
Combining the Views of Both Worlds: Science Education in Qikiqtani: Progress Report

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Honoring Local Community Aspirations for Science Education: Nunavut Pilot Study

- Based in three Qikiqtani communities over 5 years: Pond Inlet, Clyde River, Igloolik
- All elementary school communities desire to offer school programs that “combine the views of both worlds” in all areas including science education: science from or with reference to *Inuit Qaujimajatuqangit* (IQ)
- Communities chosen because of this desire and their cultural, language and geographical ‘proximity’
- Project in collaboration with each Local Education Authority (LEA) and Qikiqtani School Operations
- Focus on teacher & student ‘development’
- Outcomes can support other Nunavut schools & GN in their development of curriculum and resources and understanding of processes influencing student, teacher and school community development

Focus of Nunavut Education

- “Culture-based education”: foundational principle for school development in Nunavut
- The activities of schools must create, preserve, promote, and enhance local culture, including arts, heritage and language
- Educational experiences provided for children should reflect, validate and promote the culture and language of First Peoples
- A culture-based education program the content, skills, outcomes and objectives should be appropriate to the cultural needs of students in the communities served
- Although this might be an aspiration a variety of factors are likely to prevent this from being reality – teacher attribute and environmental – e.g., support, leadership.

Culture/Place-Based Education

- Underlying premise of culture-based education is similar to what is advocated in place-based education.
- Place-based education is rooted in place; that is, the organizing focus of the school is on the local socio-cultural, ecological setting.
- As Dewey (1907) stated:

“The great waste in schools, from a child’s perspective, is his inability to use the experience he gets outside of the school in any complete or free way within the school itself; while on the other hand he is unable to apply what he is learning in daily life. That is the isolation of the school – its isolation from life. When the child gets into the schoolroom, he has to put outside of his mind a large part of the ideas, interests and activities that predominate in his home and neighborhood”.

Stages of the Development Process

A. Diagnostic Phase (Year One):

- Nunavut Government & QSO consent.
- Initial meetings with stakeholders in each community – parents, elders and DEA, teachers (Inuit & non-Inuit), QSO administration, students.
 - Individual & group meetings & conversations, PATHing.
 - What are your aspirations for science education?
 - What do you see as the impediments and contributors for achieving these aspirations?
- Variety of risk factors mostly to do with the infancy of Nunavut or the hegemonic nature of schooling.
- Documented in CJMSTE: “Combining the Views of Both Worlds: Constraints and Contributors to Community-Based Science Education in Qikiqtani.”

School Community PATHING: Pond Inlet



“Teaching with reference to both (contemporary and traditional knowledge) just strengthens the richness of the experience provided for our students and the opportunities this provides. One without the other just reduces the richness of experience for children.” (Inuit Principal)

“Learning about our own culture is important, and I don’t want us to turn our back on that (knowledge) that is valuable for our students. It’s who they are. (At the same time) it’s really important to integrate this knowledge (with non-traditional knowledge, (Inuit Grade 1 Teacher)

Science curricula often fail to acknowledge and override local indigenous communities and their knowledge, values, and beliefs as *thoughtful and purposeful* cultures
(McKinley, 2000)

Stages of the Development Process

B. Planning for Implementation Phase (Year One):

- Identification of Inuit teacher-leaders for each community: central to the success of the project – leadership, motivation, support
 - Met in Winnipeg to substantiate preliminary findings and develop ‘first order principles’ and appropriate developmental goals
 - **Key Focus: Pilot Study that could support Inuit & non-Inuit teachers and Nunavut in its science curriculum development and provide examples of resources and school development processes in science education consistent with local school community aspirations**
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Stages of the Development Process

c. Implementation Phase (Years 2- ...)

- Researchers in communities twice a year (late fall & late spring) for 3 weeks
- Targeting 12 learning in science topics – e.g., weather, rocks, seasons, plants, structures light, keeping warm, sound, astronomy.
- Focus on ‘epistemology’: IQ: knowledge, values, beliefs
- Work with individual teachers who currently teach (Inuit & non-Inuit) these topics in Inuktitut or English
- Collaboratively develop and teach these topics with teachers using community members as required
- 2 units developed per visit along with informal classroom teaching visits
- Sources of information – ‘canonizing’ IQ through audio and video-recording of community members
- Access to IQ (elders recordings) in Igloolik (Northern Research Institute)

1. Provide **two-way learning experiences** by integrating Inuit knowledge, ways of knowing, beliefs and values and contemporary scientific knowledge, processes and attitudes.
 2. Draw upon **traditional and contemporary Inuit cultural examples** as contexts for student learning.
 3. **Include the local community** and its people in students' learning opportunities as the classroom is an extension of the school and local community
 4. Foster **language development in Inuktitut** and, where required or encouraged, English.
 5. Use locally identified, **culturally preferred teaching practices** to support student learning.
 6. Use **diagnostic and formative assessment** to inform planning and teaching and monitor student learning.
 7. **Engage** students by starting lessons by providing first-hand experiences for students or drawing upon common experience.
 8. When using **story to engage students**, use the interrupted-story-line as a vehicle to prompt first-hand investigations.
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9. Deliberately **promote scientific attitudes of mind** (curiosity, problem-solving, working to end) student through thoughtful independent consideration of questions and challenges posed.

10. Move from the experiential, first-hand experiences to the psychological; that is, after providing concrete experiences **assist students in making sense of experiences** by using purposeful strategies to promote understanding such as role plays, illustrations and analogies.

11. Assist students in their **consolidation of ideas** only as an extension of the initial experiential and psychological learning experiences.

12. Within the lesson and throughout the unit, move from concrete to more abstract ideas.

13. Provide opportunities for **student-initiated and directed investigations**.

14. Provide opportunity for students to make **connections among science and all other learning areas**.

15. **Foster student independence, creativity and curiosity** by providing opportunity for students' ideas and questions and follow-up opportunities for problem-solving and investigation.

16. Provide students the **opportunity to make connections between what they are learning and career opportunities**.

Standard Format for Resources

- Guiding Principles of the Unit
 - Cross-Curricular Applications
 - Conceptual Framework
 - Skills Development
 - Attitudes and Beliefs Development
 - Curriculum Applications
 - Things to Consider in Preparing to Teach the Unit
 - About the Activities
 - Activities
 - Conceptual Knowledge Background
 - Inuit Qaujimajatuqangit Background
 - References
 - Appendices
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Exemplars

Resource Development

- All manuscripts developed by the researchers.
 - Tremendous time commitment but exceptionally rewarding
 - Being used by the teachers and schools we work with and distributed through QSO and CRYSTAL website to Qikiqtani schools
 - Curriculum Division (Brian Yanamura) for Nunavut also incorporating them into some of their preliminary resource development work
 - Currently in English but also Canadian Council for Learning grant to ensure in Inuktitut
 - Imperative they are in Inuktitut
 - Posted on CRYSTAL site:
<http://www.umanitoba.ca/outreach/crystal/nunavut%20resources/Rocks%20Grades%201-3.doc>
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Evaluation of Project

- Year 3: Changes in Teacher Personal Attribute and Environmental Factors: Consistent with System B “The Learner & Their Environment”
- 8 factors identified through the diagnostic phase being monitored through the use of a validated instrument: Science Delivery Evaluation Instrument for Inuit Settings.
- Exists in both English & Inuktitut
- Statistically monitor development from the perception of teachers
- Development of this instrument funded by SSHRC
- Example of item (#2):
 2. I am supported in my effort to teach science from the perspective of Inuit culture and values.

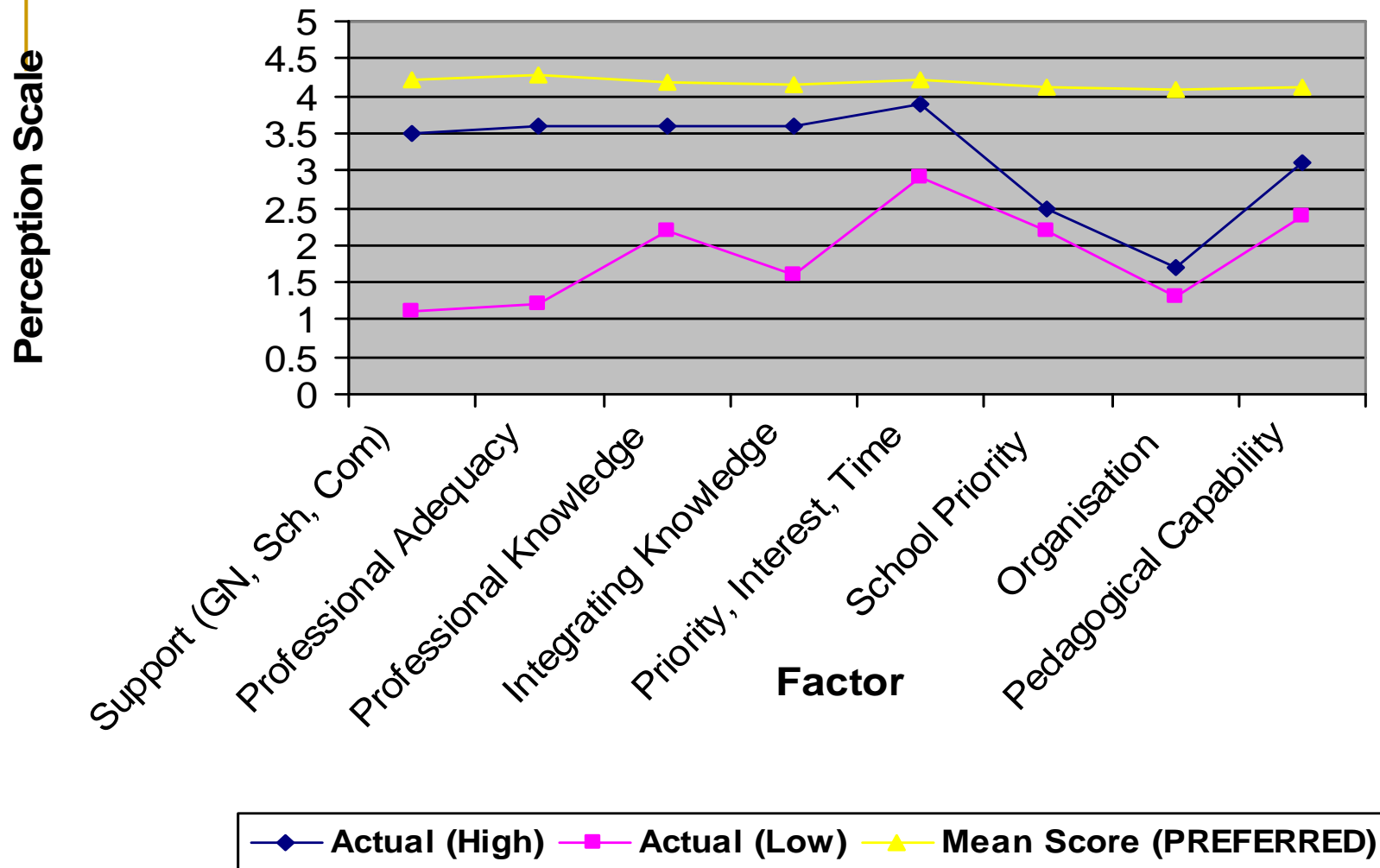


Figure 3 : Actual & Preferred SDEIIS Comparison (Igloolik) April 2007

Evaluation of Project

■ Year 2 & 3: Student development:

- ❑ Track clusters of students in each school over the duration of the project
- ❑ NWT (External) performance indicators: student scientific skills, integrated knowledge and scientific attitudes (Levels 1-5 and applied rubrics)
- ❑ Portfolios of student progress: language development, “two-way” learning, + or - perceptions of the classroom.
- ❑ Development of a further internal performance indicator: Instrument “Student Perceptions of Success for First Nation & Inuit Settings”.
- ❑ Funding assisted by Imperial Oil Academy for the Learning of Mathematics, Science and Technology
- ❑ Examples of responses:
 - “I get the opportunity to learn about my culture in science”
 - “My teacher teaches by using lots of examples”.

When do Students Think They're being Successful?

- Learning things valuable to their life.
- Completing tasks with a sense of accomplishment
- Helping someone in my class to learn
- Being able to figure something out on my own because the teacher believes I can
- Showing the class how they've solved a problem
- Showing and talking about a finished project to the class.
- Solving a problem and working something through to the end
- Satisfaction gained from doing something well
- Few made reference to extrinsic measures like a mark.

What Students Say About Teaching and Learning

- Culturally preferred practice
 - What are the characteristics of the classroom, the classroom teacher, and classmates that contribute to student learning?
 - What are your thoughts?
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Characteristics of a Positive Classroom Environment

- Preference is for a quieter environment
- Preference for a kind teacher who says nice things to me and the class
- Preference for teacher who praises us for something we've done well
- Preference for a patient teacher who does not get upset easily
- Preference for a classroom where we are part of the decision making
- Love surprises and events that make going to school more interesting
- Preference for a teacher who has expectations for me to learn

Teaching Practices that Help Me to Learn

- Speak at a language level we can understand
- Multiple levels of instruction (e.g. direct teaching followed by group teaching and one-on-one teaching)
- Peer teaching (one that knows is helping one that doesn't know, and they get to choose who helps)
- Project work where they are actually doing something (e.g., constructing and manipulating things rather than doing lots of writing)
- Working on topics that are of interest
- Learning new things
- Learning things from Elders

Summary Comments

- Time demanding but rewarding research and development project
 - Considerate of the vulnerability of Nunavut
 - Very satisfied to contribute to its understanding of what Inuit community's aspirations are what influences their development in science education.
 - Most importantly to contribute to the science education experience of its students.
 - Very grateful for NSERC and the opportunity afforded by the grant.
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