅᑐᑦ ᐃᓕᓴᐅᔪᖅᑕᐅᔪᑦ ᖃᓄᖅ ᑭᑦᓯᐊᓂᖅᑐᓴᖅᓴᐅᔪᖅᓯᒪᓕᕆᓂ ᐃᑲᔪᑎᖅᑐᓂᖅᑐ

ᐅᖃᓗᓕᕆᖃᑎᒋᔭᐅᔪ ᑎᑎᕀᕐᓂᓗᑲᑎᓂ ᐅᐃᒪᓇᖅᓯᕐᓇᖏᒪᑦ ᑐᐊᓂᓗᓕᕆᓂ ᖃᐅᔨᓴᖃᑎ ᐊᑎᑦᓚᐅᓚᑦᑎᓂᐊᖅᑐᖅ ᐅᐃᒪᒃᖁᕐᓂᐊᖅᑎᒥᒪᑦ ᑐᖃᓗᓕᕆᓂ ᐅᓂᒃᑯᓂ. ᓂᐱᓚᐅᖅᑕᐅᒐᓂᒃᐸᑕ ᐅᓂᐸᑦᑐ ᖃᓚᑕᐅᔭᒃᑯᓂ ᑎᑎᖅᑲᖓᑕᐅᓂᐊᖅᑐᑦ. ᐅᓂᐸᑦᓚᐅᖅᑐᑦ ᐃᓂᖃᖅᑎᑎᑕᐅᓂᐊᖅᑐᑦ ᐅᓂᐸᑦᓴᓂᑯᒥᓂᒃ ᑎᑎᖅᑲᓂᒃ ᓱᓪᒪᒃᓴᓪᒪᓄᑦ ᐊᓯᐸᐅᒪᒃᐸᑕᔨᓂᓂ ᐱᐃᖅᑲᖅᑎᑕᐅᓂᐊᖅᑐᑦ. ᖃᐅᔨᓴᖃᑎᐸᑦ ᑐᐊᓗᓂᑦᓴᓂᓪᒪᑦ ᐃᓕᓴᐅᒪᒃᐸᑕᔨᓂᓂ ᐱᐅᓂᐸᑦᓴᓂᑯᐃᓂ. ᐃᓕᓴᐅᒪᒃᐸᑕᔨᓂᓂ ᐱᐅᓂᐸᑦᓴᓂᑯᐃᓂ ᐅᓂᐸᑦᓴᓂᑯᐃᓂ ᐅᓂᐸᑦᓴᓂᑯᐃᓂ

ᐃᓕᐅᓂᖅ ᖃᐅᔨᓴᖅᑕᐅᔪᓂ ᑭᓇᐅᔭᓕᐅᕆᓂᖅ. ᐃᓕᐅᔪᓂ ᐱᔪᒪᕆᑎᑕᖅᓂᒃ ᐱᖏᓕᕐᖃᖅᕆᓂᑐᑦ ᓄᖅᑲᒪᒃᑯᓕᓗ ᖃᐅᖅᓯᐃᐅᓇᖅ ᓄᖅᑲᖅᓇᖅᑐᑦ. ᖃᐅᔨᓴᖅᑐᖅ ᐅᖃᓕᕆᓂᑐᖅ ᑭᑐᑦ ᐅᓂᒃᑲᖅᓯᒪᖅᓯᐊᑎᒃ ᐃᓕᑕᕐᓇᒪᖅᑕᒃᑯᓕ ᐅᓂᒃᑲᖅᑐ. ᖃᐅᔨᓴᖅᑐᖅ ᓂᐱᓕᐅᔭᕐᓂᔪᖅᑎ ᖃᖅᓀᑕᐅᔨᖏᖅᑕᐅᓂᒃ ᐱᓇᓕᕐᓂᖅ ᑐᓴᖅᑲᓂᕐᓂᖅ ᑐᐃᓐᓇᖅᑐᑦ ᐃᓕᑕᕐᓇᒪᖅᑕᒃᑯᓕ ᑕᐃᒪᐅᖅᑕᐅᓂᖅᑐᑦ ᑕᐃᒪᐅᖅᑕᐅᔪᓂᒃᑲ. ᑲᑎᒪᓂᔪᐃᓂ ᐅᓂᒃᑲᓇᔪᓂᐅᓂᖅᑐᑦ ᖃᖅᓀᑕᐅᔨᖏᔪᓂ ᐅᐊᔪᓕᐅᔭᖅᑕᐅᔪᓂᒃᑲᑎᒃ ᑎᑎᓂᖅᑲᑎᒃ ᐱᖓᓱᖅᑕᐅᔪᓂᒃᑲᑎᒃ ᐃᓕᐅᔪᓕᔪᓄᑦ.

ᖃᐅᔨᓴᖅᑐᖅ ᓇᓗᓇᐃᖅᓯᕐᐊᓕᓚᐅ ᐊᐅᓚᑐᖅᑐᖃᖅᓀᐊᕐᓂᖅ ᑲᖏᓇᖅᓯᕐᐊᕐᓂᖅᓚᐅ ᐃᓕᐅᔪᓕᔪᓄᑦ. ᐊᐅᓚᑐᖅᑐᖃᖅᓀᐊᕐᓂᖅᑐᑦ ᑲᖏᓇᖅᓯᕐᐊᕐᓂᖅᓚᐅ ᓂᐅᓂᖅᑐᖃᖅᓀᐊᕐᓂᖅᑐᑦ ᓂᓪᓕᐅᔭᖅᑕᐅᔪᓂᒃᑲᖅᓯᒪᓂᖅ ᐊᐅᓚᑐᖅᑐᖃᖅᓀᐊᕐᓂᖅᑐᑦ ᐃᓕᐅᔪᓕᔪᓄᑦ ᐃᓕᐅᔪᓕᔪᓄᑦ ᐃᓕᐅᔪᓕᔪᓄ

ᖃᐅᔨᓴᖅᑐᖅ ᐱᓕᕆᓂᖅᑎᓂᒃ ᓇᓗᓇᐃᖅᓯᒪᔨᖅᑐᖅ ᐅᓂᒋᑦ ᓂᐱᓪᐅᑎᓂᖅᓯᒪᓕᖅᖢᑦ ᐊᓯᔨᑭᕆᓇᖏᑦ ᐅᐃᔪᓪᓚᕆᓂᕐᒧᑦ ᖃᐅᔨᓴᖅᓂᕐᒧᑦ ᑎᑎᕐᓂᖅᑐᑦ ᓄᑎᕋᖅᓯᒪᓕᖅᖢᑦ. ᑕᒪᓐᓇ ᖃᐅᔨᓴᖅᓂᖅ ᓪᓚᐱᕋᑦᑎᓂᓯᓕᕆᔨᖅ ᑐᓇᓐᑦ ᓯᓪᓕᐱᖓᓐᓂᕐᒧᑦ ᐊᒻᒪᓗ ᓄᓇᕗᓂᒃ ᖃᐅᔨᓴᖅᑐᑦᓪᓕᐊᔪᖓᓂᒃ. ᐃᓪᓕᐅᖅᑕᐅᔪᑦ ᑐᓴᐅᒋᐊᖅᑐᑦ ᖃᐅᔨᓴᖅᑎᑦᓴ ᖃᐅᔨᓴᖅᑎᑦ ᐊᒻᒪᓗ ᐃᓪᓕᐅᓂᐅᑦᑐᑦ ᖃᐅᔨᓴᖅᑕᐅᔪᑦ ᐊᖏᕈᑎᓂᖅᑐᑦ.

ᖃᓄᖅ ᐅᓂᒋᑦ ᐊᕐᓇᓪᐅᖅᑕᐅᓂᔪᓐᓇ ᐊᑐᖅᑕᐅᓂᐊᖅᓯᑦ?

ᖃᐅᔨᓴᖅᑎ ᐅᓂᒋᑎᓂᒃ ᐊᕐᓇᓂᒃᓗ ᖃᐅᔨᓴᖅᐸᒪᖅᑐᖅ ᑐᐸᓪᐅᖅᓯᓗᒃᓗᑦ ᖃᓄᖅ ᐄᓕᔪᓂᒃ ᐊᐸᖓᒥᓗ ᐃᓕᓐᓂᕐᒧᑦ ᖃᐅᔨᓴᖅᑐᑦᓪᓕᐊᑦ ᐊᒻᒪᓗ ᖃᓄᖅ ᐃᓕᓐᓂᐅᑦᑕᐅᔪᑦ ᐃᓄᐃᑦ ᖃᐅᔨᓴᖅᑐᖅᑕᐅᔪᑦ ᐃᓕᓐᓂᐅᑦ

ᖃᐅᔨᓴᖅᑕᐅᔪᑦ ᒥᐦᓗᓂ ᐅᓪᓴᓗᓂᓂ ᐊᑐᖅᑕᐅᓂᐊᖅᑐᓄᓪᓗᓂᓂ? ᖃᓄᑐᐃᓐᓇᖅ ᐊᐱᖅᔪᑎᖃᖅᖃᐱᑦ, ᑐᑭᓯᐊᖅᑎᑦ?

ᐃᓱᐊᒻᒪᖅᑲᖅᓯᓐᓂᑦ ᐃᓕᐅᓂᖅᓂᒃ ᖃᐅᔨᓴᖅᑕᐅᔪᒥ, ᖃᐅᔨᑎᐊᖅᐅᓂᕈᒪᔭᓐᓇᓂᓂᓂ ᐱᔪᓐᓇᖅᓂᓂᒃ ᖃᐅᔨᓴᖅᓂᐅᑦ ᒥᐦᓗᓂ ᐅᔪᐊ ᐅᖃᓄᐊᓱᐊᖅᑕᑎᑦ ᑭᐅᓇᓐ ᒪᑦᓭ, ᖃᐅᔨᓴᖅᑐᑕᓇᓂᖅᓗᑦ ᓕᐃᓴᒃᖅᓱᓐᓂᓐᓂ ᐱᓕᕆᔨᒃᑲᓐᓂ ᐱᓪᓚᐅᔪᓐᓇᓐᓂ, ᐃᑕᑐᕈ ᐊᓂᑎᐅᓇᔪᒥ ᐅᓪᓴᓗᓂᓂ ᒍᐦ ᔪᑦᑎᒪᓕ ᖃᐅᔨᓴᖅᑐᑕᓇᓂᖅᓗᑦ ᓕᐃᓴᑦᓂᖅᓗᑦ, ᓄᓇᕗᑦ ᖃᐅᔨᓴᖅᑐᑕᓇᔨᔪᖅᓂᓐᓂ, ᐃᑦᑲᑐᐃᑦ ᓄᓇᕗᑦ. ᖃᐅᔨᑎᐊᖅᓱᒃᓴᑦ ᓰᓴᐅᑎᖅᑎ ᑎᑎᕋᖅᓱᖅᑐᓗ ᐊᑕᓐ ᑎᑎᕋᖅᔪᓕᕐᓂᑦ.

ᐅᓴᖅᓱ, ᐃᓕᐅᔪᓕᔪᖅᓱ ᐊᖅᑎᖅᔪᓕᕐᖅᓱ ᑐᐱᔪᐊᑦᓓ ᖃᐅᔨᓴᖅᑕᐅᓂᐊᖅᑐᓂᒃ ᐊᖅᑎᖅᑲᑎᑭᓕᖅᓴᖅᓱ ᑐᖅᓯᓐᓂᐅᖅᑕᐅᔪᓂᒃ ᐅᒪ ᖃᐅᔨᓴᖅᓂᐅᑦ ᒥᐦᓗᓂ “ᐃᓄᐃᑦ ᖃᐅᔨᓕᕐᑐᖅᖃᖅᖅᑎᓂᒃ ᐅᒪᔪᓂ ᐊᓴᖅᓂᐅᔪᓂᒃ ᐃᓕᓴᐃᓐᓇᖅᑐᑦ / ᐃᖅᑲᖅᑲᐅᐅᑲᖅᓂᖅᓗᑦ ᒥᑭᓂᖅᓴᐃᑦ ᐃᓕᓴᐃᓐᓇᖅᓱᓐᓂᓐᓂ” ᑕᐃᓴᖅᑐᒃ ᐅᓴᐅᑦ (Trent REB) #

ᐃᓕᐅᔪᑦ ᐊᑎᖅᑑ:_____ (ᑎᑎᕋᕐᔪᐊᖅᓯᓕᕐᓂ)

ᐃᓕᐅᔪᑦ ᐊᑎᑕᐅᕋᓂᖅᑑ: _____

ᖃᐅᔨᓴᖅᑎᐅᑦ ᐊᑎᖅᑑ: ᑲᙵᖅ ᑲᓗᕋᖅ

ᖃᐅᔨᓴᖅᑎᐅᑦ ᐊᑎᑕᐅᕋᓂᔨᖅᑑ: _____

ᐅᑦᓗᖅ ᐊᖅᑭᑎ ᐊᑎᑕᐅᖅᑕᐅᓂᔨᖅᑑ: _____

ᐊᑎᓂᒃ ᐃᓕᑕᖅᓯᓂᖅ ᐃᓕᑕᖅᓯᖅᑭᓂᕋᓂᓂ ᐅᕋᑕᒻᒪᓕᑕᐅᑦᓂ.

ᐃᓕᑕᕋᓕᖅᙵ ᐅᕋᑕᒻᒪᓕᑕᐅᑦᓂ ᐊᑲ ᐃᓕᑕᕋᓵᓗᓂ? ___ ᐃ ____ ᓇᐅᒃ/ᐊᑲ

ᐅᓂᑲᑦᓂᔨᖅᓂᒃ ᑎᑎᕋᖅᓯᓕᕐᓂᒃ ᐱᔪᒪᙵᐅᒃ? ____ ᐃ ____ ᓇᐅᒃ/ᐊᑲ

ᑭᐅᓗᓄ ᒪᑭᓄ, ᖃᐅᔨᓴᖅᑐᑕᓗᓂᔭᕐᓂ ᓯᐃᓴᒋᔭᖏᑐᓄᑦ ᐱᓕᓗᔨ, ᑐᓗᓄᑦ ᓄᓕᑐᓴᖏᔭᕆᐊᖏᓂᑦ,

ᐅᖃᓕᑎᖏᓐᓂᒃ ᓇᓴᐅᒋᑦ: 705-748-1011 ext. 7896

ᖃᓗᑕᐅᔪᓐᓇᖅᑐᓂ ᑎᑎᕋᖏᐊᐅ: kmauro@trentu.ca

1600 West Bank Drive, PO Box 4800
Trent University
Peterborough, Ontario
CANADA K9L 0G2

ᒍᓴ ᓂᕋᑏ, ᑲᒪᔨ ᖃᐅᔨᓴᖅᑐᑕᓗᓂᔭᕐᓂ ᓯᐃᓴᒋᕋᓂᕐᒥ

ᓄᓇᕗᑦ ᖃᐅᔨᓴᖅᑐᑕᓗᒍᓐᓂᒃ

ᐃᕋᓕᓗᐃᑦ, ᓄᓇᕗᒋᑦ

ᐅᕋᓕᑎᖏᓐᓂᒃ ᓇᓴᐅᒋᑦ: 867-979-7279

ᖃᓗᑕᐅᔪᓐᓇᖅᑐᓂ ᑎᑎᕋᖏᐊᐅ: Mosha.Cote@arcticcollege.ca