Gitga’at Plant Project:  
The Intergenerational Transmission of Traditional Ecological Knowledge Using School  
Science Curricula

By

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or other means, without the permission of the author.
This case study, with community action research within an Indigenous context as the overarching methodology, examines the impact of First Nations students, their teachers, parents, Elders, and other community members' involvement in a collaborative school research project designed to promote the intergenerational transmission of traditional ecological knowledge. Three themes emerged from the data: Evaluation of the Gitga’at Project, Student Learning and Other Key Outcomes, and Transmission of Traditional Ecological Knowledge. Major findings regarding the intergenerational transmission of traditional ecological knowledge include implications for: curriculum development and the active participation of students in their learning; the active participation of students in planning for their future; contemporary solutions dealing with the effects of colonialism on knowledge transfer and language development; Aboriginal control of research; and directions for future research.
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CHAPTER ONE

Introduction

Traditional ecological knowledge is recognized as an important type of locally based knowledge held by Indigenous and other long-resident peoples (Berkes 1993; Snively and Corsiglia 2000; Turner et al. 2000). First Nations peoples have had, and continue to have, an intimate relationship with their homelands, based on knowledge that is highly localized, cumulative through many generations and socially oriented (Kawagley et al. 1998). Yet, Elders and educators in First Nations communities have expressed deep concerns that youth are no longer learning the cultural and local environmental knowledge that has sustained them and their ancestors for generations (R. Quock, Tahltan Elder, personal communication 1996; R. Dennis, Tahltan Elder, personal communication 1992; H. Clifton, Gitga’at Elder, personal communication to N.J. Turner 2002). Sadly, the opportunities for communicating traditional ecological knowledge and for incorporating this type of knowledge into public school science curricula are scarce.

The school curriculum requires Aboriginal students to learn science and other subjects from a western perspective, but allows little opportunity for them to learn about their own cultural knowledge, or to appreciate plants, animals and ecosystems in their own environment from their own cultural perspective (MacIvor 1995). The traditional ecological knowledge that is part of their identity as Aboriginal people is generally overlooked, if not simply dismissed as non-scientific in most school curricula. Students’ opportunities to learn traditional ecological knowledge are restricted as well because of the time and energy devoted to meeting standard curriculum requirements.
One symptom of this lack of culturally relevant material and learning opportunities is the low achievement of First Nations students as revealed by the Province of British Columbia’s Ministry of Education’s Foundation Skills Assessment 2002 results (Province of British Columbia 2002). Indigenous educators suggest that at least part of such a deficit rests with the lack of meaningful curriculum content for First Nations students (Cajete 1994; Cajete 1999; Kawagley 1995; MacIvor 1995). In addition, the emphasis on textbooks, classroom learning, and standardized tests that predominate in schools is often not compatible with Indigenous learning preferences and learning styles (Cajete 1999; Kawagley 1995). Battiste and Henderson (2000) maintain that educators need to balance traditional Indigenous ways of knowing with western ways, but there is clearly a gap between this ideal and the actual classroom experience. What is needed is a better understanding of effective ways in which Indigenous learning and teaching can be facilitated, particularly in relationship to traditional ecological knowledge.

First Nations educators Cameron Hill and Eva-Ann Hill recognize that their children and youth have not had the same opportunities as past generations to acquire knowledge about their home territory and traditional resources, and they see the need for themselves and other teachers to take the lead in remedying this situation:

*You would think that growing up in such an isolated First Nations community, such as Hartley Bay, where the Gitga’at people reside, that our youth would be more in-tune with their natural surroundings. This is, however, not the case, in certain areas such as botany. The knowledge of plants within Hartley Bay lies with our Elderly people. It is up to us, as teachers, to bridge the gap between generations* (C. Hill and E.-A. Hill to J. C. Thompson, 25 September 2003.)
As First Nations educators, we need to find ways to bring traditional ecological knowledge into the school science curriculum in order to make science more accessible and relevant to First Nations children. Helping to fill this need was the main motivation for developing the Gitga’at Plant Project at the Hartley Bay School.

Purpose

The purpose of this study was to assess the effectiveness of First Nations students and community members’ involvement in a collaborative student research project designed to assist in the intergenerational transmission of traditional ecological knowledge. This project was designed to provide the Gitga’at youth of Hartley Bay with the opportunity to learn about the plants that have been, and continue to be important to their people. More significantly, however, it was designed to re-establish the connections between Aboriginal youth and their Elders in order to facilitate the transmission of traditional ecological knowledge. My study, in collaboration with the students, teachers, parents and guardians, Elders and community members of the Gitga’at community of Hartley Bay, was to help implement the Gitga’at Plant Project and to study its effectiveness for the students and community of Hartley Bay as a means of supporting the intergenerational transmission of cultural and environmental knowledge.

A brief description of the project, which extended from September 2003 to June 2004, is as follows: Working in pairs, grades 9-12 Tsimshian students each researched a particular plant known to have cultural importance to their people. They consulted with Elders and community members and carried out literature and web-based botanical research, as well as making observations of their plants during field study sessions. The
students gave presentations of their findings at community gatherings, and posters of the students with their plants and a summary of what they learned were presented to the community Elders and others with whom the students consulted, as well as to the students. Finally, a booklet including the students’ detailed findings along with photographs of their plants will be compiled and will be presented to the community as a way to honour the knowledge of the plant informants and to thank the community for their assistance and input. The students’ writings from this project will also be incorporated into a more extensive book (Turner and Thompson forthcoming).

Research Questions

My central research question was: What is the impact on Aboriginal youth and their community regarding their involvement in a school research project designed to promote the intergenerational transmission of traditional ecological knowledge? Given the importance of retaining local environmental knowledge within a community, the following specific questions were addressed:

1) What have been the experiences of those involved with the plant project?
2) What specifically did the students learn and/or experience?
3) Was the Gitga’at Plant Project an effective way for students to be learning about plants and other traditional ecological knowledge from their Elders?
4) What other ways or methods can be used to enhance the transmission of knowledge between generations?
I chose community action research within an Indigenous context as my overarching methodology, with a case study approach for the more specific design of my study. This study involved 19 high school students, as well as educators, parents and guardians, and Elders and other community members of the Tsimshian community of Hartley Bay. My principal data collection strategies included individual interviews, written feedback, student field notebooks, a rubric and observations. I analyzed data for themes using a framework influenced by Creswell (1998) (see Chapter Three for a detailed description of the data analysis procedure.)

**Background**

This research had its start when Dr. Nancy Turner presented a proposal she had written (co-authored with Dr. Anne Marshall and Dr. Robin June Hood) to the school in the Gitga’at (Tsimshian) community of Hartley Bay in which “each student would undertake research about a particular indigenous plant that is known to have cultural importance to the Gitga’at and neighbouring people” (Turner et al. 2001). Drs. Turner and Marshall are co-supervisors of my Master’s thesis committee and are both collaborators in a major interdisciplinary research project with coastal communities called “Coasts Under Stress” (CUS), (Dr. Rosemary Ommer, Principal Investigator), which explores the impact of social and environmental restructuring on environmental and human health in Canada, specifically on the east and west coasts. In conversations with Dr. Nancy Turner and Dr. Anne Marshall are co-investigators in CUS (www.coastsunderstress.ca). Dr. Turner is working with Gitga’at Elders and other plant specialists documenting Gitga’at plant knowledge. Dr. Marshall’s work with the Gitga’at youth at the Hartley Bay School involves life-career planning. My research is also situated within CUS.
Gitga’at Elders Chief Johnny Clifton and Helen Clifton, as well as with Ernie Hill Jr., Principal of the Hartley Bay School and a hereditary chief of the Eagle clan, Dr. Turner was told that the children and youth were not learning as much cultural or local environmental knowledge as previous generations had learned. This erosion of traditional ecological knowledge was a concern for the Elders. Around the same time, Dr. Charles Menzies², an Indigenous researcher, approached me to develop science curriculum for his research project, “Forests for the Future”³. The curriculum would be based on the local ecological knowledge of the Gitxaala people, another coastal Tsimshian group located northwest of Hartley Bay. Dr. Menzies saw the development of culturally relevant education resources as a way to give something tangible and useful back to the people of Gitxaala. I agreed to be a part of this project and developed a curriculum unit entitled, “Traditional Plant Knowledge of the Tsimshian” (Thompson 2003). By collaborating with Hartley Bay educators and adapting the curriculum that I had written, we developed and implemented the Gitga’at Plant Project.

The basis for the Gitga’at Plant Project was for the students, as part of their school curriculum, to make connections with their Elders and to learn about their territory and traditional resources, and in this particular instance, about plants important to their people. As well, we wanted the students to value and respect their Elders’ knowledge and wisdom and to recognize it is as legitimate, or more so, than the “academic” information

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² Dr. Charles Menzies, an Indigenous scholar with close family ties to the Tsimshian Nation, is a faculty member in the Department of Sociology and Anthropology at the University of British Columbia.

³ Forests for the Future was a two-year research project with the goal of conducting community-based research into local ecological knowledge in the Tsimshian community of Gitxaala.
found in textbooks, encyclopaedias, the internet, and other such secondary sources. First Nations children need to learn about their own culture and their homelands through the voices of their own people. During this project, the students were encouraged to be active participants in their learning, rather than passive learners, relying only on textbook learning, teacher telling and rote memorization.

Situating the Study

In order to provide a context for my research, it is important to provide some personal background in regards to my education, my relationship with the Gitga’at of Hartley Bay and who I am as a First Nations person. My Euro-Canadian formal education began at the age of four. The only time during my schooling that I recall learning about First Nations people in any depth was in grade four in the mid seventies. That year in Social Studies, we learned about the Plains Indians, mainly because, I believe, they were seen to be the stereotypical “Indian” with their horses, feather headdresses, tomakawks and peacepipes. We definitely did not learn about the Tsimshian, the First Nations upon whose territory my school was situated.

About fifteen years ago, my true education began when I started learning about my Tahltan culture from my grandparents, Julia and Charles Callbreath, and other Tahltan Elders. At that time, I was nearing the completion of my Bachelor of Science degree in Kinesiology. Soon after, I was accepted into Simon Fraser University’s First Nations Language Teacher Education Program. It was in this program that I first met Cameron and Eva-Ann Hill and when I began to really learn about the importance of documenting
our Elders' knowledge and the importance of learning and following the protocols of the people and the community you are working with.

Vonnie Hutchingson, a Haida educator and the Faculty Associate of the program, emphasized the importance of learning about our peoples’ ways of knowing, about our languages, and about appropriate methodologies for learning such knowledge. A year later, in my professional development (teacher-training) year, I was placed with Joyce Dundas, a teacher who had taught in Hartley Bay for many years, who had married into the community and had been adopted into the Eagle clan. In her grades one/two class at Pineridge Elementary School in Prince Rupert, BC, I developed a First Nations theme unit in which I developed lessons that took into account children’s emotional and social development, social responsibility, physical development, aesthetic and artistic development, intellectual development, and language development.

However, it wasn’t until I was an instructor at the North Coast Tribal Council (NCTC) Education Centre\textsuperscript{4} that I began to really examine and understand what traditional ecological knowledge was and to try to find ways of accommodating it within the science courses that I was teaching. With the support of Scientists and Innovators in the Schools (SIS)\textsuperscript{5} and NCTC, I was able to plan field trips to First Nations territories, such as Nisga’a, Haida and Tahltan, in order to give our adult First Nations students the opportunity to study and explore the land with Elders and western scientists. These students would then return to their First Nations communities and teach the traditional

\textsuperscript{4} The NCTC Education Centre was a private post-secondary institute for First Nations adults in Prince Rupert, BC that closed its doors in 1997.

\textsuperscript{5} The SIS program is administered by Science World and provides BC teachers with the opportunity to have scientists visit their classrooms to conduct interactive presentations.
ecological knowledge that they had learned to the children in the schools, thereby serving as positive role models. Several of my adult students from this program were from Hartley Bay. As part of their coursework, they travelled to their home community to give hands-on presentations to all of the students at the Hartley Bay School. From these experiences, and with an academic background in the natural sciences, I wanted to develop curriculum that would demonstrate that there were many different nature-knowledge systems, different ways to know the natural world, distinct from, but relevant to and in many ways complementary to, western scientific or academy-based knowledge.

*Significance of the Study*

As a First Nations educator and student, I know how important it is for First Nations children to see their own culture, their ways of knowing, their language, their people and themselves reflected in the curriculum in a way that is meaningful and relevant. The need for curriculum that integrates First Nations knowledge and wisdom is vital (Battiste 1998). As a science and math teacher, I have noticed that there is not as much curriculum developed provincially with a First Nations focus in the natural sciences as there is for social sciences. As well, while many school districts have developed curricula relevant to First Nations, there is a lack of First Nations science curricula at the high school level. Therefore, I felt a particular need to find ways of integrating Aboriginal knowledge into the science courses I was teaching.

But why is it so important to develop culturally relevant science curriculum? Nisga’a educator Sim’oogit W’ii T’axgenx (Edward H. McMillan) has pointed out that
there are three types of First Nations students (personal communication, EDCI 591, University of Victoria, July 2, 2003):

(1) Students who are very secure in who they are, who have a secure and sound knowledge of their people’s world and can negotiate both worlds; (2) Students who have given up who they are, but are considered good students as defined by the western world; and (3) Students who are ambivalent and do not know either world.

First Nations educators need to find ways of reaching the last two groups of students identified by McMillan and re-connecting them to their people and their people’s ways of knowing.

It is vital that we represent all peoples in the curriculum in schools, not just those of the dominant culture. As well, First Nations students need to see that learning about their people’s ways of knowing belongs not only in social studies, art, First Nations Studies, or language courses, but also in science courses and that it is viewed as legitimate science knowledge. Madeleine MacIvor, a Métis educator, has stated that (1995, 74), “because of the under-representation of our peoples in the sciences, and the great need for scientific and technological skills within our communities, efforts to encourage Aboriginal participation in school science are crucial”. The next step in the development of culturally relevant school science curricula is to acknowledge barriers, perceived or real, that might exist to such curricula and to find ways to diminish or remove these barriers (Snively 1995). Science curricula relevant to First Nations can help both First Nations and non-First Nations teachers feel more comfortable and confident in
bringing traditional ecological knowledge into their classrooms. Battiste and Henderson offer the following advice to First Nations educators (2000, 94):

Indigenous educators need to transform this way of knowing. They need to balance traditional Indigenous ways of knowing with Eurocentric tradition. They must respect and understand the other ways of knowing. They must embrace the paradox of subjective and objective ways of knowing that do not collapse into either inward or outward illusions, but bring us all into a living dialogical relationship with the world that our knowledge gives us.

My ultimate goal as a Tahltan First Nations educator is to facilitate and strengthen the connection of First Nations youth to their land and culture through their Elders, as a means of improving their self-identity, cultural pride, self-esteem, and ultimately their health and well-being.

Delimitations

The study was limited to 19 Hartley Bay School students, grades nine to twelve, their parents and guardians (13 out of a possible 14), six Hartley Bay School staff members, and 14 out of the 15 community members/plant informants interviewed by the students. The data were collected from September 2003 to June 2004. It is important to note that several people had dual roles; many of the plant informants were also parents or guardians. As well, while all Elders involved were plant informants, not all plant informants were Elders. One participant was an educator, a plant informant, and an Elder.
Assumptions

This study is based on the following assumptions: The importance of retaining traditional ecological knowledge within a community; the need to re-establish the connection between children/youth and their Elders through the transmission of knowledge; the need to develop culturally relevant science curriculum; and the importance of involving community members as active participants in research.

Definition of Terms

Before proceeding, I will provide definitions of terms I have used within the context of this research.

For many, the terms Indigenous, Aboriginal, First Nations, Native, and Indian are used interchangeably. However, there are distinct differences and it is important to discern between the different terms.

Indigenous peoples

A collective term usually associated with First peoples internationally (McMillan and Yellowhorn 2004). The use of the final ‘s’ in ‘peoples’ is a way of recognizing and acknowledging the diversity amongst distinct groups of people (Smith 1999)

Aboriginal

Another collective term, as defined in the Constitution Act of 1982, that refers to all Indigenous peoples in Canada, including Indians (both status and non-status), Métis people, and Inuit people (Muckle 1998). It is often used by government ministries, such as the British Columbia Ministry of Education.
First Nation

The self-determined political and organizational unit of an Aboriginal community (Muckle 1998). First Nations people refers to the Aboriginal people who are members of that First Nation.

Native peoples

This term for Aboriginal peoples was established by the Canadian federal government in the 1970s to replace the term Indian (British Columbia Ministry of Education 1998).

Indian

Historically, this term was used to refer to the original inhabitants of North and South America (Muckle 1998) and is still used to define some Aboriginal peoples under the Indian Act. While this term has often been used in a derogatory way, Aboriginal peoples will often use the term when referring to themselves.

Elder

What differentiates an “Elder” from just any elderly person? In working with Gwitch’in Elders, Wilson has found (1996, 56-57),

- It is the holistic modeling of spirituality combined with wisdom and practical knowledge that seems to differentiate the elder from the elderly. Elders are responsible not only for the transmission of knowledge, but for ensuring the passing on of the unique world view that holds this knowledge in context. Thus the difference between elders and the elderly is not only in the role they play in the community, but in the individual characteristics with which they make that role culturally relevant. The elder must be willing to share his or her knowledge with
the rest of the community. They must also provide this knowledge in a holistic manner.

Medicine, a Lakota scholar states that (2001, 73), "Elders are repositories of cultural and philosophical knowledge and are the transmitters of such information." From these definitions, it appears that not all older or elderly people are considered to be elders, that an elder is a person who has acquired a vast amount of knowledge and wisdom about their people's ways of knowing throughout his or her lifetime, and is able to pass this knowledge on to the next generation (Medicine 2001; Wilson 1996). Medicine has stated that (2001, 77), "We have misused the role of elder through our ignorance and failure to see that not all elders are teachers, not all elders are spiritual leaders and not all old people are elders." While not all elders are teachers, many take this role very seriously. "[A]n elder is one who is willing to share this knowledge by passing it on to the younger generations through the teaching and modeling of correct behaviour" (Wilson 1996, 56-57). Finally, Campbell, Menzies and Peacock have defined an Elder as (2003, 274), "a person whose wisdom about spirituality, culture, and life is recognized" and whose advice and support is sought by First Nations people and communities in both traditional and contemporary issues. They state that capitalizing the term is a way to show respect for First Nations Elders, a practice that I will use throughout this thesis.

Science

Defined in Chapter Two.

Western Modern Science

Defined in Chapter Two.
Traditional Ecological Knowledge

Defined in Chapter Two.

Traditional Plant Knowledge

Traditional plant or botanical knowledge is defined as, “the body of knowledge, held by members of any community long resident in a particular location, which guides peoples’ choices or actions in plant collection, processing and use. It includes names and terminology, methods of collecting and managing plant resources, narratives about plants, and belief systems that define peoples’ perspectives about plants” (Turner and Peacock 1996, 1).

Prescribed Learning Outcome (PLO)

In British Columbia’s education system, prescribed learning outcomes are content standards that educators are expected to meet. “The learning outcomes are statements of what students are expected to know and do at an indicated grade; they comprise the prescribed curriculum” (British Columbia Ministry of Education 2004).

Summary

In this chapter, I have presented introductory information and a contextual description related to my thesis that involved studying the impact of a school research project focusing on the intergenerational transfer of knowledge in a coastal First Nations community. In Chapter Two, I will provide a review of select written and spoken texts on First Nations education, science education, traditional ecological knowledge and Western modern science, and research involving First Nations communities.
CHAPTER TWO

Review of Discourse – Written and Spoken Texts

Discourse has been defined as “a formal discussion of a subject in speech or writing” and as “a formal written or spoken discussion of a subject.” I have chosen to call this chapter, “Review of Discourse – Written and Spoken Texts” as opposed to “Literature Review” as I feel that it is important to examine and consider the words of all experts, whether that entails the written words of scholars/academics or the spoken voices of First Nations Elders and other cultural experts. In this chapter I examine discourse relevant to the purpose of this project and the research questions. The first section provides background information on First Nations education. The second section describes the worldviews and philosophical roots of two different kinds of science knowledge, namely traditional ecological knowledge (TEK) and Western modern science (WMS). The third section will discuss science education in regards to TEK and WMS as well as examining the concept of students as active participants in their learning, with section four exploring the relationship between researchers and First Nations communities, especially in British Columbia.

Part I: First Nations Education

7 ITP Nelson Canadian Dictionary, s.v. “Discourse.”
When the word *education* is used, most educators and academics usually mean schooling. *Schooling* has been defined as “education, especially at school,” with *school* being defined as “an institution for education or giving instruction, especially for students under 19 years.” While *education* has been defined as “the act or process of educating or being educated,” and *educate* as “give intellectual, moral, and social instruction to (a pupil, a child), especially as a formal and prolonged process,” education has also been defined as “a calculated intervention in the learning process” (Egan-Robertson and Willet 1998, 15). Egan-Robertson and Willet feel that this does not limit education to a certain designated physical location, but that it can take place outside of school. “This definition is important because it locates education in many places inside and outside school, including: families, religious organizations, workplaces, peer groups, sports activities, shops, school cafeterias... A broadened view of where education takes place raises questions about the relationship of the many locations of education to each other” (Egan-Robertson and Willet 1998, 15). In regards to First Nations education, Ashworth has stated (1979, 5), “Schooling, that is the separating of children from adults for set periods each day in order that they be formally instructed, was unknown amongst the Indians, but education was not; all the tribes educated their children.”

Traditionally, education in First Nations societies did not always occur at a specific time or place. Rather, the education of children and youth took place continually, mainly

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8 Canadian Oxford Dictionary, s.v. “Schooling.”
9 Canadian Oxford Dictionary, s.v. “School.”
10 Canadian Oxford Dictionary, s.v. “Education.”
11 Canadian Oxford Dictionary, s.v. “Educate.”
through observation, experiential learning and storytelling. In regards to the Dena Tha people, Goulet speaks about how they view learning (1998, 27):

Dene expect learning to occur through observation rather than instruction, an expectation consistent with the Dene view that true knowledge is personal knowledge.

My grandfather, Charles Callbreath, is a prime example of someone who has learned through both observation and experiential learning. Grandpa Charley learned how to do many things by observation and visualization. “I picture things.” When asked where he went to school to become a mechanic, he jokingly says, “Tahltan Bridge College!” (Charles Callbreath, Tahltan Elder, personal communication to J. C. Thompson 2001). While Grandpa attended school in both Telegraph Creek and Wrangell, Alaska, he never received any formal teaching for the trade that would become his lifetime work. He learned about motors and engines himself from reading parts books and catalogues as well as by watching other workers. When they need machinery parts that they were unable to get into their remote community for months, Grandpa Charley would create parts that worked as well or better than the ones they were waiting for.

I never went to no school. I picture stuff, you know. I guess that’s what helps me to remember. I think about it and I fall asleep and the next day I go out and fix it all up. I can picture it before I start (personal communication to J. C. Thompson 2001).

My grandmother, Julia Callbreath, learned much from her Tahltan mother, Tsa’tso’ma. Through stories, Tsa’tso’ma taught her children to respect the land, plants and animals. She taught them what plants could be used for food, medicine, and materials through
observation and by allowing her children to help her. Turner, Ignace and Ignace have noted that (2000, 1280-1281), “Children’s participation in harvesting and management of traditional foods and materials is crucial; children gain practical knowledge and experience through observation and assisting their elders, parents, and grandparents.”

Granny Julia spoke to me of her mother’s keen sense of observation:

I tell you, for a woman with no education, she was smarter than me. If you were to be baking, she could sit right here and watch you and she’d see everything you put in it. And you could go home, she’ll do the same thing and never forget. She’ll make the same thing you made (Julia Callbreath, Tahltan Elder, personal communication to J. C. Thompson 2002).

While observation and experiential learning were key ways in which Elders passed on their knowledge, storytelling is paramount in regards to Elders transmitting their ways of knowing. I have heard many of the same stories over and over again from many different Tahltan Elders. Goulet has observed this method of teaching being used by the Dene Tha people (1998: 28): “…stories are repeated again and again to illustrate the kind of behavior that leads to well-being and the kind that leads to undesired consequences or disaster.” Such stories are “…imbued with lessons in ecology and proper ways of relating to others” (Turner et al. 2000, 1281). Storytelling was a valuable and effective way of teaching, a way to capture the attention and imagination of children while teaching them morality and knowledge of the land. Annie Ned, an Elder of Athapaskan and Tlingit ancestry, has spoken about the value of telling stories:
Tell stories - which way you learn things. You think about that one your grandma tells you. You've got to believe it, what Grandma said.... Old-style words are just like school! (Annie Ned cited in Cruikshank 1990, 267).

Ned goes on to talk about the importance of helping Elders and the rewards young people during her time received for their good deeds:

- Kids used to do jobs for old people - get wood, water. They paid us with stories!
- We bring wood: now! Time like school! We stayed there - we listened. (Annie Ned cited in Cruikshank 1990, 268).

While observation, experiential learning and storytelling were ways in which knowledge and wisdom was transmitted from generation to generation amongst First Nations people, these methods of teaching and learning were altered, as was the lives of Aboriginal peoples in North America, upon the arrival of European settlers over 500 years ago. For British Columbia First Peoples, the direct impacts of European contact began about 200 years ago. In an attempt to colonize and assimilate First Nations peoples, colonial governments used such methods/tools as residential schools, the creation of reserves, and the banning of cultural practices such as the potlatch that disconnected Aboriginal peoples from their land, their culture, their language, their histories, and their own people (Smith 1999). In fact, the education system was one of the main tools of colonialism used throughout the world.

In Canada, residential schools were particularly detrimental to Indigenous cultures and lifeways, in that children were taken away from their families and communities and isolated in a foreign environment in an effort to teach the values and language of the colonizers (Haig-Brown 1988; Campbell et al. 2003). While at residential school, First
Nations students were taught basic academic and practical skills but mostly those relating to the lifestyles and occupations they were expected to assume: farming or manual labour for the boys and domestic work for the girls. Children were not allowed to speak their own languages at any time and were often physically punished if they did so. While the assimilation of First Nations people was not accomplished, the residential school experience caused extraordinary problems and had devastating effects on the social and cultural lives of people for many generations.

Due to the effects of colonization and assimilation, such as those of residential schools and the ban on potlatches, there are several generations that do not know their language or the details of many aspects of their culture. However, there are still Elders who are knowledgeable about their people’s ways of knowing and they lament about how young people are not learning their traditional ways. At a Tahltan Elders’ conference in 1992, Tahltan Elder Rosie Dennis spoke specifically about what she would say to government officials involved in land claim negotiations with the Tahltan, but more importantly, she pointed out how younger generations have not been learning our TEK:

This young generation, just the white people way they know. If I’m with this guy they ask for land I’ll tell him you guys got your grandpa’s hotel and camping place. You name it. And I got my grandma and my grandpa’s hotel tree. The biggest tree with the big branches. That’s their camping place. And I know the name of it. My grandma, my grandpa’s moccasins scattered all over. Where’s that Queen’s camping place? Show me where that Queen been camp. Trying to own our country.... Show me where Queen’s place and where she give name to the river, to the mountain like what we do. You people start it out, name it by you
own language. And we’ve got names for every mountain, every creek, every camping place, every lake, everything, we got name for it. Now you guys just make us forget. All the young generation just took your side and forget about our own way (Rosie Dennis, Tahltan Elder, personal communication to J. C. Thompson 1992).

Elder Annie Ned echoes similar sentiments to that of Rosie Dennis:

Where do these people come from, outside?
You tell different stories from us people.
You people talk from paper-
Me, I want to talk from Grandpa.


Mrs. Ned’s words eloquently illustrate and reflect the difference in the ways First Nations children were educated during her time as opposed to how present generations are generally being educated. Tahltan Elder Robert Quock, when sharing experiences he had with his father, spoke about the need for the younger generations to learn the traditional ways of our people:

I’ve been right around that mountain. I used to don’t like my dad about he take us out all the time. We were young, me and my brother. But nowadays I’m very pleased how big a country he showed me and he tell us what it is, you know. Something like that I’m glad I picked it up. I travel, I learn a lot from my dad, you know. And he didn’t speak English very much. He knew how to speak English but he used mostly Tahltan language. And I’m very happy with that…. I’m real happy I learn all this. And my grandchildren and a lot of young people should
learn like that, you know. But you got to do a full study on everything; I mean you got to listen to older people and everything like that and you pick up a lot of different things (Robert Quock, Tahltan Elder, personal communication to J. C. Thompson 2000).

While many Elders want the children in their communities to learn about their people’s ways of knowing and the respectful relationship they have with the land, they recognize that the school system plays an important role in the lives of the children. Kitty Smith, an Elder of Athapaskan and Tlingit ancestry, has spoken about why she wanted her stories to be written down in regards to a great-grandchild: “Well, she’s six years old now. Pretty soon paper’s going to talk to her!” (Kitty Smith cited in Cruikshank 1990, 16). Julie Cruikshank explains further why three Athapaskan Elders worked with her to record their stories:

> These narrators want to produce booklets that their grandchildren can read. Their own childhood instruction came either from observation or from oral tradition, but they recognize that children now learn from books.... Schools teach things totally outside the experience of elders; stories, on the other hand, recreate the life cycle. Women see their books of stories as a connection between the world of tradition and the schools’ “paper world” and feel that, thus legitimized, the stories should be part of the school curriculum (Cruikshank 1990, 16).

Many Elders realize that in order to teach our traditional ways, the modern ways need to be utilized. Although Elder Annie Ned learned much of what she knew through stories told by her Elders, like Kitty Smith, she also realized that “schoolkids learn from paper” and her goal was to prepare a book for children (Annie Ned cited in Cruikshank 1990,
These two Elders realized that they were then in a different world from that of their youth, full of distractions such as television, telephones and video games, and they recognized the need to bridge these two worlds. Such astute Elders and educators have realized that, "All individuals involved with Native education will benefit by effectively using elders metaphorically as bridges between two cultural domains" (Medicine 2001, 81).

Part II: Examining Two Distinct Nature Knowledge Systems

There are many different expressions being used for the description and interpretation of natural phenomena, such as Western modern science (Ogawa 1995; Snively and Corsiglia 2000), academic science (Ziman 2000), Indigenous science (Snively and Corsiglia 2000), Indigenous knowledge (Berkes 1999; Ohmagari and Berkes 1997; Snively and Corsiglia 2000), traditional ecological knowledge (Berkes 1993; Berkes 1999; Johnson 1992; Snively and Corsiglia 2000; Butler 2004), traditional environmental knowledge (Johnson 1992), traditional ecological knowledge and wisdom (Turner et al. 2000; Snively and Corsiglia 2000), and local knowledge (Berkes 1999; Ignas 2004). Since many of these terms for knowledge systems have multiple meanings and interpretations, it is important to define them as well as other terminology used in many current science and science education discussions and debates. In this section, the worldview and the philosophical roots of two specific nature-knowledge systems, namely Western knowledge (Western modern science) and Indigenous knowledge (traditional ecological knowledge), are examined.
What is science? Its Latin root, scientia, means knowledge, which comes from the Latin verb, scire, to know. However, a more recent definition is, “a branch of knowledge conducted on objective principles involving the systemized observation of and experiments with phenomena, especially concerned with the material and functions of the physical universe.”12 This is but one definition of science, albeit a very common and dominant one. It reflects the science of the western modern world in the last few centuries. People who practice science are seen to objectively observe, predict, investigate, experiment, infer, and monitor the natural world. Bronowski (1978) has stated that the beginning of the scientific way of thinking was a fundamental change in worldview that occurred between 1500 and 1700, and that a scientific worldview does not accept the idea of one logic for the natural world and another logic for a supernatural world. Western modern science (WMS) is a term that Ogawa (1995) uses to refer to this scientific worldview, also known as modern science. Ogawa defines Western modern science as (1995, 589) “a collective rational perceiving of reality, which is shared and authorized by the scientific community.” Ziman (2000) uses the term academic science in much the same way that Ogawa uses the term Western modern science. Ziman elaborates on how academic science is a culture in itself, in that “it is a complex way of life that has evolved in a ‘group of people with shared traditions, which are transmitted and reinforced by members of the group’” (Ziman 2000, 24). Academic science’s roots can be traced back to before the seventeenth-century Scientific Revolution, emerging in essentially its modern form in Western Europe in the first half of the nineteenth century.

12 Canadian Oxford Dictionary, s.v. “Science.”
“Since then it has evolved into a coherent and elaborate social activity, increasingly integrated into society at large. Indeed, science has grown and spread around the world as a characteristic subculture of the general culture of modernity” (Ziman 2000, 25). Like all knowledge systems, Western modern science cannot be separated from its worldview and its culture, any more than other nature-knowledge systems (Ogawa 1995). However, the Western science community in general believes that science is universal, absolute and objective. It does not see science as being relative or having significance in relation to something else (Kellogg 1998; Stanley and Brickhouse 1994).

Relativism\textsuperscript{13} has been defined as “any theory of ethics or knowledge based on the idea that all values or judgements are relative, differing according to circumstances, persons, cultures, etc.” Ogawa (1995, 584) refers to the “relativization of Western modern science” as the examination of the “description and interpretation of what scientists call natural phenomena as inextricably linked to cultural views, and therefore, to viewing Western modern science as an expression of Western thought and as one way of describing and interpreting natural phenomena”. From a philosophical point of view, Western modern science has been characterized as “positivistic” (Battiste and Henderson 2000, 86), has been called, “logical empiricism (positivism)” (Snively and Corsiglia 2000, 9) and has been labelled a “positivist-reductionist paradigm” (Berke 1999, 11). All of these descriptions have identified positivism as a common trait. Positivism\textsuperscript{14} is “a system of philosophy originated by August Comte [a French philosopher and socialist from the 19\textsuperscript{th} century] based solely on observable, scientific facts and their relations to

\textsuperscript{13} Webster's New World Dictionary, s.v. “Relativism.”

\textsuperscript{14} Webster's New World Dictionary, s.v. “Positivism.”
each other.” Positivism adopts a perspective that judges how the natural world can be analyzed and comprehended and applies it to the social world of human beings and human societies. Linda Tuhiwai Smith (1999, 42) sees this way of understanding the world as "being akin to measuring". Reductionism is defined as "any attempt to reduce, replace, or derive theories of one (higher) level to, by, or from those of another (lower) level...the most important instances include attempts to reduce the mind to the body, the intensional to the extensional, and the external world to sense data" (Fetzer and Almeder 1993, 119). Conti states that experimental science, or Western modern science, is infected with the “disease of reductionism” (1991, 106-107):

We must recognize the fact that the experimental sciences scale down a large number of parameters...not only in terms of the number of objects observed, the period of observation or the reduced spatial dimensions, but also – in what is particularly dangerous practice, perhaps the most dangerous of all – in terms of the number of aspects exhibited by a phenomenon, a process usually referred to as “reductionism”.

Ziman appears to concur with Conti by declaring that (2000, 20): "A widespread belief in reductionism is typical of modern science...general theories are favoured because they seem more fundamental than specific facts. Invisible entities, such as quarks, molecules and genes, are thought to be particularly fundamental because they operate behind the scenes". Ogawa asserts (1995, 589), "Western modern science pertains to a Cartesian materialistic world in which humans are seen in reductionistic and mechanistic terms."

Advocates of Western modern science clinging to a universalist epistemology. Stanley and Brickhouse claim that (1994, 390) “the universalist view of science claims that the
ontological physical world itself judges the validity of a scientific account of that world, and this account is unrelated to such things as human interest, culture, gender, race, class, ethnicity, or sexual orientation”. In other words, the reality of the natural world is impartial to the personal qualities of examiners.

The very idea that human beings can objectively describe and interpret natural phenomena without their worldview influencing their observations, or even what they choose to observe, lies at the heart of the current debate in science education. The debate between multiculturalism and universalism began in the 1990s, when one of the emerging issues in the science education community was that of multicultural science education (Aikenhead 1993; Hodson 1993; Ogawa 1995). What does “multicultural” science mean? It has been defined it as, “a construct, a process, and an educational reform movement with the goal of providing equitable opportunities for culturally diverse student populations to learn quality science in schools, colleges and universities” (Atwater and Riley 1993, 664). Multiculturalism has been defined as “the need to acknowledge and draw upon cultural diversity” (Ogawa 1995, 583-584). The universalist view of science has been challenged by philosophers of science, feminist scholars, and most recently, by multiculturalists (Stanley and Brickhouse 1994) and by science educators (Snively and Corsiglia 2000). Stanley and Brickhouse (1994) stated that the standard universalist account of the nature of science was flawed, and that the nature of science should in fact reflect a multicultural perspective of scientific knowledge, one that accounts for different worldviews or alternate ways of knowing nature.

Indigenous peoples have had, and continue to have, an intimate relationship with the land, a knowledge of the land that is highly localized and social. For example, Dr.
Angaayuqaq Oscar Kawagley, a Yupiaq scholar, states that his people, located in southwestern Alaska, have “a body of scientific knowledge and epistemology that differs from that of Western science” (Kawagley et al. 1998, 136). Kawagley further states that:

Much of Yupiaq scientific knowledge is manifested most clearly in their technology. One may argue that technology is not science. However, technology does not spring from a void. To invent technological devices, scientific observations and experimentation must be conducted. Yupiaq inventions, which include the kayak, river fish traps … represent technology that could not have been developed without extensive scientific study of the flow of currents in rivers, the ebb and flow of tides in bays, and the feeding, resting, and migratory habits of fish, mammals, and birds (Kawagley et al. 1998, 136).

Science from this perspective refers to descriptive knowledge of nature developed through experience with it. The definition of science used here is consistent with Ogawa’s (1995, 588), who refers to science simply as “a rational perceiving of reality.” From this definition, Ogawa (1995) argues for the existence of many different legitimate sciences. One such nature-knowledge system, or science in Ogawa’s definition, is traditional ecological knowledge (TEK).

Defining traditional ecological knowledge is just as troublesome as the term science. Johnson states (1992, 3), “this knowledge is variously labelled as folk ecology, Ethnecology, traditional environmental or ecological knowledge, indigenous knowledge, customary law, and knowledge of the land.” Snively and Corsiglia (2000, 8) have described traditional ecological knowledge (TEK) as “both the science of long-resident oral peoples and a biological sciences label for the growing literature which records and
explores that knowledge”. There is no universally accepted definition of traditional ecological knowledge due in part to the ambiguity of the words that make up the expression (Berkes 1993). “Traditional usually refers to cultural continuity transmitted in the form of social attitudes, beliefs, principles and conventions of behaviour and practice derived from historical experience” (Berkes 1993, 3). The problem associated with the use of this word is that societies are dynamic, adopting new practices and technologies and changing over time. The amount and the kind of change would make it hard to stay true to the definition. The term, Indigenous ecological knowledge, is often used thereby avoiding the use of the word traditional, and placing the emphasis on Indigenous people (Berkes 1993). However, this term does not capture the time depth generally associated with such knowledge.

The term ecological knowledge is also troublesome to some. Ecology is a branch of biology and, as such, is a sub-discipline of Western modern science, and therefore “ecological” may not be an appropriate word to use. However, “if ecological knowledge is defined broadly to refer to the knowledge, however acquired, of relationships of living things being with one another and with their environment, then the term TEK becomes tenable” (Berkes 1993, 3). LaDuke, an Indigenous writer, defines TEK as “the culturally and spiritually based way in which indigenous people relate to their ecosystems” (cited in McGregor 2000, 444). A complete and concise definition has been put forward by Berkes (1999, 8): “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 things (including humans) with one another and with their environment.” This is the definition I will adopt for the purposes of this thesis.
Part III: Science Education

What is science in science education? Questions about the content of science curricula have been raised that challenge the assumption that Western modern science should comprise school science curricula (Stanley and Brickhouse 1994). While there is still dispute about science and multiculturalism, or multiscience, many science educators have moved past that debate and have accepted that all knowledge systems about nature are fixed in the context of a cultural group (Coburn and Loving 2000; Snively and Corsiglia 2000; Stanley and Brickhouse 2000). The new focus is to find ways to position Western science so that it can inform and be informed by the nature-knowledge systems of other cultures, and find ways of bringing these different worldviews and perspectives into the science classroom.

In this context Western students come to understand that their ways of seeing the world are but one of a plethora of cultural perspectives. The simple act of recognizing the existence of indigenous knowledge in an educational setting undermines Western science's pretensions to universality. Students and teachers in this pedagogical context understand that Western science is not the only lens through which to look at the world. Engaging Western science and indigenous knowledge in a dialogue with one another grants indigeneity a level of respect it has traditionally not received in Western education (Semali and Kincheloe 1999, 47).
Besides proving that TEK is distinct from WMS, we need to show students how these different views of science and nature are firmly rooted in certain cultural assumptions that influence how the practitioners go about formulating and solving significant problems.

A popular mode of teaching has been based on behavioural psychology (Brooks and Brooks 1999; Aikenhead 1996). Theorists and researchers in the field of behaviourism characterize human behaviour by the “stimulus-response relationship coupled with positive reinforcement of desired behaviours and negative reinforcement of unwanted behaviours” (Brooks and Brooks 1999, 25-26). However, behaviourism does not take into account that students have ideas based on prior knowledge and experience, and that “these ideas or beliefs affect the ways students respond to and interpret instruction in science” (Snively 1995, 57). In many subject areas, students are often not given the opportunity to participate in the process of making knowledge, with this teaching style being prevalent in the sciences (Blades 2001; Kellogg 1998; Carr et al. 1994). As science educator Kellogg has noted (1998, 213),

Epistemologically speaking, science is a field dominated by empirical research. Yet within science classrooms students are not often encouraged to participate in the process of making knowledge through the application of scientific principles (i.e. through their own research). Rather, science is often taught by the transmission model of teaching, in which students are bombarded with vast quantities of information produced by experts. Blades has stated (2001, 72), “Almost from their first ‘science’ lesson children learn that the canon of science contains ‘facts’ they must assimilate.” By the time students are in high school, they have learned how to provide memorized information required by the set
curriculum, but that is not relevant to their lives and that has been produced by “experts” in the world of academia. They have not been given the opportunity to take part in critical research; the only research that they have taken part in is laboratory assignments with procedures that have previously been developed by others with predetermined results, often dubbed “cookbook science” (Blades 2001; Kellogg 1998). “Student success is then determined not based on their ability to ask and carefully investigate questions by applying methods of science to problems within society or in their lives, but by regurgitating pre-digested and decontextualized facts and by reproducing predetermined results in contrived laboratory settings” (Kellogg 1998, 213).

More educators are moving towards providing teaching and learning experiences in which students are active learners and are encouraged to construct their own knowledge and to present that knowledge in ways that give the student more autonomy (Yeager et al. 1998; Solomon 1998; Curry and Bloome 1998; Mercado 1998). The idea that knowledge is self-constructed is most often associated with the work of Jean Piaget (1926, 1977). Piaget’s work in child psychology, along with the work of other individuals in the field of educational philosophy, has led to the constructivist learning epistemology. Constructivism takes into account the concept that children of different cultures have different ideas and beliefs about specific science concepts (Snively 1995). For example, Indigenous children may have distinct beliefs and ideas about their relationship with nature, such as weather, plants, animals, and time, and the ways in which they “know”, as opposed to that of the dominant culture (Snively 1995). As Snively has pointed out (1995, 59), “It seems that science instruction does little to probe for or incorporate the
prior beliefs of First Nations children and even less to enable all students to talk about the possibility of multiple perspectives and traditions of science” (Snively 1995, 59).

One teaching strategy consistent with a constructivist learning epistemology is to have students become researchers of their own culture in their own communities, which will provide positive and active learning experiences (Curry and Bloome 1998). Students often do not recognize that what they know and what their family and/or community members know is as credible as something that is found in print, such as books or newspapers. In regards to most student work, Curry and Bloome have noticed that (1998, 33) “...previous work students engaged in text reproduction – reproducing the text of ‘authoritative’ sources such as textbooks, encyclopaedias, and teachers. Students engaged in little reflection on the knowledge they were reproducing and they did not employ the knowledge they had or that was in their communities to help them compose their academic writing or to challenge authoritative knowledge.” Wells (1994) feels that students will need to learn more than just the knowledge from the traditional academic disciplines that makes up school curriculum, and that they also need to be actively involved in their learning in order for students to become independent thinkers and responsible human beings.

Part IV: Research with First Nations Communities

In the past, western researchers as “principal investigators” have often had exclusive control over research carried out in communities that they did not belong to. Their actions and ethics often created distrust amongst First Nations communities because of the way Indigenous knowledge was presented or appropriated. “Aboriginal
people in Canada have a long history of cultural invasion that has attempted assimilation but failed, and of research that has quantified and described their reality but has done little to improve it” (Dickson and Green 2001, 473). Anthropology was one such academic discipline, but by no means the only discipline, whose scholars were often guilty of such actions:

Anthropology concerns an individual who goes into a community, learns, ..., writes his books, publishes it in another system – one altogether different from the one he has just learned from and studies.... The anthropologist does that as a career, as an identity, as a way of life ... while the people that he studies are … disrupted, having given the very heart of their perception of themselves and their world. This is extractive to us. In no small measure, a rip-off. Anthropology serves ... the so-called ‘body of knowledge’ that Western education systems of higher learning seem to cherish so much (Ismaelillo 1978, 20).

I have heard of this distrust over and over again from First Nations Elders, as have other Indigenous scholars (Archibald 1997; Menzies 2001; Menzies 2004; Smith 1999). Tahltan Elder Loveman Nole spoke to me about a conversation he had with a linguist that had been hired by his band:

I said, “I don’t mind if my cousin Judy right here talking to me. She’s a Tahltan and I’m a Tahltan. Them things I tell her will stay right here. But if I tell you that, it will be gone. Where you go it will go with you and we’ll never get nothing back”. That’s true, you know. I did it for four people, I never got nothing back (Loveman Nole, Tahltan elder, personal communication to J. C. Thompson 2001).
Loveman’s words not only highlight the suspicions that First Nations people have had in sharing their knowledge with outsiders, but the importance of our own people working with us and learning from each other so that our knowledge will be retained and used for the betterment of the people in the community.

While there has been a history based on mistrust between researchers and First Nations communities, more and more researchers are conducting research that involves working with First Nations peoples and their communities (Menzies 2001). Indigenous scholar Charles Menzies has stated (2004, 15), “The new focus on community involvement marked an important turning point in anthropological research and has gone a long way toward shifting anthropological practice from research on subaltern peoples to research with communities of people.” Researchers are adopting participatory and collaborative research methodologies as a way to involve the communities that they are working with (Menzies 2004; Smith 1999). Indigenous scholar Linda Tuhiwai Smith (1999, 9) has written about the ways in which the world of academia and has been changing: “Significant spaces have been opened up within the academy and within disciplines to talk more creatively about research with particular groups and communities – women, the economically oppressed, ethnic minorities and indigenous peoples.”

Whoever research is initiated by, whether it be a First Nations community, an Indigenous researcher, or non-Indigenous researcher, it is vital that a respectful research protocol is adhered to (Menzies 2001). Menzies (2001) has outlined how research can be carried out in a respectful manner, as well as the challenges faced by researchers. Smith (1999) has also discussed the significance of Indigenous perspectives on research as well as ways of conducting research that are culturally sensitive and appropriate. While these
two Indigenous researchers have provided ideas, methods, and procedures for carrying out research with Indigenous communities, it is important to keep in mind that each community has their own cultural protocols that need to be adhered to if the research is to be considered truly participatory and collaborative. As Menzies has stated (2004, 27), "Irrespective of whether one is an Indigenous scholar or not we all share a responsibility to conduct respectful research that demonstrates not just form, but the actual content of respect and honour."

Summary

This chapter has provided an overview of select discourse on First Nations education; the examination of two distinct nature knowledge systems, namely traditional ecological knowledge and Western modern science; science education; and research with First Nations communities. While the education of First Nations children traditionally involved observation, experiential learning and storytelling, the impact of colonialism and assimilation disrupted these teaching and learning methods. While Elders have emphatically stated the need for the younger generation to be learning their peoples’ ways of knowing, they also understand that times are different and that modern methods may need to be utilized. Educators see the need for the development of culturally relevant science curriculum that includes traditional ecological knowledge along side that of Western modern science. From the constructivist learning epistemology, many educators are providing teaching and learning experiences that involve students as active learners. An example of this is having students become researchers of their own culture in their own communities. Not only does this provide a way for students to be active participants
in their learning, it is also a way for First Nations people to be actively involved in
research about themselves, something that has not happened in the past. This research
project attempts to include Hartley Bay community members at differing levels of
participation in an effort to provide students with the opportunities to be actively involved
in the intergenerational transmission of knowledge. In Chapter Three, I discuss the
methodology and design of this study.
CHAPTER THREE

Methodology

In this chapter, I review the purpose of the study and explain the methodology chosen for it. I then give a description of the research setting, participants, and procedures, as well as examine several issues of validity.

Purpose of Study

The objectives were: (1) to find ways of bringing traditional ecological knowledge into school science curricula in order to make science more relevant and accessible to First Nations children, (2) to facilitate and strengthen the connection of First Nations youth to their land and culture through their elders, and (3) to assist in the intergenerational transfer of traditional ecological knowledge. The more specific purpose of this study was threefold: (1) to develop a program with Hartley Bay teachers and community members in which students learn about the Gitga’at uses of plants in order to find an effective means of facilitating transmission of traditional ecological knowledge to younger generations, (2) to help to implement this program, and (3) to evaluate student and community responses to the effectiveness of such a program. The entire project was done in collaboration with students and teachers at the Hartley Bay School, and with members of the community. As a First Nations educator working with a First Nations community, I needed to select a research methodology that would be both culturally sensitive and would follow the protocols of the community.

Choice of Methodology
Methodology is important in that it sets the context for the questions being asked; it establishes the tools and methods to be used and shapes the analyses (Smith 1999). In regards to Indigenous methodologies, Smith (1999, 143) has stated that they are “often a mix of existing methodological approaches and indigenous practices”. It was important to me as a First Nations educator and researcher to ensure that this project was framed within an Indigenous context. I chose to use community action research within an Indigenous context as the overarching methodology, with a case study approach as the more specific design.

Action Research

Action research, a term originating from the work of Kurt Lewin in the 1940s (Kemmis 1997; Nodie Oja and Smulyan 1989) has been defined as “a form of collective self-reflective enquiry undertaken by participants in social situations in order to improve the productivity, rationality, and justice of their own social or educational practices, as well as their own understanding of these practices and the situations in which the practices are carried out” (Kemmis 1997, 174). From an educational standpoint, action research is seen as a way to improve practice (Glesne 1999); it is “an approach to improving education by changing it and learning from the consequences of changes” (Kemmis 1997, 175). Kemmis and McTaggart (1988) have stated that action research is participatory in that people are working towards improving their own practices, and that it is collaborative because it involves everyone from those directly responsible for the action to everyone affected by that action. “It establishes self-critical communities of people participating and collaborating in all phases of the research process” (Kemmis 1997, 175). Participatory research, a form of action research, combines three processes:
research, education, and action (Hall 1993) and is said to be "emerging as a self-conscious way of empowering people to take effective action toward improving conditions in their own lives" (Park 1993, 1). From this perspective, terms such as participatory action research (Fals-Borda & Rahman 1991), participatory research (Park 1993; Hall 1997), and collaborative action research (Sagor 1992; Nodie Oja and Smulyan 1989) are different variations of action research that all refer to the same general process.

Community Action Research

Other variations of the term action research are community research (Ristock & Pennell 1996), community-based participatory research (St. Denis 1992), community-based action research (Stringer 1996) and community action research (Smith 1999). Ristock and Pennell (1996, 1) have deemed community research to be "research as empowerment" and "an approach to building knowledge that seeks to change the conditions of people's lives, both individually and collectively. It involves consulting or collaborating with diverse individuals, groups, or communities as part of the process of illuminating people's lives and social issues" (1996, 2). Community-based participatory research is a way for communities to become empowered through research (St. Denis 1992). Community-based action research starts with a group, community, or organization defining a problem, helping the people involved to better understand the circumstances of the situation, and then finding ways of resolving the problem by taking action (Stringer 1996). These expressions are very specific in regards to the participation and collaboration of the community in the research. However, defining community is not an easy task. From an Indigenous perspective, identifying oneself and one's community is
usually tied to the territory, the tribe or First Nation of which you are a member, and the clan and/or family to which you belong. As Smith has stated (1999, 126), “Through this form of introduction you locate yourself in a set of identities which have been framed geographically, politically and genealogically.” Ultimately, in order for community action research to be valid, the community must generate their own definitions of who they are. They also have to define and determine what type of research will take place in their community, how it will take place, and who will be involved.

**Community Action Research within an Indigenous Context**

Maori scholar Linda Tuhiwai Smith (1999) maintains that a community action approach makes a positive difference in the lives of people in the community, and also provides a way for First Nations researchers to actually do research in their own communities. While many research methodologies have assumed that the researcher is an outsider able to observe somewhat objectively, Smith states that (1999, 137) “Indigenous research approaches problematize the insider model in different ways because there are multiple ways of both being an insider and outsider in indigenous contexts”. Using community action research as a methodology allows First Nations researchers to carry out research in either their own communities or other First Nations communities, and to be involved in what Smith (1999) has referred to as insider/outsider research. Originally coming from the field of anthropology, the labels of *native researcher*, *Indigenous researcher*, or *insider researcher* are applied to someone who studies their own social, cultural, racial, or ethnic group of which they are a member (Jones 1970; Kanuha 2000). While a First Nations person doing research with her own community would be considered an insider, she could also be considered an outsider if she was not brought up
there or no longer resides there. A First Nations person working with a First Nations community other than her own could be considered an insider on some levels, but would most definitely be considered an outsider on other levels. Because this label of insider/outsider research is so complex, it is important that both First Nations and non-First Nations researchers be clear in defining themselves and their relationship with the community.

Case Study

A case study is “an empirical investigation that is defined by interest in a specific phenomenon, within its real-life context. It is a qualitative form of inquiry that relies on multiple sources of information” (Anderson 1998, 249). The case study methodology allows the research to “retain the holistic and meaningful characteristics of real-life events” (Yin 1994, 14). Yin (1994) has outlined three conditions for choosing a case study approach: the form of the research question is more explanatory, it does not require the researcher to have control over behavioural events, and it focuses on contemporary events. The Gitga'at Plant Project incorporates two elements of case study methodology: an action research element, which involves bringing about change in the project or situation being studied, and an evaluation element, which entails the evaluation of programs (Stenhouse 1988). A case study in an action research form can be a study of a case “created by actions of the researcher but where the primary concern is not controlling variables to measure their effects” (Hammersley and Gomm 2000, 4). A case is a bounded system that is limited by time and place, such as a program, a project, an event, or individuals (Creswell 1998; Merriam 1988; Stake 1995) and researchers using a case study approach need to establish the boundaries of the case (Creswell 1998; Yin 1994).
The Gitga’at Plant Project was developed and implemented by two Hartley Bay teachers, Cameron Hill and Eva-Ann Hill, and myself, thereby creating the case by our actions. Essentially, the Gitga’at Plant Project, the case, was a community action research project that was participatory and collaborative in nature, which involved the community in an attempt to make a positive difference in the education of the children in Hartley Bay. The case study approach allowed me to focus specifically on the Gitga’at Plant Project and the experiences of all of the people involved. I was also able to use several different ways to collect data and different sources of information. It gave me the opportunity to bring in curriculum that I had developed so that the teachers and I could adapt it specifically for the school and community’s needs, could monitor, assess, and improve upon the implementation of the project, and could evaluate the project.

Research Setting

This coastal community had previously been established as a site for other Coasts Under Stress (CUS) research (as described in Chapter One). This specific research project was suggested by a researcher (ethnobotanist) already carrying out collaborative research on traditional ecological knowledge of the Gitga’at people relating to plants and the environment (Turner and Clifton 2002). Since one of the goals of CUS is to assist local communities in the documentation and perpetuation of traditional knowledge, and to demonstrate its importance to younger members of the communities, such a school project would be in line with the goals of this larger research project.

I carried out the fieldwork or data collection between September 2003 and June 2004. This study took place in the Gitga’at community of Hartley Bay, British Columbia,
which has a population of approximately 200. Hartley Bay is located 140 kilometres (90 miles) southeast of Prince Rupert, BC, at the confluence of Greenville Channel and Douglas Channel.

The Gitga'at people are members of the Tsimshian Nation. Besides Hartley Bay, there are seven other Tsimshian communities: Kitasoo, Gitxaala, Kitselas, Kitsumkalum, Lax Kw'alaams, Metlakatla, BC, and Metlakatla, Alaska (Campbell 2001). The Tsimshian inhabit the lower portion of the Skeena River, the islands found at the mouth of the Skeena, and along Douglas Channel (Tsimshian Chiefs 1992). In regards to Gitga'at territory, it includes a large portion of the mainland south of the Skeena River, as well as several offshore islands, namely Gil, Gribble, Campania Islands, and most of Princess Royal Island. Tsimshian territory is characterized by a mild, marine climate with heavy precipitation, which in turn supports dense, wet conifer forests. Biologists recognize the Coastal Western Hemlock Zone as the major biogeoclimatic zone within Tsimshian territory. The Tsimshian speak the Sm'Ã¯'alyax language.

Research Site

As part of the Coasts Under Stress project, this study was undertaken as a way to find methods to ensure the documentation, perpetuation, and intergenerational transmission of traditional ecological knowledge, and to evaluate such a program. The Hartley Bay School is located in the heart of the community and was chosen as the site for this inquiry. The Hartley Bay School has approximately 68 students, ranging from Nursery School to Grade 12. All of the students are of Tsimshian descent. There are four classes: Nursery school to grade four, grades five to seven, grade nine, and grades 10 to
12. The staff is made up of a principal, five teachers, a learning assistance teacher/librarian, a Sm’algyax language teacher, a secretary, and a custodian. Most of the staff are members of the Gitga’at Nation with the exception of two of the teachers.

Ethics and Relationship Development

A proposal was submitted to the principal in June 2001 in regards to working with the high school students on a plant project, in which each student would study a plant that has cultural importance to the Gitga’at people (Turner et al. 2001). At this point, Dr. Nancy Turner already had a formal agreement in place with the Gitga’at Nation in regards to her research with CUS. Verbal permission to initiate this project was given by the principal and the teachers. Written permission to work with the school was obtained from the superintendent of School District No. 52 and the principal of the Hartley Bay School; written permission to work with Hartley Bay community members was obtained from the Hereditary Chief of the Gitga’at Nation and the Chief Councillor of the Gitga’at Nation. These letters of approval can be found in Appendix A.

Before beginning the implementation of the project, I sought and received permission from the University of Victoria’s Human Research Ethics Committee. All participants involved in the study signed a consent form (see Appendix B) before any data was collected to acknowledge their participation in the study. As well, they were informed of the time required to participate as well as of issues and options for maintaining confidentiality and anonymity. The letter of consent explained the purpose of the study, the procedures, and the right to withdraw at any time.
Project Design

The Gitga’at Plant Project was made up of three stages: (1) Development, (2) Implementation, and (3) Evaluation. First of all, the curriculum was developed by the two teachers and myself in order to make science curriculum more relevant for the high school Hartley Bay students, thereby setting the “action” in motion. The Implementation stage involved the high school students becoming the researchers as they interviewed elders and other community members about the importance of specific plants to their people. In the final stage, students, teachers, and adult community members involved with the project evaluated the plant project by providing information and feedback about the effectiveness of such a project.

Development

It is important to state that there were two stages of development for this project. The first stage involved myself developing a relationship with the community of Hartley Bay. The second stage involved the actual development of the Gitga’at Plant Project. From February 2002 to April 2003, I developed a unit plan entitled “Traditional Plant Knowledge of the Tsimshian” (Thompson 2003) which was made up of six lessons: (1) Learning about Traditional Plant Knowledge; (2) Plant Observation, Collection and Identification; (3) Plant Use of the Tsimshian; (4) Plant Harvesting, Preservation, and Storage; (5) Plant Nutrition; and (6) Relationships with other First Nations and their Plants. The unit plan focused specifically on the traditional ecological knowledge First Nations peoples have about plants. While the curriculum was specific to the Tsimshian, I tried to make it so that it was flexible enough to be adapted to other First Nations groups.
Traditional ecological knowledge is holistic in nature and therefore is not confined to the artificial boundaries of disciplines or subject areas. Therefore, while these lessons were developed with science courses in mind, they also covered the prescribed learning outcomes (defined in Chapter Two) in courses listed under Social Studies and Applied Skills, as well as Sciences. All provincial public schools and private schools receiving funding from the provincial government are required to follow the Prescribed Learning Outcomes set out by British Columbia’s Ministry of Education. I felt unsure about matching traditional ecological knowledge to the prescribed learning outcomes listed in the Science integrated resource packages as this science was coming mainly from a Western perspective and I wanted to be guided by First Nations’ ways of knowing, First Nations peoples and First Nations communities. However, I also I wanted to encourage and all teachers to use the curriculum. They have only a limited amount of time to actually implement the prescribed learning outcomes; materials that are not listed in the integrated resource packages are supplemental and may receive lower priority and attention.

I especially wanted to encourage science teachers at the high school level to bring traditional ecological knowledge into their classrooms. There are many reasons that teachers may not implement and/or integrate traditional ecological knowledge into science: (1) they are not First Nations so do not feel that they are qualified to do so; (2) they would like to, but do not know how to; and (3) they do not feel that traditional ecological knowledge is as valid or as academic as Western modern science. Even First Nations science teachers may not feel that they can bring in traditional ecological knowledge if it is not covered in the prescribed learning outcomes, or if their training is
specifically in Western modern science. At the high school level, curriculum is usually tied to specific learning materials, such as textbooks.

Because many community schools have mixed grade classes, these lessons were prepared for grades 5 through 12 so that as many students and teachers as possible could access and utilize this material. As well, many of the lessons can be taken on as projects involving all students in a school. This unit plan was designed in a modular form so that the classroom teacher could use the individual lessons as needed. The unit plan contains lessons, teacher information, and student worksheets (also referred to as blackline masters).

As noted previously, the Gitga’at Plant Project was designed and implemented by two teachers at the Hartley Bay School and myself. The first three lessons were taken from the “Traditional Plant Knowledge of the Tsimshian” unit plan (Thompson 2003) and used to form the basis of the Gitga’at Plant Project. I supplied the teachers with a copy of this curriculum along with other materials. From these materials, planning of the lessons in collaboration, and ongoing discussions, the Gitga’at Plant Project was designed.

Implementation

The implementation of the project began September 2003. Consistent with participant action research, the development process continued while the Gitga’at Plant Project was being implemented. The teachers and myself were constantly responding to student feedback, taking notice of what worked and what did not, in order to make their teaching more productive, informative, and relevant to the students. As the project progressed, changes were made along the way and lessons or assignments were developed.
as needed. For example, Cameron, Eva-Ann and I planned a lesson together involving role-play about the protocols of interviewing someone.

During the times when I was in Hartley Bay, I routinely met with the students both formally and informally. I was often there for class discussions, either as an observer or participant, and occasionally contributed to lessons that were being taught. Cameron and Eva-Ann did most of the implementation of the project with the students. With the production of a plant booklet (Appendix C), posters, and by speaking at community gatherings, students were actively involved in the dissemination of their newly learned skills, knowledge, and wisdom.

**Evaluation**

The evaluation of the project began as soon as it began being implemented. I received feedback from the students on an ongoing basis in the form of Feedback cards and from their field notebooks.

I met with the teacher/co-researchers, Cameron and Eva-Ann, everyday while I was in Hartley Bay and also kept in contact via telephone and electronic mail. The teacher/co-researchers provided me with written feedback in September 2003. I also received feedback in the form of the instructional rubric (which is explained in more detail later in this chapter under the section, *Data Analysis*; the rubric can be found in Appendix F) from Cameron and Eva-Ann.

The interviews of the plant informants, parents/guardians, and the rest of the school staff began after the students had completed their interviews. These interviews took place between January and June 2004. Once interviews were completed, I typed up
my written notes and sent copies, along with self-addressed stamped envelopes, to interviewees in order to get them to check for accuracy.

Throughout the whole process of development and implementation, I kept notes on my observations. In keeping with cultural protocol, and to show my genuine appreciation for their time and involvement, I gave gifts to all participants.

Participants

It is important to note that the majority of the people involved in the Gitga’at Plant Project, whether in its development, implementation, and/or evaluation, are members of the Gitga’at First Nation. The exceptions are the senior teacher, a non-First Nations educator, and myself, a First Nations educator of Tahltan descent. As noted, the two teachers involved in the development and implementation of the project (Cameron Hill and Eva-Ann Hill) are both members of the Gitga’at Nation and have lived in Hartley Bay for most of their lives.

When the original proposal was submitted to the principal of the Hartley Bay School, Cameron Hill agreed to have his class participate in the project. Originally, the senior teacher, Desiree Marshall-Peer, was also going to be involved as she taught science for Cameron’s class, and in exchange, he taught First Nations Studies for her class. When she left the school at the end of the 2002-2003 school year, it was decided that the primary teacher, Eva-Ann Hill, would become part of the research team. For the 2003-2004 school year, Eva-Ann was going to be working with Cameron’s grade nine class twice a week on research skills, getting them prepared to interview people in their community about the Gitga’at uses of plants.
In September, it was decided that the senior class (grades 10-12) would become part of the project and would be partnered up with the grade nine students. Cameron made the decision about who should be paired up with whom. Nineteen students in grades 9-12 were then involved with the project. While these students were involved in the project as researchers, they were also asked to take part in the evaluation of the project. At least one parent/guardian of each of the nineteen students was also asked to take part in the evaluation of the project, with 13 out of 14 agreeing to participate.

Later that month, during a meeting of the two classes and the three teacher-researchers, possible plant informants (interviewees) were listed on the classroom white board. Student partners were to try to interview at least three plant informants. The two Hartley Bay teachers and the students decided upon the possible plant informants the partners should contact to interview. Besides the two teachers directly involved with the project, all school staff that were involved at varying degrees with the project were asked to take part in the evaluation of the project.

Data Sources

I was able to gather a variety of data from six different sources: students, the researcher (myself), the teachers/co-researchers (Cameron and Eva-Ann), teachers, plant informants, and parents/guardians. Interviews, written feedback, student field notebooks, a rubric, and observations were the multiple ways in which data was collected for this study. Table 1 shows the ways in which data was collected from the different participants (the sources of data). The data collection techniques, such as interviews, feedback cards, instructional rubric, field notebooks, and observations, are described in detail:
Table 1. Data collection from different sources.

<table>
<thead>
<tr>
<th></th>
<th>Students</th>
<th>Researcher</th>
<th>Teachers/ co-researchers</th>
<th>Teachers</th>
<th>Plant Informants</th>
<th>Parents/ Guardians</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interviews</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Feedback cards</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Instructional rubric</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field notebooks</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Interviews:

Freeman defines an interview as (1998, 216) “a structured oral (or possibly written) exchange with someone. It aims to gather information”. I conducted interviews with students, parents/guardians, plant informants, and teachers from January to June 2004.

The interview questions varied somewhat depending upon who I was interviewing (see Appendix D); however, the majority of the questions were the same. I was unable to directly interview two teachers and one parent in person, so I supplied them with the questions and they returned their responses via electronic mail.

Feedback cards:

Freeman defines feedback cards as (1998, 206) “a fast way of collecting data from individual students” that are usually handed out after an activity or lesson for a limited amount of time. In this project, students were given sheets of paper with the questions at
the top with plenty of room for their responses. I used this form of data collection to get students’ impressions of lessons, field trips, and research experiences while they were taking part in the Gitga’at Plant Project. This was done approximately once a month, until January 2004.

The questions for each feedback card were based on what stage we were at in the project (see Appendix E). For instance, in November 2003, the students had completed their interviews and we wanted to get their feedback on what the experience was like while it was still fresh in their minds. In June 2003, questions were asked about the field trip we had gone on the previous day.

Student Field Notes:

Students were divided into pairs, usually from different grades, and were assigned a plant to research. Names of plants that were known to be important to the Gitga’at people were put on coloured index cards and the students “drew” their plant from the deck of cards. They were supplied with “Rite in the Rain” field notebooks to record their observations, class notes, interview questions and research notes. Students recorded information in their field notebooks from June 2003 to January 2004.

Instructional Rubric:

An instructional rubric is a tool used by educators to assist with teaching and as a way to evaluate student work (Andrade 2000). It is a short document outlining differing levels of quality from excellent to poor and has two features: a list of criteria that are essential for the project or assignment, and gradations of quality that describe the criteria (Andrade 2000). Rubrics can also be used to evaluate educational programs and curricula. I developed a rubric to evaluate the cultural components of First Nations and
Traditional Ecological Knowledge (traditional ecological knowledge) curricula. I came up with the criteria by examining many First Nations and traditional ecological knowledge curriculum packages and then articulating some of the principles that I felt needed to be part of culturally relevant curriculum. Because Cameron, Eva-Ann, and I worked together on the development and implementation of the curriculum, I asked them to evaluate the project and student learning using the rubric (see Appendix F), which they completed in June 2004.

**Observations:**

I kept a written account of my observations while working with students, going on field trips, taking a moccasin-making workshop with the students, at gatherings, informally while walking/running around village, and attending cultural events (Christmas community event 2002, 21 June 2003 opening of cultural centre, Halloween event 2003).

Cameron and Eva-Ann and I would meet often to discuss the progress of both the students and of the project. I wrote down any observations that they shared.

**Data Analysis**

Data analysis is the process of organizing all of the data collected to bring about meaning and understanding and to find a way to present what has been discovered to others (Bogdan and Biklen 1998). As Creswell has pointed out (1998, 142), “One enters with data of text or images (e.g., photographs, videotapes) and exits with an account or a narrative.” It is important to note, as Hubbard and Power (1993) point out, that data
collection and analysis are not two separate entities, to be carried out in isolation from each other. When collecting data, analysis can also begin as it allows the researcher to think about existing data and to come up with new ideas and strategies for collecting different data (Freeman 1998; Bogdan and Biklen 1998). As I collected data, especially in regards to the interviews and feedback cards, I was constantly thinking of new ways to collect data, such as different questions or different ways to ask the original questions, in an attempt to get the best and most relevant data.

As noted previously, data analysis for this study involved examining the interview transcripts from the four different groups of individuals (students, parents/guardians, plant informants, and teachers), the written feedback from students, student field notebooks, the instructional rubric, and researcher observations. Specifically, the data gathered were analyzed for themes using an analysis framework influenced by Creswell (1998). Sagor (1992) distinguishes two types of themes: items that come up numerous times, and unusual or peculiar items that are significant. Two questions arise from data analysis: “What are the important themes in this data?” and “How much data support each of these themes?” (Sagor 1992, 48).

The exact steps involved:

1. Reading through all data numerous times and making notes to get a sense of its meaning;

2. Coming up with a short list of themes by searching the data for patterns or regularities that represent specific concepts or major organizing ideas;

3. Expanding themes into categories and sub-categories as data is reviewed several times;
Three major themes were identified: Evaluation of the Gitga’at Project, Student Learning and Other Key Outcomes, and Transmission of Traditional Ecological Knowledge. I went through all of the data and highlighted all of the relevant sections in different colours that represented each of the themes, such as red for “Evaluation of the Gitga’at Project”, green for “Student Learning and Other Key Outcomes”, and blue for “Transmission of Traditional Ecological Knowledge” (Creswell 2003). I then transferred all of these colour-coded data into three tables.

**Considerations of Validity**

Validity has traditionally been used as a tool in quantitative research in order to “draw meaningful and useful inferences from scores on the instruments” (Creswell 2003). However, it can also be seen to be a strength of qualitative research when it is used to establish whether the results are accurate from the perspective of the individuals involved, such as the researcher or the participant, or the reader of such a study (Creswell 2003). Marshall and Rossman state that (1995, 143), “All research must respond to canons that stand as criteria against which the trustworthiness of the project can be evaluated.” The use of terms such as trustworthiness, authenticity, (Creswell and Miller 2000) and credibility (Creswell and Miller 2000; Lincoln and Guba 1985) are used in qualitative literature to “find qualitative equivalents that parallel traditional quantitative approaches to validity” (Creswell 1998, 197).

Creswell (2003) has outlined eight strategies to test the accuracy of findings, and has recommended that qualitative researchers use one or more of these strategies. The first strategy or technique that I used to establish the trustworthiness of my study was
triangulation (Hopkins 2002). In research, triangulation is defined as “including multiple sources of information or points of view on the phenomena or question you are investigating” (Freeman 1998, 96). Triangulation attempts to eliminate or minimize bias in order to strengthen and increase confidence in research findings (Freeman 1998; Glesne 1999). “On the matter of validity of observations...the case study provides a clear advantage over other methods of investigation. Although the case study must rely on a good deal of judgement, exercised by the observer, the great strength of this form of research is that it does permit the observer to assemble complementary and overlapping measures of the same phenomena” (Orum et al. 1991, 19). I have used two types of triangulation: data triangulation and methodological triangulation (Freeman 1998). Data triangulation involves using several sources of data. I interviewed students, parents/guardians, the plant informants, and the teachers involved. Methodological triangulation involves using multiple ways of collecting data. From the students, I collected feedback cards and examined their field notebooks. From the teachers/co-researchers, I received written feedback in the form of a feedback card and an instructional rubric. I also have my own observations as well as photographs and video of lessons, activities, and events. With the exception of two individuals, I interviewed everyone that was involved in the Gitga’at Plant Project.

While triangulation was the main technique I utilized to convey that my results were accurate, I also utilized other strategies outlined by Cresswell. Cresswell (2003, 196) has stated that qualitative researchers should use “rich, thick description to convey findings.” I attempted to do this by not only using the words of the participants, but by also describing the setting so that readers could get a sense of the experiences.
In Chapter Five, I included the “Limitations of the Study” which basically outlined the bias I felt I brought to this research project. Creswell states that (2003, 196), “This self-reflection creates an open and honest narrative that will resonate well with readers.”

Another important technique that I used to establish trustworthy or accurate results was by making many trips to Hartley Bay and spending a lot of time in the field. From May 2002 to June 2004, I travelled to Hartley Bay twelve times, with each trip lasting up to seven days. As well, in between visits, I kept in touch with the two teachers (Cameron Hill and Eva-Ann Hill) by telephone or electronic mail. By spending a prolonged time in the field, Creswell feels that (2003, 196), “the researcher develops an in-depth understanding of the phenomenon under study and can convey detail about the site and the people that lends credibility to the narrative account.”

Summary

Community action research within an Indigenous context was used in this study as the overarching methodology, with a case study approach as the more specific design. This overall methodology was used to investigate the effectiveness of a research project that was developed in the Gitga’at community of Hartley Bay to specifically assist students in learning knowledge about culturally relevant plants, and more generally, to make connections between students and Elders to perpetuate the intergenerational transmission of traditional ecological knowledge. The data results are outlined in the next chapter.
CHAPTER FOUR

Results

This chapter presents the results of the data analysis. It is divided into three sections, each section corresponds to one of the three overarching themes that emerged from the analysis. The three themes are: 1) Evaluation of The Gitga'at Plant Project, 2) Student Learning and Other Key Outcomes, and (3) Transmission of Traditional Ecological Knowledge.

Within each theme are more specific data categories and sub-categories. Quotations (in italics) from the interviews and selected written comments from feedback cards, and observations are used to illuminate the findings. Data from all four participant groups has been included. It must be acknowledged that there is some overlap and fluidity between themes and it is difficult at times to separate data.

Table 2, Data Analysis of the Gitga'at Plant Project, outlines the data themes, categories and sub-categories.
Table 2. Data Analysis of the Gitga’at Plant Project

<table>
<thead>
<tr>
<th>THEME 1: Evaluation of the Gitga’at Plant Project</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Category 1: Success</strong></td>
</tr>
<tr>
<td>Overall Experience</td>
</tr>
<tr>
<td>Adaptability</td>
</tr>
<tr>
<td>Protocol</td>
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<tr>
<td><strong>Category 2: Challenges and Improvements</strong></td>
</tr>
<tr>
<td>Involvement</td>
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<tr>
<td>Format and organization</td>
</tr>
<tr>
<td>Student motivation and preparation</td>
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<tr>
<td><strong>Category 3: Next Steps</strong></td>
</tr>
<tr>
<td>Building on the Gitga’at Plant Project</td>
</tr>
<tr>
<td>Future Topics of Study</td>
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Theme One: Evaluation of the Gitga’at Plant Project

A major focus of this study was student and adult evaluation of the Gitga’at Plant Project. The three categories that comprised this theme are: Success, Challenges and Improvements, and Next Steps.

Category 1: Success

Overall Experience

Overwhelmingly, all of the students spoke or wrote about how much they enjoyed the Gitga’at Plant Project. For example, one student commented, “Well, I think it’s pretty cool if you ask me and I hope we can do this again.... And well, I think this book will be cool and maybe our kids can look at this or these books and maybe they’ll get to do this experience too and they’ll have fun, lots of fun.” Another student wrote, “It was a lot of fun getting to know things about what they [Elders] know about yellow cedar.” A grade nine student stated, “This is such a great experience for me. I’m really enjoying this and since we’re doing blueberries, it’s all good. They’re so yummy too.... I just really like this whole plant project.” Her partner added, “If I didn’t go to these interviews I never would have known or learned about them [blueberries]. So it was great that we had the chance to do this.”

A First Nations teacher raised in Hartley Bay wrote, “A whole project done by First Nations for First Nations, what more could you want? A community like Hartley Bay where all of the plants are from and used by the people here, with input from the people that know and use the plants. The Gitga’at voice shines through our kids in the project.” Other teachers also wrote of their thoughts on the plant project: “Great project,
exciting to watch it unfold" and "I found it to be interesting, educational and culturally significant for the students ... some students seemed genuinely enthused and committed to the experience."

People in the community also voiced their thoughts and observations about the success of the Gitga’at Plant Project. One plant informant/Elder stated that the school should continue to do these types of projects and another plant informant/parent said that she felt that the project got the students more interested in learning about plants. Other parents spoke about how the plant project affected their children. One mother said that her child never got into anything at school but now seemed really interested in the plant project. Another parent noticed that her children were “into plants now.” Yet another parent wrote, “My son definitely tackles homework assignments in a different way; more methodical.” This same parent stated that, “I didn't realize that so many of them have a love of the outdoors.” Another parent said that she told her son that she wished that she had been able to work on such a project when she was going to school and that he was lucky.

One teacher noticed that more children were out picking berries this year than any other year and he attributed this to the plant project. Another teacher who has taught several generations of Gitga’at children stated, “I think that sometimes our students do not see a relationship to the things that they learn in school and their lives as First Nations youth. The Plant Project offered opportunities to exemplify this in a very concrete way.”
Adaptability

In terms of adapting this plant project to other First Nations communities, one teacher described how this could be done. From a teaching perspective, one of the teachers felt that the Gitga’at Plant Project fit nicely with the curriculum in that it was tied to the prescribed learning outcomes from different subject areas. He liked that the focus was on Hartley Bay; specific to Gitga’at uses and specific to Hartley Bay. Another teacher wrote, “All of the resources that were used and obtained can be adapted to any First Nations group.”

Protocol

An important aspect of the research was following the protocols of the community during both the development and implementation of the plant project. In regards to the development stage, this meant informing the Chief Councillor and Band Council, the Hereditary Chief, the School District, the School principal, as well as the teachers, parents, and students. The actual implementation of the plant project involved teaching the students about the protocols of the community as well as the protocols of interviewing people, especially Elders. A First Nations teacher felt that we were successful at doing this, “The protocols were all followed to a tee. I think all of our Elders were well informed and all protocols done, done well.” Another First Nations teacher stated, “Before and during the project the protocol was evident.” In regards to the implementation of the plant project, one of the school administrators felt that the students learned about cultural protocol and another felt that “the students...had to honour traditional protocol, to the protocol of the school culture.”
Involvement

While the development of the Gitga’at Plant Project largely involved two of the Harley Bay School teachers and myself, the actual implementation of the plant project attempted to inform and involve as many community members as possible.

One of the teachers wrote about her involvement, “My experience has been more of an organizational one, in arranging interviews, and making suggestions as to who might be willing to share their expertise.” Another teacher stated, “I think that the community, Elders, educators and learners worked together throughout this project.”

All parents rated the plant project positively. Several students either kept their parents informed about the project or involved them by asking for help or sharing knowledge and information with them. For example, one the senior students asked his mother who he could interview to find out information about his plant. A grade nine student told her mother which Elder she was going to interview about her plant. Another grade nine student asked her mother if she knew the uses for the plant that she was researching. One of the student’s parents was away working for part of the school year, but upon the return of that parent, the grade nine student told her mother all about it, as well as showing her the write-up. One of the grade nine students told her mother all about the plant she was researching and was therefore teaching her mom about her new knowledge.

Category 2: Challenges and Improvements

Although the project was seen to be very successful overall, there were a number of challenges encountered and there were several suggestions for improvements.
Involvement

While many teachers, students, and community members felt involved in the process, there were also instances where individuals did not feel a part of the project. As was stated before, there were two classes involved in this project: a grade nine class whose teacher was involved with all aspects of the project, and a senior class (grades 10-12) whose teacher was new to the community and new to the project. From interviewing the students and reading their feedback cards, it was evident that many of the students in the senior class did not feel as closely involved with the project because of who their teacher was. New and/or non-Aboriginal teachers may not feel competent or capable of implementing such a project or may not feel that they are part of such a project if coming in part way through the process. As this teacher wrote, “As a non-aboriginal person and newcomer to the community I feel unqualified to direct any cultural based curriculum. Perhaps after some length of time and experience, that would change.”

Format and Organization

Students and teachers came up with some suggestions on ways to improve on the actual organization of the project. When asked how to improve on the plant project, a few students said that they would have liked to conduct more interviews: “...asking more people so I can get more information” and “...have [the project] last a little longer so we could interview more than two to three people and get way more information.” However, one student wrote, “I hated it when we had to do interviews.”

One student suggested to “make it a school wide project and make it longer.”

Although clearly acknowledging the success of the project, many adults put forth ideas for improvement. One teacher felt that it would be more productive to do this
project over two springs, thereby focusing on a full annual cycle of plant growth. While most of the implementation of the plant project happened during the 2003-2004 school year, Nancy Turner and I first met with the students and teachers in regards to the plant project in May of 2002 upon which time the students chose their plants. Because of this span of time from when the project was being developed until its completion, another teacher felt that the plant project should have been done over a shorter period of time. She felt that if the project was done all at once, the students would not forget about the project or any knowledge they may have learned.

Student Motivation and Preparation

One teacher commented that she would like to see the students collect more plant samples and set up interviews on their own. In regards to not setting up their own interviews, she thought that this might be due to the students being nervous and shy about approaching some of their Elders and other adult community members. Many students confirmed this when they wrote about their interviewing experiences. It was suggested that part of the project should incorporate students working on their speaking skills to help them overcome their shyness or nervousness. A parent suggested that the students do presentations to their “moms and dads or grannies and grandpas. It will give them the opportunity to speak and share what they have learned.” She also said that it was a great way for the students to teach others what they have learned.

A teacher noted that while most of the students interviewed community members about their plant, they did not learn where to get it or how to prepare it. She thought that the students could go out with the person/s they interviewed to gather samples and to learn how to prepare the plant for use. An Elder suggested that the students should do
their research while they are actually working with plants and another thought that it would be good to actually take the students out and show them where the plants can be found.

Another suggestion was to have a template for the students; a form in which they could have their questions written down and space to record the responses. Many of the students stated that they had a difficult time recording what their Elders were teaching them: "The only thing I didn't like is the writing, writing so fast trying to keep up with our Elders." Many felt that it would have been helpful to tape-record the interviews. One student said that if they used a tape recorder, they would be able to "get all the words down." She said that the Elders talked too fast but that her and her partner did not want to ask them to slow down or repeat what they had said because they felt that would be rude.

While the school was provided with a plant press and plant identification books, one of the teachers suggested that "care packs" would also be useful. She felt that it could include such things as pressed plant samples, samples of plants in glass, pictures of plants during different phases of their growth and development, and pictures of what the plants looks like when being harvested and prepared.

A parent thought that if all of the students were more aware and exposed to other projects by other students that it might give them more motivation to do well with their own research.
Category 3: Next Steps

So many community members spoke about the wish to expand on this project, whether that meant including more students in the process, or repeating the project, but studying other areas of TEK. This clearly indicates the importance that the community places on their TEK and on having it transmitted to the younger generations.

Building on the Gitga’at Plant Project

Many participants were enthusiastic about continuing and expanding the implementation of the project. Three of the parents really liked the “Gitga’at Seasonal Harvest Round” poster that Nancy Turner gave out to community members in December of 2003 which highlighted the foods that are harvested by the Gitga’at people throughout the different times of the year. One parent said that her daughter was asking questions about the poster and was impressed with it. This mother suggested that we do a poster about the plants that the students were studying.

An idea to build on the plant project came from one of the grade nine students: “Let our little brothers and sisters do this and see if they’re any good at this.” After this student suggested this, I asked other students what they thought of this idea. Most of the high school students thought that the younger students would do well and were willing to help them out. One student wrote, “I think the younger students would enjoy doing the plant project. I would help them. I would help them with their interviews.” Another stated, “I think that it would be cool for the younger classes to do what we are doing and it would be good experience for when they get older.” One of the parents said that her older children were telling their younger brother about what they learned and thought that involving younger students was a good idea. She worried that the younger kids are
interested now but won’t be interested by the time they get to high school. She felt that starting at a younger age is better; that what they learn will stay with them. She felt that students in grades four to seven still want to learn. A student echoed her feelings: “I think it would be a great thing for people to learn at a young age.”

A teacher suggested that one class could focus on spring plants and another on fall plants. She also thought that the plant project could be broken into seasons.

What came up over and over again from adults (educators, plant informants, parents) was the need for students to actually do the hands-on harvesting of plants, the preserving of plants and the processing of plants. As one Elder put it, “They have to learn how to prepare and preserve food.” One Elder thinks felt that it was a good idea to teach the students about plants, but he also felt that they need to show them; they all need to go out and get the plant. He thought the students should ask the Elders about one plant and the Elders should tell them what plant to get as many Elders cannot go out with them to look at and gather plants anymore.

One plant informant thought that students should learn about food preparation and medicines. Three Elders spoke about how crucial it is for children to learn the difference between poisonous and non-poisonous plants.

One suggestion was for the students to follow-up on their initial learnings; this Elder feels that they need to “go out and see the plants,” harvest the plants and prepare them. She said that they needed to be focused and not to have any distractions. She added that students should “go and get it and give it to someone” referring specifically to Elders or people in need of the plant.
Future Topics of Study

Many different topics were suggested for future research projects and learning experiences. A very popular one was to study the sea, with five students wanting to learn about this further. As a grade nine student wrote, "If we were to do another project like this, I think I would like to do the sea because I am a Native and I don’t know anything about the sea, so I would like to." One of the teachers talked about learning about the different types of kelp, seaweed and other marine life. One of the parents put it eloquently when he said that, "the ocean floor is like another forest."

Six students wanted to learn about animals: "I would like to learn about our native animals, birds, sea animals, creatures." Three students were interested in learning more about plants: "I would like to learn more about different kinds of medicines that First Nations people use."

Three wrote about learning more about their people, their Elders, and their culture. "I would like to learn about the old days" and "I would like to learn about the old people’s culture." Many plant informants and parents felt that children needed to learn about their culture and learn about who they are related to. Two Elders felt that it was important to be "finding out families and straightening out clans." One parent thought that genealogy would be important for the students to learn, and another parent said, "They should learn Indian names and how they come to get names, and what houses they belong to" as well as how will the names be carried on. Another parent would like to see more Indian dancing in Hartley Bay. While it is being done in the school, she thinks that there are not enough Elders involved. She’d like to get the culture back through Indian dancing.
Lastly, one student stated, "I would like to learn about other villages" in regards to other First Nations people, their communities, and their culture.

One of the teachers would also like to see the students learning how to use different media such as digital photography, digital video, and how to use computer programs such as iMovie.

Another focus that one of the teachers talked about was the idea of place; that is to study the plants of places important to the Gitga’at such as Kiel and Old Town. A few plant informants talked about taking children to places such as Old Town and Kiel for extended periods of time. One plant informant said that while students usually go to Old Town for one day, he felt that they needed to go longer than just a day trip. As well, he suggested sending only four or five students at a time for a few days over a month. He talked about a trip a few years ago in which he took a punt load of children to Old Town to “tell them what’s what.” He thought that it would be better if there were fewer children. Another plant informant/Elder said that she wouldn’t mind having kids around when preparing fish at Old Town or at Kiel. She thinks that it is a good idea to just work with a small group, such as three girls and three boys.

One of the teachers thought that the students should learn how to weave, and since they have good weavers in Hartley Bay, he felt that they would not have to bring in outsiders to teach this practice.

A plant informant/educator felt that the project should be ongoing. While this group’s focus was on plants, he felt that another group of students could study and work, for example, on salmon. He thought that children could continue to learn from Elders using the format of this project to learn about other traditional ecological knowledge.
Another teacher echoed this sentiment: "This project could be the beginning of documenting much more of our traditional knowledge of nature." Many students said that they liked learning from the Elders, but because they were too shy to approach them on their own, they liked that it was part of a school project.

It was also suggested by a plant informant that students should have a knowledge of weather and that they should learn about the link between animals and food preparation. An Elder said that students should learn about the tides, be able to recognize animal signs, know the names of islands, rivers, and camps and should also know why their people went to camps.

One of the teachers suggested that the students share their knowledge with others: "The sharing of information with other Aboriginal communities and cultures would be a fascinating experience for the students. For instance, the interaction with other youths from the interior."

A parent felt that more communication and interaction between Elders and school children is needed and that a way to solve this is to have an Elders evening.

Two plant informants talked about the need for a bunkhouse or a community building at Kiel so that students could stay there for extended periods of time to learn from their Elders and other community members. One Elder would like to see children doing more of the following: "...going out on boats, fishing for halibut, picking seaweed, knowing what kind to harvest and camping out."

Model for Other School Programs

Promotion of the project and its presentation to other communities was seen to be important: "It will be great to see others using what we have done and asking questions,"
even refining what we have done, just to use it as a stepping stone for their own language and culture.” He felt that by making presentations at First Nations Annual General Assemblies, at the First Nations Education and Steering Committee and BC Ministry of Education’s Annual Provincial Conference on Aboriginal Education, and by letting organizations such as the First Nations School Association know about the project, that many educators would be made aware of the project.

**Theme Two: Student Learning and Other Key Outcomes**

This theme is focused on the students’ experiences relating to their taking part in the plant project. The two categories that comprised this theme are: What Students Learned and Other Key Outcomes.

**Category 1: What Students Learned**

**Knowledge**

All 19 students were able to describe in specific detail the new knowledge and understandings gained while participating in the Gitga’at Plant Project. Importantly, they learned more than facts and characteristics of the plants they studied; they were able to contextualize this knowledge in relation to the large ecosystem and community. A grade nine student wrote, “I learned stuff on salal berries. Like making jam and how they used the leaves for when they were drying seaweed. They would put the leaves in the middle so it wouldn’t stick together.” Another student reported what she and her partner learned: “We learned that you could make string with yellow cedar but you can’t use it for warp (or something like that) but you can’t rub your eyes after touching it. You have
to wash your hands after touching it. And you could make a rectangular shelter you just take a piece of yellow cedar in a rectangular shape lay it on the ground and get more pieces and sticks and if its raining you can put the yellow cedar the slippery way. So it will just drain off.” One student did not realize that the plant she researched with her partner had more than one use: “I found it interesting that there were more than one way that it could be used.” Another student stated, “We learned how to do different sorts of things with our plants. So this was very helpful.” In regards to a food plant, a student wrote, “Some things we found out about blueberries were so amazing. I never ever knew they could be used as a medicine.”

Many students wrote about the plant knowledge and wisdom that was specific to their people and tied to their land. From one grade nine student: “I learned that a lot of people like to eat salmonberries with oolichan grease and sugar or milk and sugar. Salmonberries grow last at Old Town up in the valleys. I also learned that you can eat the sprouts (of). People really enjoy salmonberry jam at feasts. They never used to use freezers to preserve salmonberries, they would make jam. Salmonberries can stay in the valleys of Old Town until middle of November. Bears and birds really enjoy eating Salmonberries.” Another student described the importance of the plant she researched to her people: “I learned that yew wood is just not a plant, it is very important to us First Nations, it is used for cancer, and some people in Hartley Bay have to drink it, it’s used for any kind of cancer.” A grade nine student wrote about why taking part in the Gitga’at Plant Project was important to students in Hartley Bay: “But doing this experience is really fun, getting to know what is important to our relatives and what relatives have to use it, it’s very interesting.”
While students specifically talked about the knowledge they learned about their specific plants, many also mentioned how they learned about other plants. A senior student said, "It is nice that we are learning about different plants because I learned that you could use other plants as medicine and other different things." Another student stated, "Oh yes, we learned about a lot of other plants from two of our interviewees. The information was interesting to know, it really tickled my toes. We found out lots of information."

Language was an important aspect of the Gitga’at Plant Project as the students learned the Sm’algyax names for the plants they researched, with many acknowledging this: "We learned the Sm’algyax name ‘smmaay’ which means oval-leaf blueberry, if I can remember correctly." Another student wrote, "I learned the Sm’algyax name for devil’s club." Two sets of partners identified several Sm’algyax names for their plant at various stages of growth and development. For example, one set of partners identified the Sm’algyax names for the actual salmonberry plant as well as the names for the berries when they are both yellow and red. A teacher wrote, "Even though I don’t think many of us feel we know much about our language, I feel we do and this project brought it out. We know our language more than we think."

A grade nine student talked about how they learned how to preserve food from their school principal, a hereditary chief: "Mr. Hill told us how to keep food over spring and summer, for winter. You put your food into a bentwood box and bury it under the mud to keep it nice and cool."

One of the teachers who took the students on field outings to collect local plant samples noticed a difference in students’ plant knowledge. She said that the students
now knew where most of their plants could be found, whereas “...before some of the students could not even identify the plant, let alone find it and tell of its uses.” Another teacher felt that the students learned about plants from a First Nations perspective; while the student partners focused on one individual plant, the students also learned about other plants. He felt that the students got a sense of real knowledge for the environment in which they live in. He also noticed that one of his grade nine students was really keen, not only in regards to his plant, but with everyone else’s as well. Another teacher wrote that the most important thing that the students learned was “that traditional values and knowledge can exist side by side with ‘modern’ science, and that the values and knowledge of the past has a dominant place still today.” Another teacher felt that practical and cultural knowledge was gained.

Besides learning about plants, one student wrote how one Elder talked to him about his family: “I learned about my family. She told me who I was related to.”

Research Skills

It was primarily adult participants who described the actual skills that the students learned. These included field research, text research, information integration, and interviewing skills. One teacher stated: “The students' experience with the plant project has been positive on so many levels, from the standpoint of doing research, of sharing knowledge, of marrying the practical experience of fieldwork, to the 'book learning.' They learned to meet deadlines, to write reports, and to express what they were learning in a variety of ways of reporting.” Another teacher observed that the students acquired new research skills and learned how to tap primary sources. A parent also noted, “I think
the students had fun while gaining new skills. Interviewing skills, researching skills, how to record scientific data.”

The interviewing part of the project was substantial, and was a key aspect of the experience. Many adult participants commented that this was a valuable skill and a good experience for the students. Some students described how they were hesitant at first to set up interviews, but once they did, found it to be a good experience. “I had no problems setting up all three interviews; they were great. It was easy actually and here I was being really nervous and shy but my partner helped me out and phoned an interviewee yesterday. She set it all up and we were on our way. Actually going out and interviewing people was easy, I seriously thought it would’ve been hard.” Her partner added, “At first I thought I was going to be very nervous going to interview people, but it was alright.” Another student noted, “[My partner] and me did take forever to get an interview, but once we got one done I wanted to do another one, but yeah, it wasn’t hard to set up an interview, it’s just a phone call away.” One of the senior students noted, “Interviewing people as a primary source was invaluable. First hand knowledge was an asset,” with another writing: “Interviewing people is a good way to gather information. Working with a partner was a good way to gather information. My partner and I shared the preparation and questioning.” A plant informant/Elder said that the students that interviewed her were not shy and they really listened to what she had to say.

While the students commented on their interviewing experience in a general way, plant informants talked about how the students performed. When being interviewed by the students, one plant informant said that one student asked the questions while the other student wrote down information, with each one playing a different role. Another plant
informant talked about how the student asked him good questions. He noted that the student knew how to take notes and would read back what she had written to him to make sure she had it right.

Roles

All but one of the students had a partner. Overall, this was seen to be a positive aspect of the project as the students appreciated having a partner when interviewing plant informants. The students wrote about the roles they took in the interviewing process. "It was very helpful working with [name] as my partner. It was fun. But she was supposed to ask the questions and I write but I did both, but it was very helpful because she made up questions." Another student stated, "It is easy working with a partner because I don't always have to write while the person is talking." A grade nine student indicated how important it was to have partner: "It was really useful having [my partner] as a partner. I don't think I could have asked questions and wrote down things by myself."

One student wrote about how she and her partner worked through challenges in regards to their roles and their own personal relationship: "I kinda had a little problem setting up an interview because I couldn't find my partner, or she was sick and we weren't talking to each other for a while." This student went on to say, "Both me and my partner wrote down notes and asked questions because we both had a different plant to work on."

While some students had specific roles, such as one asking the questions and one recording the information, other students often shared the same roles. "It was kind of helpful working with a partner. We both were writing down stuff in case we missed anything." Another student noted, "Well, [my partner] wrote the stuff down and I asked
the questions so there was nothing wrong either. Oh yeah, me or [my partner] never wanted to take the notes because they talk so fast and [my partner] thought I was fast at taking notes but I’m not and [my partner] is really good at doing it so I ask the questions and [my partner] takes the notes so there is no problem with me and [my partner] being partners.”

In some instances, individual students carried more of the responsibility or load when it came to both setting up the interviews and carrying through on them. “Doing the interviews was pretty cool but my partner only helped me on the last two interviews. I done our first two on my own so yeah, he kind of helped by asking the questions and/or writing down.”

One student wrote about the roles he and his partner took on: “By asking the questions to them and writing down some information. He helped generate the questions.” Two students discussed some of the difficulties of interviewing as well as some of the rewards. “Taking down notes was hard cause I had to write down really fast. Asking questions was kind of easy but it would have been easier if we had the question made on paper already. Working with a partner made it a whole lot easier ‘cause I would write down and he would ask questions and then the next one I would ask the question and we would write down notes on to the paper. And on one interview it was really fun ‘cause me and my partner got a jar of jam each to keep for ourselves. It was thimbleberry jam and it was real good too.”
Category 2: Other Key Outcomes

In addition to the knowledge and skills gained as part of the Gitga’at Plant Project, there was growth and change noted in a number of other areas. These included Pride, Confidence, and Respect.

Pride

When the students were showing their teacher the work they had done, he could see the pride they had in their work. Another teacher wrote, "I saw growth in the students. They were shy at first to go out and do the interviews, but they did it, and they seemed to have pride in the results that began to appear." One of the Elders said that many of the students were showing interest in their people’s knowledge as well as pride in who they are.

Confidence

While one of the teachers noticed that the students in general were more confident after their participation in the plant project, he specifically noticed that three of the students were showing more confidence in what they know.

Respect for Others

One parent felt that by being involved in this project, students would learn respect for their Elders. One of the educators noticed students showed more respect for Elders after the interviews. One of the teachers noticed this respect for Elders as well as a respect for their knowledge of plants. One of the plant informants was interviewed by two groups of students and also observed another interview between a student and an Elder. In regards to asking questions, he thought that the students seemed to have respect
for what knowledge the informants had. Two plant informants stated that the students that interviewed them were very respectful.

Two of the teachers noticed that not only were the students impressed by the knowledge that their people had about plants but by who had this knowledge. Many students were not aware that their people were so knowledgeable about plants. After going on a field trip with ethnobotanist Nancy Turner and myself, one of the students wrote, "I remember going up the lake and learning about other plants and trees. It was pretty fun because I don't think anybody else in the village would know a lot about plants." This opinion quickly changed after the interviews with their Elders. I also recall one of the students coming to school the next morning after interviewing an Elder the previous evening. Her eyes were bright and she excitedly said, "I never knew that yew wood was so important!" From this interview experience, her teacher has noted that she has built a relationship with this Elder that was not there previously.

One plant informant/Elder talked extensively about her interview experience with two students. She said that at first she was annoyed when the students showed up at her home, since she was busy baking bread. She said that they were "gentlemen" and "seemed interested." "I kind of hesitated. They told me it was a school project. They asked all kinds of questions. They were shy at the beginning." This Elder said that they act differently towards her now, not so "standoffish." She said that they usually never talked to her when they saw her around the community, but that "now it's different."

Respect from Others

While the above-mentioned Elder spoke of the respect that she received from the two students, she in turn talked about how she wanted to show them respect. When she
realized that they were serious, she stopped what she was doing and focused all of her attention on them. "To show respect, I stopped what I was doing [baking bread]. They took turns asking questions. It was just the three of us, no VHF [very high frequency marine radio].... I was glad no one interrupted. I didn't want to be rude to the boys. They kept thanking me before they left."

Interaction with the Older Generation

Students often talked about the knowledge that their people have and how they enjoyed their time interviewing the plant informants. For example, one student stated, "We found out a lot of information from the people we saw." One student mentioned, "But doing this experience was really fun, getting to know what is important to our relatives and what relatives have to use it, it's very interesting." Another student wrote: "We stayed for quite a bit with the people we interviewed."

People that were interviewed by the students felt that this project provided a valuable way for children and adults to interact. A teacher suggested that there should be more sharing and discussion among students and adults. It was also suggested that this process should be documented by taking pictures of the two groups interacting. One plant informant thought that this was helping to bridge the gap between students and adults and Elders and that it would help students to start conversing with adults and Elders. She also felt that it showed students that adults and Elders know something and that it was a good way for students to interact with adults and Elders.

Some students were sharing what they learned from the interviews with their parents or were asking their parents if they knew anything about their plant, thereby making a connection with their parents.
One of the teachers wrote, "I am sure this will be passed on generation to
generation. I think the learning will take place on an ongoing basis." He also felt that
the plant project was good for the community as a whole since younger and older
generations were working together.

One teacher observed that, "...it helped the younger generation interact with the
older generation and learn more about their culture, which they do not do on their own
time or inclination."

While the principal felt that it was great to have the knowledge recorded in print,
he felt that even more important was the interviews with the Elders and learning from the
Elders. As a plant informant himself, he had a good experience with the students that
interviewed him as he said that they had a lot of laughs. Other plant informants also
spoke about how they enjoyed this experience with the students. One of the Elders said
that she enjoyed talking with the students and telling them what she knew about certain
plants.

A plant informant who was interviewed by two sets of students observed
differences between the two. She thought that the boys were more interested during the
actual interview. However, the girls wanted to learn about getting cedar bark, splitting it
and preserving it. They showed an interest in actually learning and doing. She told the
girls that she would "take them out and teach them."

For this project, one of the main goals was for students to learn TEK from their
Elders. While they learned interviewing skills, there were two instances in which the
plant informant/Elder started talking without being asked specific questions and having
the students listening, thereby teaching in a way that they may have been taught by their
Elders. One of the students wrote, "We didn't have to ask any questions. [She] just started talking about it." During another interview, two of the students were given a lesson on how an Elder wanted them to learn the knowledge she was teaching them. The Elder told the two students a story and then she asked one of the students to tell it back to her. When I interviewed her, she said that she wanted to see how much he remembered by just listening to her. When the students returned from this interview, the other student related how his partner started to write down what the Elder was telling him about the plant, and that she told him to stop writing, put the pen down, and just listen.

One of the parents wrote, "Up to now, I don't know of any other reason the students would have had those types of interaction with the Elders, so yes I do think the project has served well."

**Theme Three: Transmission of Traditional Ecological Knowledge**

Transmission of TEK was a critical focus of this research study. From the data, two categories emerged that relate to this theme: Impediments to transmission of traditional ecological knowledge and Ways to support the transmission of traditional ecological knowledge. This theme involves an abstract concept, which was rather difficult to tap in the students. Most of the data came from adult participants.

**Category 1: Impediments to the Transmission of Traditional Ecological Knowledge**

**Student Interest**

Adults were asked why children aren't learning from their Elders. Many adults said that times have changed and that kids are not interested. In regards to having
students learning from their Elders, one plant informant said, "Youth are egocentric. By bridging this gap, it lets students know that they have a rich culture and that there is so much knowledge." Another plant informant said, "Students usually won't ask. On a normal basis, students won't ask Elders about plants and the uses for them and other TEK. Students usually don't talk to Elders."

One Elder thought that it was important for the young people to come around and interact more with those who know about plants. Several plant informant/Elders felt that because children took part in so many activities, such as playing basketball, spending time at the gym, playing videogames, using computers and watching television, that they did not have time to spend with Elders.

One parent wondered whether children weren't learning from their Elders because they thought of Elders as "grumpy" old people.

One Elder felt that children weren't learning about the old ways because "some kids don't want to know." However, she also blamed the older generation for not teaching the younger generation their language. A parent also thought that both the younger and older generations were at fault. She felt that they are not interested and the older people have never taken the time to teach them.

Another plant informant/Elder said that, when she was young, her generation had nothing else to do and so if her mother was doing something, she was right there, watching her. She said, "these kids don't really watch" in the same way. She feels that the parents should teach them, but she said that, "even if you tell them, they're different."

One of the parents talked about when she was a young girl and about how she was so young and crazy and didn't have time to listen. She also talked about how the present
day Elders wish they had learned more from their Elders. One parent said that it is her generation that is not learning the old ways, but she was not sure why.

One reason a parent gave is that he thinks his kids don’t think they need to learn about the harvesting and processing of plants because “their dad knows it.”

**Family/Community**

While many adults said it was the fault of students for not learning from their Elders, many adults blamed themselves. One Elder said that it is their [the Elders’] own fault because they are not taking the young people out and showing them how to prepare food. Another Elder said, “*We should teach them at home but we don’t.*” She said that they [the Elders] were taught by their parents and grandparents about plants: “*What it is and what it’s used for.*” She said that they [the Elders] don’t use most of the plants anymore and that she has told kids that nowadays they are not taught to do anything. In regards to the younger generation not learning the language, this Elder stated, “*It’s our fault.*” Another parent talked about learning by watching and observing what her mother did and feels that all of this seems lost with children today. She thinks that parents and others do too much work for them.

Another reason given was that fewer families are spending time at Kiel, the spring seaweed/halibut camp.

**Suppression of Sm’algyax Language**

One Elder identified language decline as an important underlying factor in knowledge loss. She talked about how everyone spoke Sm’algyax in Hartley Bay over 50 years ago. In the 1940s and 1950s, she remembered how the teachers would say that the students were not going to get anywhere and would not do well academically unless
they spoke English. This Elder spoke about the gradual shame that came about due to the promotion of the English language over their language and how, with the suppression of their language, it didn’t take long before fewer individuals were speaking Sm’algyax. Presently, the Sm’algyax language is being taught in the school but is not widely used at home.

Category 2: Ways to Support the Transmission of Traditional Ecological Knowledge

A number of statements were made relating to behaviours and conditions that would support the transmission of TEK. These included: more interactions with Elders, extending the project to all grades and subjects, and role models.

More Interaction with Elders

So many of the Elders spoke of their desire to teach the young children, especially since they could now see that so many were seriously interested and wanted to learn from their Elders. Overwhelmingly, adults stated that the way to support the transmission of TEK was to have the children learning from their Elders. One Elder/plant informant said that they don’t usually hear about what the students are learning in school, and he would like the children to show the Elders what they’ve learned and provide feedback. He thought the Elders’ tea held on June 9, 2004 was a good idea and a step in the right direction. As was mentioned earlier in Theme 1, a parent suggested that students give presentations to family members on what they have learned in order to give them public speaking experience as well as the opportunity to teach others what they know. Another Elder/plant informant talked about the importance of hands-on learning as opposed to “book” learning: “You don’t learn from reading it in books; you have to do it.” A parent
suggested that the Elders should go into the school. Another Elder said that he is willing to work with the children and that they should be out doing stuff and asking him questions, thereby having their “classroom” outdoors much of the time. In regards to gathering foods, one of the Elders talked about the importance of doing these activities with young people and teaching them about their people’s TEK: “To be with the children, that’s the main thing.” One of the parents wants more for her grandchildren. “It is slipping away” and she wants to know “how can we get it back.” She thinks that young students should spend time with Elders at the Elders Centre. She felt that they could integrate a 2-hour session on the weekend (e.g. with the nursery class), so that the Elders could sing songs with the children and tell stories. If it starts at a young age, she feels that they will learn to respect Elders. This parent also feels that students have to work more with Elders, and said, “Young people will respect Elders, which will lead to Elders respecting the kids.”

One of the plant informants said that most Elders cannot get berries for themselves and suggested that students should get them for the Elders. She will often pick enough berries for Elders so that they can make jam. She told the students, “Pay it forward; do something big for somebody.” She told the students about her grandmothers and told them that Elders are the best teachers. She told the students that they need to listen to the Elders.

One suggestion that an Elder had was that after interactions and learning experiences with Elders, she thinks that it would be good if they could all get together and see what they learned. She feels that it is a good idea to praise them for the work they are doing and the work they’ve done.
One of the parents feels that adults and young people need to work more closely with Elders, since, "They are all are slowly dying and they are taking their knowledge with them."

Extending Project

As was mentioned in Theme 1, Category 3, there were many suggestions from both students and adults in terms of ways to improve upon and build on the plant project (as discussed in that theme and category).

Role Models

One of the plant informants talked about growing up in Hartley Bay and how he had many positive role models. They taught him the importance of working and helping out Elders. If they worked for certain Elders, they could either get paid or they could go into the Elder’s home for tea and stories. He would go hunting with an older individual who taught him to share by giving out deer when they got back to town. This person taught him how to survive and how to treat people and would tell young people to "Go help those Elders". From this experience, this plant informant is now trying to be a positive role model for young boys in the community.

One of the plant informants talked about how one of the teachers is doing the same thing for young people. He said that the teacher will get students to help him on the weekend, such as fishing and gathering cockles, but that what is really happening is that he is teaching them valuable skills. I witnessed this on a day trip that included fishing for halibut and harvesting seaweed. The teacher not only taught the four boys about fishing and harvesting seaweed, but he also modelled a work ethic that they all copied. At the end of the day, I and the other teachers who went on the outing witnessed the pride that
the students had when they left with the foods that they had gathered and that they were going to share with their families. When talking with several of the plant informants/Elders, they talked about how Elders also did this with them as well, with Lucille Clifton, mother of Chief Johnny Clifton, being mentioned by many female Elders.

There are other opportunities in Hartley Bay that are allowing students to interact with their Elders and learn from them. When the school has feasts, students assist community members with the preparation of food, thereby spending time with Elders either at the school or in their homes and learning from them, which is a valuable learning experience.

As noted previously, one of the parents thought that young students should spend time with Elders at the Elders Centre. They could integrate a 2-hour session on the weekend, for example, with the nursery class. The Elders could sing songs with the children and could tell stories. If it starts at a young age, "...they will learn to respect Elders."

Summary

Overall, the Gitga’at Plant Project was considered to be a great success. Students, teachers, parents, Elders, and other adults were enthusiastic in the praise for the project. A number of key elements were identified as being important, with the most important one being youth learning from their Elders. As well, students gained knowledge and research skills. In addition, they showed pride in who they were, they became more confident in their knowledge, and they not only showed respect for their Elders, but also gained respect from their Elders. Challenges were also identified, along with many
concrete suggestions for expansion of and improvement to the project. The next and final chapter discusses the meaning and implications of these findings.
CHAPTER FIVE
Discussion and Summary

In this chapter I discuss the results of the study, beginning with a summary of the major findings reported in Chapter Four. I have organized the summary according to the four research questions outlined at the beginning of the study, and the findings are discussed within the context of relevant discourse. In the second part of the chapter I address the limitations of the study and the broader implications; how it can be applied in both theoretical and practical terms. The last part of this chapter outlines directions for future research. Some of my own observations and reflections are also presented.

Discussion of Findings

In this section, I discuss the results in terms of my research questions, which can be found in Chapter One.

Question 1
*What have been the experiences of those involved with the plant project?*

Overall, the experiences have been very positive. The students, in particular, wrote and spoke about how much they enjoyed learning from their Elders and learning about the Gitga'at uses of plants. Many students shared this knowledge with family, with parents seeing positive changes in their children. The teachers had varying degrees of involvement in the project and all of them spoke or wrote about how culturally significant the project was. Many adults saw changes in the children’s self-esteem, their pride in themselves and their people, and confidence in their new knowledge and wisdom. Most of the Elders were very impressed with the way that the students behaved and with the
respect that they showed to them, with many expressing a desire to spend more time with students teaching them about their TEK. Cameron Hill and Eva-Ann Hill stated how it was the responsibility of teachers to “bridge the gap between generations” and it is apparent that the Gitga’at Plant Project provided a wonderful opportunity for children to connect with their Elders. Smith states that (1999, 148), “connectedness positions individuals in sets of relationships with other people and with the environment”. One of the goals of the Gitga’at Plant Project was to facilitate and strengthen the connection of First Nations youth to their land and culture through their Elders as a means of improving their self-identity, cultural pride, self-esteem, and ultimately their health and well-being.

As Smith states (1999, 149), “Connecting is related to issues of identity and place, to spiritual relationships and community wellbeing.”

The project also gave youth the opportunity to communicate with their parents about schoolwork, as several either shared their knowledge with the parents or asked for assistance. Torres (1998) has noted that parents often think that their children do not need them as much as they enter high school, and it is at this very time in their development that youth start to feel less connected to their school, their family, and their community. Parents may also feel disconnected from their children and the school at the very time when these students need their family involved in their education and when they need to see themselves and their community reflected in the curriculum. As Torres states (1998, 60), “It is an age at which young people’s connections to families, communities, and schools need to be strengthened rather than strained,” and the present findings underscore this as being important.
Question 2

*What specifically did the students learn and/or experience?*

Students were able to articulate clearly what they learned in terms of knowledge and skills. They learned the Sm'algyax names, characteristics, medicinal, material and food uses, as well as the cultural significance of the plants, and were able to explain these to their classmates and community members. With regard to skills, they learned about cultural protocol in regards to interviewing Elders, as well as other research skills. The adults were able to identify additional gains, such as pride and respect, and self-confidence. Students also were actively involved in constructing their own knowledge as well as becoming “researchers” of their own community and culture (Curry and Bloome 1998; Mercado 1998; Solomon 1998; Yeager et al. 1998).

The Gitga’at Plant Project included learning experiences that validated the students’ culture, their community, and their people as sources of knowledge. It demystified knowledge by giving students the opportunity to be researchers and thereby making knowledge accessible, it emphasized the importance of their Sm'algyax language, and helped to redefine the relationships between students, teachers, parents, and community members, as well as the school and the community in general (Egan-Robertson 1998).

In their role as researchers, the students shared their knowledge with the community in an oral form (presentations at community events) and written form (posters, booklet). This has a lot in common with the “Sharing” project outlined by Smith (1999), which is about First Nations researchers sharing information and knowledge that they are discovering with the community throughout the project. “For
indigenous researchers sharing is about demystifying knowledge and information and speaking in plain terms to the community” (Smith 1999, 161). This happened several times during the Gitga’at Plant Project in which the teachers, the students, and I shared with the community what the project was about, why it was important, and the knowledge that the students were learning. As Smith has stated (1999, 161), “Oral presentations conform to cultural protocols and expectations.”

**Question 3**

*Was the Gitga’at Plant Project an effective way for students to be learning about plants and other traditional ecological knowledge from their Elders?*

From the overall positive responses from all involved, to the tangibles that were produced by the students (booklet) or from the students’ work (posters), and the relationships between generations that were strengthened, it appears that the project was effective. In this study, the “effectiveness” was gauged by the feedback from the participants. The comments from both students and adults alike were a good indication of their interest and accomplishments. Recognition by adults and Elders of significant learning and of more pride and respect was also very important. Besides the Elders involved with this project, Elders from other First Nations communities have talked about the need to use the school system as well as modern technologies and contemporary approaches in order for Aboriginal youth to learn from their people about their ways of knowing (Robert Quock, Tahltan Elder, personal communication to J. C. Thompson 2000; Annie Ned cited in Cruikshank 1990). As Medicine (2001) has stated, educators can work with Elders in order to, in the words of Cameron and Eva-Ann Hill, “bridge the
gap between generations" so that First Nations children can learn about their people’s traditional ways of knowing within a contemporary setting.

**Question 4**

*What other ways or methods can be used to enhance the transmission of knowledge between generations?*

All involved with the project came up with ideas about how the Gitga’at Plant Project could be expanded upon or changed. Ideas such as including the whole school in such a project and the concept of role modelling, whether by Elders, adult community members, or older students, would be an important step toward community commitment and involvement. As well, expanding the classroom to the outdoors was raised as a way to enhance the intergenerational transmission of knowledge. What was evident was the importance of ongoing and regular opportunities for learning and sharing, and the need to tie learning to everyday activities. Language was raised as a way to bring about both the learning of TEK and as a way to re-connect youth to their Elders (Battiste 1998).

**Implications**

The major study findings inform the discussion on Aboriginal science, educational theory and practice in this area, and cultural identity and transmission of knowledge. Several implications can be construed from the study results and these implications are outlined and substantiated by illustrative examples.

**Implication 1**

There is a continuing need for the development of curriculum that is relevant to the lives of First Nations students and that involves them as active learners. Traditional
ecological knowledge needs to be incorporated into the mainstream curriculum, providing locally relevant ways and examples of learning about the environment, plants, animals, geography and language that will give students self-confidence and a stronger sense of identity and community. In regards to the Gitga’at Plant Project, the focus of the project was to bring traditional ecological knowledge into science curriculum. Smith has noted (1999, 160), “Indigenous students across many contexts have struggled with Western science as it has been taught to them in schools. Science has been traditionally hostile to indigenous ways of knowing. Science teaching in schools has also been fraught with hostile attitudes towards indigenous cultures, and the way indigenous students learn.”

There is also a need to address the under-representation of First Nations students in science classes in secondary and post-secondary institutions and the under-representation of First Nations people in science-related careers, which is linked to science curriculum not being relevant to First Nations youth (MacIvor 1995; Snively forthcoming). By developing science curriculum that allows for more than one worldview and honours different nature-knowledge systems (Ogawa 1995), First Nations students can become more successful at school, with that being just one of many benefits of the development of such curriculum. While it is important to educate students about different nature-knowledge systems besides that of Western modern science, the world of science academia should also be open to other worldviews.

Implication 2

The application of this learning must be brought into children’s everyday lives, not only in their lives at school. Elders and adult participants were adamant that the
learning had to go beyond the gathering of information, to the “hands on” learning experiences with Elders teaching children about their traditional knowledge systems on the land. These types of learning experiences need to become how the students both live and learn. This can only come about if the experiences are relevant to the students’ lives and if the students can be active participants in their learning (Yeager et al. 1998; Solomon 1998; Curry and Bloome 1998; Mercado 1998). In the Gitga’at Plant Project, students learned from their Elders about the Gitga’at uses of plants, along with other culturally relevant knowledge and wisdom. By using the school system and curriculum, a contemporary method was utilized to bring back and/or continue the intergenerational transmission of traditional ecological knowledge.

Implication 3

The effects of colonialism have had devastating repercussions on the transmission of knowledge. While many Aboriginal people were not allowed to speak their language due to residential schools, others were not taught their language because of the misconception that they would do better in school and in everyday life if they learned to speak English and forget their language. (Julia Callbreath, Tahltan Elder, personal communication 2001; Battiste 1998; Smith 1999) Culture is tied to language (Battiste 1998) so if children are not learning their language, they are probably not learning other cultural ways of their people. From my research, adult community members talked about the importance of children learning about their TEK from their Elders. This could have an impact on students learning their Sm’algyax language outside of school, which could complement their language classes in school.

Implication 4
The transmission of knowledge is important to Aboriginal communities. Retention and promotion of TEK can be enhanced by providing opportunities and situations that encourage and facilitate the learning of TEK; factors that contribute to the maintenance of TEK in a community. Because of changing times and colonialism, amongst other things, many of the circumstances supporting and facilitating interactions between children and Elders are disappearing quickly or are already gone. It is urgent to address this gap and to help to re-connect children to Elders. While many reasons can be given for why such interactions might not work, there is a need to work together to come up with solutions. The community and families have to want this to happen, and it can begin at the school with projects such as the Gitga’at Plant Project.

Implication 5

Aboriginal control over research in their community is another important implication of this research. While I am not from Hartley Bay, as a First Nations person, I wanted this project to involve the community as much as possible, and especially the students. The people interviewed did not have a negative thing to say about the project, only suggestions for ways to improve upon it. With the students taking on the role of “researchers”, they were learning research skills as well as learning about cultural protocol and about their peoples’ TEK. As Menzies (2004) has stated, it is vital that First Nations communities take control and play an active role in research that takes place in their communities and with their people. As a member of the Tsimshian Nation, Lewis has pronounced (2004, 8), “As Gitkxaala we are no longer interested in sitting back and watching our country being exploited by outsiders.” From the data, it appears that the people of Hartley Bay felt like they were actively involved in this research project.
Implication 6

A final implication deals with the active participation of youth in planning for their future. Marshall, Sheppard and Batten (2002) list concerns that face youths living in rural communities, such as (2002, 2), “isolation, health risks, lack of occupational role models, limited access to training or education, and cultural or identity differences”. This project has provided students with many of the skills needed for life-career planning, such as the research skills they acquired, presentation skills, working with others, to name a few. However, like the youth in Marshall, Sheppard, and Batten’s study (2002, 7), they may “need help to picture how they might actually implement these transferable skills to real work and life roles.” The results have indicated that students feel more confident in regards to their schoolwork and have more pride about who they are from taking part in this plant project; this may increase their hopes and aspirations about future possibilities (Marshall et al. 2002).

Limitations of the Study

It is important to recognize the problems and sources of influence that may have affected the outcomes of this study. I have had relationships with many people from Hartley Bay for thirteen years, as well as having been a presence in the Hartley Bay School for several years now. Having developed positive relationships with the school staff, students and their families benefits a study such as this one that relies on rapport and trust. However, these relationships could also lead to some bias in my research. For example, students may have given positive answers to my questions about the Gitga’at Plant Project just to please me, or have given what they thought were “correct” answers,
or what they thought I wanted to hear. As well, I took on different roles during the study, which could lead to bias. While Cameron and Eva-Ann were the main teachers in the classroom, I taught some of the lessons and often took part in class, school and community activities during my many visits to Hartley Bay. As well, I was the main researcher on this project and recorded virtually all of the data.

I attempted to address this situation by ensuring that my interview questions were not leading (e.g. giving the respondents 'clues' to 'right answer' or certain viewpoints). I also collected written responses from students and teachers in order to give the participants time to think and the opportunity to use their own words and thoughts in their answers. I triangulated data by including multiple ways of collecting different forms of data from different sources in an attempt to increase the credibility of the findings.

Because of time and practical considerations in the school setting, the data were more complete in some areas than in others. Not all students could be involved to the same extent, for example, and not all adults and Elders could participate in the Gitga’at Plant Project. Now that resource materials and procedural guidelines have been established, data collection can be expanded in future projects.

Future Directions for Research

The majority of the Hartley Bay School administrators, teachers, and support staff are members of the Gitga’at Nation. Future research could determine how such a school project would work in a First Nations community that does not have their own people in such pivotal educational roles. Another possibility would be to implement the project in
an urban community, such as Prince Rupert, where there are many Aboriginal children from many different First Nations, as well as non-Aboriginal students in the schools.

What is also needed is a better understanding of effective ways in which Aboriginal learning and teaching can be facilitated, particularly in relationship to TEK. Working with First Nations communities to identify elements of TEK, as well as ways of transferring this knowledge and wisdom, is an area that needs to be looked at more closely and is an area of research that I will pursue in the future.

It is important to have culturally sensitive assessment “tools” in order to appropriately assess and evaluate First Nations curricula and programs, as well as students’ learning. The instructional rubric used in this project (see Chapter Three and Appendix F) was developed to evaluate the cultural components of First Nations and Traditional Ecological Knowledge (TEK) curricula. While the six criteria were listed (First Nations Voice, First Nations Languages, Diversity Amongst First Nations, Protocol, Relationship with the land, and Ways of Learning, Ways of Teaching), other criteria could be included to answer the following questions: Can the curriculum be adapted for different First Nations groups, different age groups, etc.; does the curriculum support cross-curricular or interdisciplinary activities; does the curriculum recognize different learning styles; is there appropriate in-service training and orientation for all educators, community members, school board members, administrators, etc. involved with the curriculum; is oral tradition identified as being crucial to First Nations cultures; are the world views of First Nations articulated; are First Nations values and beliefs part of the curriculum (e.g. respect for selves, family, community, plants, animals, the land); etc. Many of these criteria can be added to the rubric, while others could be part of a
checklist. By articulating some of the principles that need to be part of culturally relevant curriculum, culturally sensitive assessment tools, such as this rubric, can assist First Nations educators in the critical analysis of First Nations and TEK curriculum. As well, such a rubric could be adapted to assess and evaluate students’ learning.

**Reflections of the Researcher**

Working with the Gitga’at community of Hartley Bay has been a tremendously rewarding experience. I have grown not only as a person, but also as a teacher, researcher, and as a learner. I learned so much from the community, from Elders to toddlers. However, one experience stands out that really made me realize that the Gitga’at Plant Project was a success. While all students worked hard and took their research seriously, one student in particular really seemed to embrace the project. When student partnerships were established in the Fall of 2003 and students were expected to begin their research, this young man was one of the first students to start interviewing Elders. While at Old Town, he asked the Chief’s wife about his plant (devil’s club), what its uses were, and how to prepare it. He also learned the cultural and spiritual protocols that went along with harvesting such an important plant. The following spring, Dr. Nancy Turner wanted to go out and harvest this plant. I didn’t want to pass up this “teachable” moment, so I suggested that this student take us out and teach us what to do. After school, the three of us ventured out onto one of the trails in search of devil’s club. While Nancy knew a lot about this plant, we asked him to tell us what the Chief and his wife had taught him. He took the harvesting of this plant very seriously as he explained
exactly what we could and could not do. When I asked him about his knowledge of
devil’s club, he said, “I knew a little before, but I really got into it with this project.”

It’s hard to put into words the difference I saw in this boy. While this student
usually had a difficult time staying on task at school, he showed patience while
harvesting the plant and while teaching us about it. When giving this important medicine
to the Chief’s wife, he appeared both humble and proud at the same time. When he
explained to us that he had to go right to his grandmother’s to give the medicine to her, it
was apparent that this was important to him, as he had been taught to share what he
harvested. After he left, the Chief’s wife spoke about how he had sat on the floor at the
Chief’s feet, listening and learning. You could tell that she was proud of this young man,
as was I!

There are many, many other stories and experiences that illustrate the success of
this project, and they need to be built upon, they need to be nurtured, as do the
connections and the relationships that have been either created or enhanced between the
younger generation and their Elders.
REFERENCES


APPENDIX A

Letters of Approval
Letters of Approval

To: Hartley Bay School
    School District No. 52
    Gitga’at First Nation
    John Clifton, Hereditary Chief, Gitga’at Nation

My name is Judy Thompson, my Tahltan name is Edōsdi, and I am a member of the Tahltan Nation. I am a graduate student at the University of Victoria and I am required to conduct research as part of the requirements for a Master’s degree in Environmental Studies.

The purpose of the proposed research is to assess and evaluate the usefulness of incorporating culturally relevant ways of bringing indigenous knowledge into school science curricula. “The Gitga’at Plant Project” curriculum developed by myself will be part of the students’ assigned schoolwork. Cameron Hill, a grades 7/8 at the Hartley Bay School has agreed to pilot the curriculum. As part of the curriculum, the students will be contacting family, community members, and elders in order to learn about Gitga’at People’s usage of plants. Upon completion of the plant project, the students will have produced a Gitga’at plant booklet. As part of the research, students, teachers, and adult community members involved with the plant project will be asked to evaluate the plant project by providing information and feedback to myself about the implementation and outcomes of the project. This research will take place during the fall of 2003.

Research of this type is important because it will contribute to the advancement of knowledge since it focuses on First Nations traditional ecological knowledge (TEK) and its incorporation into school science curricula, a body of knowledge and wisdom that has largely been ignored in regards to its contributions to science. The research will also help gain an understanding about the intergenerational transmission of TEK. Results from the research will assist educators in making science more accessible and relevant to a group of students that have been underrepresented in science classes and science related careers. The research will also provide a model for future development of culturally relevant curricula.

At the beginning of the research, a community meeting will be held to inform the community about the evaluation of the plant project. A school meeting will also be held to inform teachers, students and staff about the evaluation. At the completion of the research, a meeting will be held to share the results of the evaluation of this project with the whole community and to celebrate the completion of the plant project. A copy of the written report will be given to the school and the Gitga’at First Nation.

It is anticipated that the results of the evaluation of this project will be shared with others in the following ways: directly with participants, in a Master’s thesis, in published articles, in presentations at scholarly meetings, and in community-based science curricula.

This research is being funded by Social Sciences and Humanities Research Council of Canada and Natural Sciences and Engineering Research Council of Canada. A major collaborative research initiative, Coasts Under Stress has developed partnerships with the Gitga’at First Nation, the Tsimshian Tribal Council and School District No. 52.

If you have any questions, you can contact me at (250) 627-8772 or jth@citytel.net. You may also contact my supervisors Dr. Nancy Turner at (250) 721-6124 or nturner@uvic.ca, and Dr. Anne
Marshall at (250) 721-7815 or amarshal@uvic.ca. You may verify the ethical approval of this study, or raise any concerns you might have, by contacting the Associate Vice-President, Research at the University of Victoria (250-472-4362).

Your signature below indicates that your organization approves of the research project being carried out by Judy Thompson.

__________________________________________________________________________  ______________________________________________________________________  __________
Name and position                                                                 Signature                                                                 Date

\textit{A copy of this letter will be left with your organization, and a copy will be taken by the researcher.}
APPENDIX B

Consent Forms:
Documents Relating to Requirements for Human Subject Research Ethical Review
CONSENT FORM FOR PARTICIPATION IN THE STUDY:
Gitga’at Plant Project

Youth

You are being invited to participate in a study entitled “Gitga’at Plant Project” that is being conducted by Judy Thompson. My Tahltan name is Edösdi and I am a member of the Tahltan Nation. I am a graduate student in the department of Environmental Studies at the University of Victoria and you may contact me if you have further questions at (250) 627-8772 or jt@citytel.net.

As a graduate student, I am required to conduct research as part of the requirements for a degree in Environmental Studies. It is being conducted under the supervision of Dr. Nancy Turner and Dr. Anne Marshall. You may contact Nancy Turner at (250) 721-6124 and nturner@uvic.ca, and Anne Marshall at (250) 721-7815 and amarshall@uvic.ca.

This research is being funded by Social Sciences and Humanities Research Council of Canada and Natural Sciences and Engineering Research Council of Canada and through a broader research project, Coasts Under Stress.

The purpose of this research is to assess and evaluate the usefulness of incorporating culturally relevant ways of bringing indigenous knowledge into school science curricula. “The Gitga’at Plant Project” curriculum developed by Judy Thompson will be part of the students’ assigned course work. Students, teachers, and adult community members involved will evaluate the plant project by providing information and feedback to the researcher about the implementation and outcomes of the project.

Research of this type is important because it will contribute to the advancement of knowledge since it focuses on First Nations traditional ecological knowledge (TEK) and its incorporation into school science curricula, a body of knowledge and wisdom that has largely been ignored in regards to its contributions to science. The research will also help gain an understanding about the intergenerational transmission of TEK. Results from the research will assist educators in making science more accessible and relevant to a group of students that have been underrepresented in science classes and science related careers. The research will also provide a model for future development of culturally relevant curricula.

You are being asked to participate in this study because you are a student in Mr. Hill’s class. If you participate in this research, you will keep track of what you think of the plant project in a field notebook. While working on the plant project, you will be observed by your classroom teacher, Mr. Hill, your science teacher, Ms. Marshall-Peer, and Judy Thompson. Judy Thompson will also interview you and your class at the completion of the plant project in order to find out what you thought of the plant project.

There are no known or anticipated risks to you by participating in this research. The potential benefits of your participation in this research include learning about the ways that your people utilized local plants. You will also be learning from your people (family, community members, elders) in a more traditional way. All participants will receive a copy of the completed plant booklet and a summary of the research results.
You will be given a copy of the plant booklet as a small memento recognizing your participation. It is important for you to know that it is unethical to provide undue compensation or inducements to research participants and, if you agree to be a participant in this study, this form of compensation to you must not be coercive. If you would not otherwise choose to participate if the compensation was not offered, then you should decline.

Your participation in the evaluation of this research is completely voluntary. If you do decide to participate, you may withdraw at any time without any consequences or any explanation. If you do withdraw from the study your data will be used in the study analysis ONLY if you agree.

Your anonymity will be protected if you request it. If you request anonymity, your confidentiality and the confidentiality of the data will be protected by identifying you only by a fictitious name, or by coded initials. As well, any identifying information will be removed from the outcomes of the study.

The Hartley Bay School may use the data for other educational purposes, but only with the permission of the participants and/or their families. Data from this study will be disposed of only if you request it.

It is anticipated that the results of the evaluation of this project will be shared with others in the following ways: directly with you, in a Master's thesis, in published articles, in presentations at scholarly meetings, and in community-based science curricula.

In addition to being able to contact the researcher [and, if applicable, the supervisor] at the above phone numbers, you may verify the ethical approval of this study, or raise any concerns you might have, by contacting the Associate Vice-President, Research at the University of Victoria (250-472-4362).

Your signature below indicates that you understand the above conditions of participation in this study and that you have had the opportunity to have your questions answered by the researcher. Your parents or guardians will also need to give permission for you to take part in the evaluation of the plant project.

Name of student  Signature  Date

Name of Parent/Guardian  Signature  Date

A copy of this consent will be left with you and your parents/guardians and a copy will be taken by Judy Thompson.
CONSENT FORM FOR PARTICIPATION IN THE STUDY:
Gitga’at Plant Project

Teachers

You are being invited to participate in a study entitled “Gitga’at Plant Project” that is being conducted by Judy Thompson. My Tahltan name is Edosdi and I am a member of the Tahltan Nation. I am a graduate student in the department of Environmental Studies at the University of Victoria and you may contact me if you have further questions at (250) 627-8772 or jt@citytel.net.

As a graduate student, I am required to conduct research as part of the requirements for a degree in Environmental Studies. It is being conducted under the supervision of Dr. Nancy Turner and Dr. Anne Marshall. You may contact Nancy Turner at (250) 721-6124 and nturner@uvic.ca, and Anne Marshall at (250) 721-7815 and amarsh@uvic.ca.

This research is being funded by Social Sciences and Humanities Research Council of Canada and Natural Sciences and Engineering Research Council of Canada and through a broader research project, Coasts Under Stress.

The purpose of this research is to evaluate the usefulness of incorporating culturally relevant ways of bringing indigenous knowledge into school science curricula. “The Gitga’at Plant Project” curriculum developed by Judy Thompson will be part of the students’ assigned course work. As part of the research, students, teachers, and adult community members involved with the plant project will be asked to evaluate the plant project by providing information and feedback to the researcher about the implementation and outcomes of the project.

Research of this type is important because it will contribute to the advancement of knowledge since it focuses on First Nations traditional ecological knowledge (TEK) and its incorporation into school science curricula, a body of knowledge and wisdom that has largely been ignored in regards to its contributions to science. The research will also help gain an understanding about the intergenerational transmission of TEK. Results from the research will assist educators in making science more accessible and relevant to a group of students that have been underrepresented in science classes and science related careers. The research will also provide a model for future development of culturally relevant curricula.

At the beginning of the research, a community meeting will be held to inform the community about the evaluation of the plant project. A school meeting will also be held to inform teachers, students and staff about the evaluation. At the completion of the research, a meeting will be held to share the results of the evaluation of this project with the whole community and to celebrate the completion of the plant project. A copy of the written report will be given to the school and the Gitga’at First Nation.

You are being asked to participate in this study because you are a teacher at the Hartley Bay School and you are involved with the implementation of the Gitga’at Plant Project curriculum written by Judy Thompson. If you participate in this research, your participation will include keeping track of your comments and feedback in regards to the curriculum and keeping notes on your observations of the children’s participation in the plant project. The researcher will interview you at the end of the research project. The interview will take less than one hour.
There are no known or anticipated risks to you by participating in this research. The potential benefits of your participation in this research include making science more accessible and relevant to children in your community and other First Nations children.

You will be given a copy of the plant booklet in recognition of your participation and assistance. It is important for you to know that it is unethical to provide undue compensation or inducements to research participants and, if you agree to be a participant in this study, this form of compensation to you must not be coercive. If you would not otherwise choose to participate if the compensation was not offered, then you should decline.

Your participation in the evaluation of this research must be completely voluntary. If you do decide to participate, you may withdraw at any time without any consequences or any explanation. If you do withdraw from the study your data will be used in the study analysis ONLY if you agree.

Your anonymity may not be protected within Hartley Bay as the other teachers will know who participated in the research, as will the students. In the written report, your confidentiality and the confidentiality of the data will be protected as no names or identifying information will be used in the evaluation of the plant booklet. Data from the evaluation of the project will be destroyed after the completion of my Master’s thesis. It is anticipated that the results of the evaluation of this project will be shared with others in the following ways: directly with you, in a Master’s thesis, in published articles, in presentations at scholarly meetings, and in community-based science curricula.

In addition to being able to contact the researcher and the supervisors at the above phone numbers, you may verify the ethical approval of this study, or raise any concerns you might have, by contacting the Associate Vice-President, Research at the University of Victoria (250-472-4362).

Your signature below indicates that you understand the above conditions of participation in this study and that you have had the opportunity to have your questions answered by the researcher.

_________________________  ________________________  ________________
Name of Participant       Signature                  Date

A copy of this consent will be left with you and a copy will be taken by the researcher, Judy Thompson.
CONSENT FORM FOR PARTICIPATION IN THE STUDY:
Gitga'at Plant Project

Parents or Guardians

You are being invited to participate in a study entitled “Gitga'at Plant Project” that is being conducted by Judy Thompson. My Tahltan name is Edòsdi and I am a member of the Tahltan Nation. I am a graduate student in the department of Environmental Studies at the University of Victoria and you may contact me if you have further questions at (250) 627-8772 or jt@citytel.net.

As a graduate student, I am required to conduct research as part of the requirements for a degree in Environmental Studies. It is being conducted under the supervision of Dr. Nancy Turner and Dr. Anne Marshall. You may contact Nancy Turner at (250) 721-6124 or nturner@uvic.ca, and Anne Marshall at (250) 721-7815 or amarshall@uvic.ca.

This research is being funded by Social Sciences and Humanities Research Council of Canada and Natural Sciences and Engineering Research Council of Canada through a broader research project, Coasts Under Stress.

The purpose of this research is to evaluate the usefulness of incorporating culturally relevant ways of bringing indigenous knowledge into school science curricula. “The Gitga'at Plant Project” curriculum developed by Judy Thompson will be part of the students’ assigned course work. As part of the research, students, teachers, and adult community members involved with the plant project will be asked to evaluate the plant project by providing information and feedback to the researcher about the implementation and outcomes of the project.

Research of this type is important because it will contribute to the advancement of knowledge since it focuses on First Nations traditional ecological knowledge (TEK) and its incorporation into school science curricula, a body of knowledge and wisdom that has largely been ignored in regards to its contributions to science. The research will also help gain an understanding about the intergenerational transmission of TEK. Results from the research will assist educators in making science more accessible and relevant to a group of students that have been underrepresented in science classes and science related careers. The research will also provide a model for future development of culturally relevant curricula.

At the beginning of the research, a community meeting will be held to inform the community about the evaluation of the plant project. A school meeting will also be held to inform teachers, students and staff about the evaluation. At the completion of the research, a meeting will be held to share the results of the evaluation of this project with the whole community and to celebrate the completion of the plant project. A copy of the written report will be given to the school and the Gitga’at First Nation.

You are being asked to participate in this study because you are the parent or guardian of a Hartley Bay School student in Cameron Hill’s class. If you participate in this research, your participation will include being interviewed by Judy Thompson at the completion of the project in order to find out what you thought of the plant project. The interview will take less than one hour.
There are no known or anticipated risks to you by participating in this research. The potential benefits of your participation in this research include giving you the opportunity to comment on curriculum that will hopefully make science more accessible and relevant to your child and other First Nations children.

You will be given a copy of the plant booklet in recognition of your participation and assistance. It is important for you to know that it is unethical to provide undue compensation or inducements to research participants and, if you agree to be a participant in this study, this form of compensation to you must not be coercive. If you would not otherwise choose to participate if the compensation was not offered, then you should decline.

Your participation in the evaluation of this research is completely voluntary. If you do decide to participate, you may withdraw at any time without any consequences or any explanation. If you do withdraw from the study your data will be used in the study analysis ONLY if you agree.

Your anonymity will be protected if you request it. If you request anonymity, your name will not be recorded on the transcribed data, a fictitious name or coded initials will be used in place of your name and the researcher will be the only person who knows your identity. In the written report, your confidentiality and the confidentiality of the data will be protected as no names or identifying information will be used in the evaluation of the plant project. Data from the evaluation of the project will be destroyed after the completion of my Master's thesis.

It is anticipated that the results of the evaluation of this project will be shared with others in the following ways: directly with you, in a Master’s thesis, in published articles, in presentations at scholarly meetings, and in community-based science curricula.

In addition to being able to contact the researcher and the supervisors at the above phone numbers, you may verify the ethical approval of this study, or raise any concerns you might have, by contacting the Associate Vice-President, Research at the University of Victoria (250-472-4362).

Your signature below indicates that you understand the above conditions of participation in this study and that you have had the opportunity to have your questions answered by the researcher.

Name of Participant ______________________________ Signature ______________________________ Date ______________________________

* A copy of this consent will be left with you, and a copy will be taken by the researcher. */
CONSENT FORM FOR PARTICIPATION IN THE STUDY: Gitga’at Plant Project

Elders and/or Community Members

You are being invited to participate in a study entitled “Gitga’at Plant Project” that is being conducted by Judy Thompson. My Tahltan name is Ed6sdi and I am a member of the Tahltan Nation. I am a graduate student in the department of Environmental Studies at the University of Victoria and you may contact me if you have further questions at (250) 627-8772 or jt@citytel.net.

As a graduate student, I am required to conduct research as part of the requirements for a degree in Environmental Studies. It is being conducted under the supervision of Dr. Nancy Turner and Dr. Anne Marshall. You may contact Nancy Turner at (250) 721-6124 or nturner@uvic.ca, and Anne Marshall at (250) 721-7815 or amarshal@uvic.ca.

This research is being funded by Social Sciences and Humanities Research Council of Canada and Natural Sciences and Engineering Research Council of Canada through a broader research project, Coasts Under Stress.

The purpose of this research is to evaluate the usefulness of incorporating culturally relevant ways of bringing indigenous knowledge into school science curricula. “The Gitga’at Plant Project” curriculum developed by Judy Thompson will be part of the students’ assigned course work. As part of the research, students, teachers, and adult community members involved with the plant project will be asked to evaluate the plant project by providing information and feedback to the researcher about the implementation and outcomes of the project.

Research of this type is important because it will contribute to the advancement of knowledge since it focuses on First Nations traditional ecological knowledge (TEK) and its incorporation into school science curricula, a body of knowledge and wisdom that has largely been ignored in regards to its contributions to science. The research will also help gain an understanding about the intergenerational transmission of TEK. Results from the research will assist educators in making science more accessible and relevant to a group of students that have been underrepresented in science classes and science related careers. The research will also provide a model for future development of culturally relevant curricula.

At the beginning of the research, a community meeting will be held to inform the community about the evaluation of the plant project. A school meeting will also be held to inform teachers, students and staff about the evaluation. At the completion of the research, a meeting will be held to share the results of the evaluation of this project with the whole community and to celebrate the completion of the plant project. A copy of the written report will be given to the school and the Gitga’at First Nation.

You are being asked to participate in this study because you were interviewed by a Hartley Bay School student in regards to the plant project they were working on as part of their schoolwork. If you participate in this research, your participation will include being interviewed by Judy Thompson at the completion of the project. The interview will take less than one hour.

There are no known or anticipated risks to you by participating in this research. The potential benefits of your participation in this research include giving you the opportunity to comment on
curriculum that will hopefully make science more accessible and relevant to children in your community and other First Nations children.

You will be given a copy of the plant booklet in recognition of your participation and assistance. It is important for you to know that it is unethical to provide undue compensation or inducements to research participants and, if you agree to be a participant in this study, this form of compensation to you must not be coercive. If you would not otherwise choose to participate if the compensation was not offered, then you should decline.

Your participation in the evaluation of this research is completely voluntary. If you do decide to participate, you may withdraw at any time without any consequences or any explanation. If you do withdraw from the study your data will be used in the study analysis ONLY if you agree.

Your anonymity will be protected if you request it. If you request anonymity, your name will not be recorded on the transcribed data, a fictitious name or coded initials will be used in place of your name and the researcher will be the only person who knows your identity. In the written report, your confidentiality and the confidentiality of the data will be protected as no names or identifying information will be used in the evaluation of the plant project. Data from the evaluation of the project will be destroyed after the completion of my Master's thesis. It is anticipated that the results of the evaluation of this project will be shared with others in the following ways: directly with you, in a Master's thesis, in published articles, in presentations at scholarly meetings, and in community-based science curricula.

In addition to being able to contact the researcher and the supervisors at the above phone numbers, you may verify the ethical approval of this study, or raise any concerns you might have, by contacting the Associate Vice-President, Research at the University of Victoria (250-472-4362).

Your signature below indicates that you understand the above conditions of participation in this study and that you have had the opportunity to have your questions answered by the researcher.

____________________________  __________________________  ________________
Name of Participant        Signature          Date

A copy of this consent will be left with you, and a copy will be taken by the researcher.
APPENDIX C

Template for Booklet and Excerpt from Plant Booklet
Gitga’at Plant Project:
Template for Booklet

Information on each plant can be from 1-4 pages each.
-Booklet will be similar to booklets produced by the Hartley Bay School (e.g. “Our Smoked Oolichans”)
(For an example of a plant booklet put together by a grade 6 class in Saskatchewan, refer to “Beauval Elders’ Plant Stories and Selected Student Reports on Plants”).

Below are the kinds of things you should include when researching your plant:
1) Names of students (include grade) researching particular plant
2) Names of plant informants
3) Plant:
   a) Sm’algyax name
   b) Common or Local English name
   c) Botanical name

INTERVIEWS (primary research)
-interview community members knowledgeable about plants (make sure to give credit to person sharing the plant knowledge and wisdom)

4) Why is this plant important to the Gitga’at people? How is it used? How is it harvested and prepared for use? What parts of it are used? When are they ready? Does it provide food? Or materials for carving or manufacturing things? Is it a medicinal plant?

INTERVIEWS (primary research)
BOOKS/INTERNET (secondary research)

5) Observations of plant:
   a) What does the plant look like? Is it a tree, shrub, or a low leafy plant? Is it coniferous (evergreen) or deciduous? Does it have needles or leaves, and what is the shape and colour of the leaves? What is the bark or stem like? What about the roots? Flowers or cones, or spore-bearing structures?
   b) Habitat: Where does the plant grow? Does it grow in the shady forest? In the open, or at the edge of clearings? In swampy ground, or in sandy or gravelly soil? In peat? In standing water, as around a lake? What other plants does it share this habitat with?
   c) Other information: Is it poisonous? Is it used especially by some kind of animal or bird? Is there a special story about it? Is there a place named after it?

6) Pictures/Diagrams
   a) have picture of student with plant (e.g. from June 2003 field trip to Lake)
   b) have picture of student with community member/Elder that shared knowledge and wisdom about particular plant
   c) sketch of plant by student
   d) a map of the places where plant grows in Gitga’at territory
Sm’algyax name: mak’ooxs (plant)
magm dziiws (yellow berries)
magm atk (red berries)

Common name: salmonberry

Botanical name: *Rubus spectabilis*

How is it used?

As a food: Salmonberries are used mainly as a dessert. They are sometimes used in jam, but it is not as successful as other berries. We sometimes used salmonberries at feasts as a dessert with oolichan grease.

How is it harvested?

When you go picking, you don’t pile salmonberries too high because they will become squished and are hard to clean. It is best if you pick the berry with the flower still attached to prevent too much squishing. Depending on what you are picking for will determine how long you stay out picking. If it’s for a feed, maybe an hour; if it’s for storing or feasting, three to four hours. You should wear long sleeves and proper shoes as you do get scratched up from bushes and it is usually muddy.

When is it harvested?

It takes two to three years for a branch to grow. Salmonberries start to ripen in the early summer months of June or July. The sprouts/stems are harvested in mid-May. You can go to different areas around Hartley Bay to pick at different times. Blossom Island usually ripens first, then McKay Reach, then Hartley Bay and last Old Town where you can pick ripened berries in the middle of July to September.

How is it prepared?

If you want to freeze salmonberries, you clean the berries then squish them and mix them with sugar and water. Then you put them in a Ziploc bag or a container. If you want to eat the berries fresh, you can squish them and have them with water, oolichan grease (*smk’awtsii*) and sugar, or with milk and sugar. People also eat the sprouts (oyl) with sugar. You have to peel the skin off and then dip the sprout in sugar. Stems are eaten raw and sometimes steamed or are put in a salad.

What does it look like?

The salmonberry plant is erect and branches can grow up to four metres. They are tall, often forming dense thickets. Salmonberries are a deciduous shrub. The leaves alternate,
usually having three leaflets. They are dark green and sharply toothed. The flowers are pink to reddish purple. The berries are yellow or reddish, like mushy raspberries. The yellow berries are called magm dziws ("ripen in the day") and the red berries are called magm atk ("ripen in the night") even though they probably don’t. It is mostly associated with its colour. The stem is golden brown with numerous thorns.

**Where does it grow?**

Salmonberries are found in moist to wet places, mostly along stream edges, avalanche tracks and wet logged areas. Salmonberries share their habitat with blueberries and thimbleberries. Salmonberries are picked almost everywhere in Gitga’at territory. We pick salmonberries everywhere along the boardwalks, rivers and the houses. One of the best places for picking salmonberries is Blossom Island, a small island near Union Pass, that is mostly salmonberries. We can start picking salmonberries at Blossom Island and Hartley Bay in June but we still pick them in August and September in Old Town. In Kiel you can pick salmonberries in May.
APPENDIX D

Interview Questions
Adult Interview Questions

At the beginning of each interview, I will remind the participants of the overall purpose of the plant project and the role that they played in it.

Parents/Guardians: Their children were researchers in plant project.
Elders/Community Members: Students interviewed them for the plant project.
Teachers: Either involved directly or indirectly with plant project or observed the plant project in progress.

1) Tell me about your experience with the plant project.
2) How would you describe the children’s experience with the plant project?
3) What do you think the children learned?
4) Did you learn anything about the students during this process?
5) Have you noticed a change in the students? If so, in what way? Please explain.
6) What would you like children in the community to learn more about?
7) Can you suggest ways to improve upon such a project?
8) Can you make suggestions for future projects?
9) Is there anything else you’d like to add/mention/suggest/comment upon?

Elders/plant knowledge holders
- Were the students respectful when interviewing you? If so, how did they demonstrate this?
- Who taught you about plants? How did they teach you? How did you learn?
- Is this plant project an effective way for students to be learning about plants (or other traditional knowledge) from their Elders?
- Can you suggest other ways that students can learn traditional knowledge from their Elders?
- Could we include a picture of you with the students that interviewed you in the plant booklet?

Teachers
- (Can you make suggestions of what you would need (or a new teacher to the community might need) to feel comfortable and confident in implementing culturally relevant curriculum?)
Student Interview Questions

At the beginning of each interview, I will remind the participants of the overall purpose of the plant project and the role that they played in it.

1. Tell me about your experience with the plant project.
2. What did you learn?
3. Can you suggest ways to improve upon such a project?
4. Is there anything else that you’d like to learn more about?
5. Can you make suggestions for future projects?

6. When interviewing people, did anyone object to you writing information down?
7. Did anyone share information with you that they didn’t want you to write down or share with others?
8. Did anyone tell you how they learned the knowledge that they were sharing with you?
9. Did they tell you who they learned it from?

10. Is there anything else you’d like to add/mention/suggest/comment upon?
APPENDIX E

Feedback Cards
Gitga’at Plant Project

1) Write about your experience of interviewing people for the plant project.

(e.g. Did you have any problems setting up the interviews? If so, what were they? Did you learn about things other than plants? If so, explain. How did you find the actual exercise of interviewing (writing down the information, asking the questions, etc.). Was it helpful working with a partner? If so, how did your partner help you?)

Student Feedback


Gitga'at Plant Project

Write about your experience working on the plant project.

1. What did you learn?
2. What did you like? What did you dislike?
3. Can you suggest ways to improve upon such a project?
4. If you did another project like this, what would you like to learn about?
5. If we did the plant project with the younger students, how do you think they would do? Would you be willing to help them out? If so, how?

Student Feedback
APPENDIX F

Instructional Rubric
Rubric for the Evaluation of Cultural Components in First Nations and Traditional Ecological Knowledge Curricula

What is a rubric?
- a 1-2 page document that describes varying levels of quality from excellent to poor.

2 features:
1) list of criteria that is essential for the project or assignment (or in this case, FN/TEK curricula)
2) gradations of quality that describe the criteria


This rubric was developed in order to be used to evaluate the cultural components of First Nations and Traditional Ecological Knowledge (TEK) curricula. I have come up with these criteria by examining many First Nations and TEK curriculum packages. There are more criteria to add to this rubric; this will be an ongoing process and exercise as I go through my graduate programs. Some of the criteria I will be working on will deal with the flexibility of the curriculum (can the curriculum be adapted for different First Nations groups, different age groups, etc.); does the curriculum support cross-curricular or interdisciplinary activities; does the curriculum recognize different learning styles; is there appropriate in-servicing and orientation for all educators, community members, school board members, administrators, etc. involved with the curriculum; is oral tradition identified as being crucial to First Nations cultures; are the world views of First Nations articulated; are First Nations values and beliefs part of the curriculum (e.g. respect for selves, family, community, plants, animals, the land); etc. Many of these criteria can be added to the rubric, while others could be part of a checklist. By articulating some of the principles that need to be part of culturally relevant curriculum, it is hoped that this rubric will assist First Nations educators in the critical analysis of First Nations and TEK curriculum.

This rubric is a work in progress and I hope that First Nations educators and educator of First Nations students will utilize this tool, add to it, as well as provide feedback and suggestions on how to improve it.

MĖDUH!!!
**Rubric for the Evaluation of Cultural Components in First Nations and Traditional Ecological Knowledge Curricula**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Gradations of Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Nations Voice</strong></td>
<td>4</td>
</tr>
<tr>
<td>Cultural experts (FN educators, community members, Elders, etc.) are a significant and critical part of unit implementation. Elders and community members are involved at all stages of the curriculum development process and a First Nations person is directly involved in the writing of the curriculum.</td>
<td>3</td>
</tr>
<tr>
<td>Cultural experts are involved. Elders and community members have been involved in many stages of the curriculum development process.</td>
<td>2</td>
</tr>
<tr>
<td>Cultural experts have been involved, but their role is not clear.</td>
<td>1</td>
</tr>
<tr>
<td>Involvement of cultural experts not mentioned.</td>
<td><strong>Comments</strong></td>
</tr>
<tr>
<td><strong>First Nations Languages</strong></td>
<td>4</td>
</tr>
<tr>
<td>First Nations languages are recognized as being an integral part of First Nations ways of knowing and worldview. The language plays a large part in the lessons and activities.</td>
<td>3</td>
</tr>
<tr>
<td>First Nations languages are recognized as being an integral part of First Nations ways of knowing and worldview. While the language does not play a large part in the lessons, the importance of learning the language from elders and other fluent speakers is stressed.</td>
<td>2</td>
</tr>
<tr>
<td>No mention of the importance of First Nations languages to First Nations ways of knowing and worldview but there are First Nations words used here and there throughout the curriculum.</td>
<td>1</td>
</tr>
<tr>
<td>First Nations languages are not part of the curriculum and there is no mention of their importance to First Nations ways of knowing and worldview.</td>
<td><strong>Comments</strong></td>
</tr>
<tr>
<td>Diversity amongst First Nations</td>
<td>Focus of curriculum is on one particular First Nations group. The curriculum is flexible enough so that it can be adapted to other First Nations groups.</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Comments</td>
<td></td>
</tr>
<tr>
<td>Protocol</td>
<td>It is recognized that when working with specific First Nations communities and cultural experts that there are protocols to be followed. These are explicitly stated.</td>
</tr>
<tr>
<td>Comments</td>
<td></td>
</tr>
<tr>
<td>Relationship with the Land</td>
<td>States the importance of the land, plants and animals to First Nations peoples. Lessons either take place out of the classroom on the land (e.g. at fish camps, seaweed camps, field trips, etc.) or in the classroom. Cultural experts are integral to the lessons.</td>
</tr>
<tr>
<td>Comments</td>
<td></td>
</tr>
</tbody>
</table>

| Ways of learning, ways of teaching | Traditional ways of learning and teaching are outlined. Activities are numerous and varied and are student-centred. They often take place on the land with elders (observation, practice, participation, active involvement, etc.). Learning and evaluation ideally take place at the same time. Evaluation is formative in that it is continuous and takes place throughout the lesson. | Traditional ways of learning and teaching are mentioned. Several activities take place, such as videos, guest speakers, field trips, guided labs, non-directed labs. Lectures are limited and teacher acts as a facilitator. Evaluation is a balance of formative and summative (evaluation takes place at the end of the lesson). | Traditional ways of learning and teaching are not mentioned. Some activities, such as videos or guided labs. Evaluation is a balance of formative and summative. | Traditional ways of learning and teaching are not mentioned. Activities are teacher-centred (lecture oriented). Evaluation is summative. |
| Comments | | | | |