

Learning Indigenous Science from Place

Executive Summary

**Research Study Examining Indigenous-Based
Science Perspectives in Saskatchewan First Nations
and Métis Community Contexts**

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LEARNING INDIGENOUS SCIENCE FROM PLACE

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Michell, Dr. Herman, Yvonne
Vizina, Camie Augustus and Jason
Sawyer

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We can be contacted through:

Aboriginal Education Research Centre
Room 1212, College of Education
University of Saskatchewan
28 Campus Drive
Saskatoon, SK S7N 0X1 Canada
Tel: (306) 966-1360 Fax: (306) 966-1363
E-Mail: aerc@usask.ca

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Executive Summary

Introduction

In 2005, a group of Aboriginal and non-Aboriginal educators, teachers, professors, school science researchers, policy makers, curriculum experts, and community members came together in Saskatchewan as the *Indigenous Knowledge in the School Science Curriculum Committee* to dialogue about the importance of incorporating Indigenous knowledge in school science as a valid means of understanding the natural world and as a means of improving the achievement levels and representation of First Nations and Métis students in scientific careers. In 2007, a research initiative entitled *Learning Indigenous Science from Place* was developed to investigate First Nation and Métis perspectives of learning Indigenous science in relation to place and how Indigenous science is translated into the science curriculum of Saskatchewan schools. The Committee based the research on the premise that a science curriculum could be framed by the perspectives and worldviews of Indigenous knowledge. An enhanced science curriculum recognizes Indigenous knowledge as a knowledge system that describes and explains nature in culturally powerful ways.

The project commenced under the joint leadership of First Nations University of Canada and the Aboriginal Education Research Centre at the University of Saskatchewan. The strategy of the research was to go out and interview actively serving teachers, pre-service teachers, First Nations and Métis Elders and traditional land users in Saskatchewan communities. In addition, the research included a search for best practices of using Indigenous science in educational processes. An action research approach was used to ensure accountability, transparency, and on-going information sharing and action between the research team, the supporting Committee, educators and the Aboriginal community.

The findings of this research project highlight perspectives of First Nations and Métis worldviews as foundations for understanding science through Indigenous knowledge systems. The findings in this research provide theoretical and practical solutions for educators and others seeking information on how to begin making a transition to a science curriculum that is more culturally sensitive to the First Peoples in Saskatchewan.

The Report

The purpose of the research project was to investigate how educators and education systems might take up Place-based Indigenous science and apply it within the established school science curriculum. This research focuses on three of the major research areas identified by the Canadian Council on Learning's Aboriginal Learning Knowledge Centre as needing exploration including: Learning from Place, Diverse Educational Systems, and Nourishing the Learning Spirit. As researchers involved in science education, we were aware that advancements in Western science play an increasingly significant role in everyday life for Aboriginal students, but so too does the present day wisdom of Indigenous knowledge in many communities.

The objective of this research was to respond to the following questions:

- What is a First Nations perspective [of learning Indigenous science from Place] for the purposes of curriculum development in Saskatchewan?
- What is a Métis perspective [of learning Indigenous science from Place] for the purposes of curriculum development in Saskatchewan?
- How can learning from Place help to create a foundation for a science curriculum that is contextualized to Place and to the people of the Place?
- How can these perspectives and learning from Place inform teachers of the processes and content needed in science curriculum?
- What supports or processes are needed for educators and systems to engage authentically in Indigenous science?

The research team identified the following benefits that would materialize as the study progressed: An Honouring of Indigenous Knowledge Systems; A Sharing of Worldviews; Community-based Focus; Building Research Capacity; Creating Partnerships and Networks; An Honouring of Indigenous Methodologies; Uncovering Best Practices; A Guide for Curriculum Developers; Evidence for educational policy development; Contribution to equitable representation of First Nations and Métis perspectives in science education; and Examining Western and Indigenous goals of science education.

Literature Review

In this section, a literature review is provided that serves as a framework for the research project and the research questions posed. The review is divided into five areas that include the following: 1) Historical Overview of Aboriginal Education in Canada; 2) Historical Overview of Saskatchewan Learning Policy; 3) The Concept of Indigenous Science; 4) The Concept of Indigenous Science Education; and 5) Promising Practices: A Summary of the Literature. The literature review begins with an examination of the history of Aboriginal education. We draw attention to the policy directions that have been undertaken by the federal and provincial governments and current challenges facing teachers as they struggle to meet the needs of Aboriginal learners in school science. Our overall purpose is to trace the evolution of advancements made in relation to the inclusion of Indigenous knowledge systems in the science curriculum. The literature review ends with a summary of promising practices that have been constructed around common themes uncovered during the course of this research project. We ask readers to turn their attention to the history of Aboriginal education in Canada in order to understand the importance of incorporating cultural and linguistic content in school science.

Research Methodology and Methods

The Action Research approach used for this study was selected as a result of Committee sensitivity to the importance that the questions asked are not provided by some distant scholarly interests but arise among those who will benefit most from the research. Much research has been done in First Nations and Métis communities where communities have asked, 'What is the benefit?' This research is not based on further advancing an empiricist science paradigm but is directed toward the needs and interests of an established community of individuals, groups, institutions and governments who are interested in being involved in making

science relevant to Aboriginal students and informing others of the knowledge inherent in Indigenous ways of knowing. It is directed where it will have greatest relevance: in schools, among teachers, in curriculum, and in cooperation and collaboration with First Nations and Métis communities for the ultimate benefit of the learners, both Aboriginal and non-Aboriginal. It is grounded in the deeply felt concern of the community members to make science context and praxis a meaningful development of skills, knowledge, values, and applications in multiple realities, not just for those belonging to one way of thinking. Action Research provides an opportunity to view validity from another perspective.

As indicated within the final research report, numerous community-based organizations supported and assisted in the completion of this research. Some signed ethical consent forms agreeing to the research within their jurisdiction, some discussed the project and offered encouragement and advice, and some assisted in arranging interviews or focus groups with participants.

Data Analysis

In order to answer the research questions, our project team used the Clue Structure approach to data analysis. The Clue Structure method of analyzing the transcript data includes paying attention to and describing the knowledge that emerges from the transcripts as categories that have already been empirically or philosophically established in the literature. The Clue Structure approach was used to link the data with the Holistic Lifelong Learning Models developed by First Nations and Métis Peoples and depict major components of their respective cultures of learning.

Research Findings

If you do assessment based on a culture, the values, the identity, you have a totally different curriculum. (NWS5, 1.91)

The major findings revealed by the research are formed from a community-based response to the interview questions, and often, directly to the research questions themselves. Analysis was based thematically on the Lifelong Learning Model for First Nations and the Lifelong Holistic Learning Model for Métis. The application of these Models using Clue Structure analysis allowed the researchers to test whether the themes emerged naturally within the context of the interview results. The researchers had an opportunity to see if this research study reflected a holistic worldview, even though the topic was specifically focused on science education. The themes did emerge from the interview data in the First Nations interview analysis. The themes also emerged from the interview data in the Métis interview analysis. This provides strong evidence of the validity and importance of the Holistic Lifelong Learning Models as appropriate reflections of a First Nations framework and a Métis framework for learning. Further, the interview analysis provided additional data not depicted on the Lifelong Learning Models. We refer to this additional data as *gap areas* that may be considered for next iterations of the draft Models.

The study further explicated the meaning of learning Indigenous science in relation to Place based on literary review and primary interview data. The complexity of the Place concept includes, but is not limited to, the aesthetic, ceremonial, economic, personal, familial, historical, political, social, spiritual and scientific aspects of a particular Place.

The study provides a significant amount of raw material for consideration by educators, administrators, policy-makers, curriculum writers and others to help inform the particular kinds of questions they have in relation to their work and place in education. The thematic structure of the data analysis will help gain both a holistic picture of learning Indigenous science in relation to Place, and a topical picture of specific parts influencing Indigenous science education. As the data conveys, there is no one answer to accomplishing the inclusion of Indigenous science, indeed, there is a continuum that is acknowledged ranging from actual physical cultural experiences out on the land, through learning from Elders stories, through having someone else tell Elder stories, and as a last resort, learning from a book. Service and pre-service teachers shared candid views about the challenges and needs to integrate Indigenous science into their classrooms. Community members shared insights from their perspective on relationships between community and schools that could help advance Indigenous science within the school system. Some of these insights included life on the land experiences, participation in cultural and ceremonial teachings, having teachers and administrators educated alongside of students with respect to cultural teachings, appropriate use of Indigenous language within school settings to ensure students develop fluency in their own language, and overcoming systemic racism which will continue to impede progress of including Indigenous perspectives in the classroom. In short, education systems will need to review the report and use it to help inform their work in the particular way and manner that is meaningful to the kind of challenges they face or the goals they have set.

Ultimately, in actualizing Indigenous educational processes and goals outlined by the Aboriginal community and contemporary researchers, Canadian education systems will need to create new forms of educational institutions which are grounded in Indigenous traditional knowledge and values, but can facilitate the development of Western scientific academic disciplines as well. Indigenous science education must take its rightful place as a vehicle of cultural transmission and can produce a culturally-aware and ecologically-aware education system leading to a healthy global environment for all. Educators, researchers, policy-makers and community members can examine various forms of Indigenous education in an effort to ascertain common characteristics and philosophies, but the primary focus must be to integrate local knowledges into curricula.