System B: **The Individual Learner as Part of a Classroom and School Community**

University of Manitoba
Centre for Research, Youth, Science Teaching & Learning

Focus of System B: The Individual Learner as Part of a Classroom and School Community

- Primary Research Focus: How do attributes of the classroom and school community combine to impede, or contribute to and sustain science and mathematics 'success' for teachers and/or students?
- Focus on the Learner - "teacher" and/or "student" as part of a classroom and school community environment.
- Objectives:

  (1) identify implemented mechanisms and the risk and supportive factors associated with these mechanisms which influence and sustain educators' instructional development.

  (2) identify the characteristics of instructional strategies, curriculum content and pedagogical orientations which contribute to student success;

Summary Comments

- Complex setting and development project
  - Political infancy of Nunavut
  - Nature of schooling in past
  - Re-structuring and re-orientation
  - Policy development as a foundation is vital
- Similar to NZ Maori situation but two decades delayed
- Project has great implications in terms of ‘process’ and ‘outcome’ for school development and science education in Aboriginal settings.
- Gratified to be facilitating this process
- Only possible because of NSERC funding

Projects in System B

- Improving the Teaching and Learning of Science using Units of Historical Presentation: Metz et al (Winnipeg & Manitoba)
- Honoring Local Aspirations: Old Crow (Yukon), Beaufort Education Council (Northwest Territories) and Qikiqtani (Nunavut) (Lewthwaite & McMillan)
- Improving Teaching of Grade 9 and 10 Science and Mathematics (Wessel et al (Regina & FNU)
- Collaborative Research on the internet-based Keewaytinook Internet High School (Bartley, Lakehead)
- Improving Teaching of Mathematics for Inservice and Preservice Teachers (Kajander, Lakehead)
- Enhancement of University Science Teaching Pilot Study (Blais, Manitoba)
- Improving the Success of Teacher Candidates in Achieving Their Pedagogical Aspirations (2 sub-projects)

Honoring Local Community Aspirations for Science Education: Nunavut Pilot Study

- Based in three Qikiqtani (Baffin Island) Communities: Pond Inlet, Clyde River, Igloolik
- All elementary school (K-8) communities desire to offer school programs that “combine the views of both worlds” in all areas including science education
- 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
- Paralleling similar projects in Beaufort-Delta Region of NWT (CRYSTAL funded) and Maori-medium schools in NZ (SSHRC funded)
- Focus on teacher & student ‘development’


NUNAVUT
250 0 250 500km
Nunavut Territorial Parks
Proposed parks, Wildlife Areas
Bird Sanctuaries
Areas Under Federal Jurisdiction
Roads
Territorial Capital
Arctic Ocean
Magnetic North Pole
Ellesmere Island
Grise Fiord
Baffin Bay
Resolute Bay
Arctic Bay
Pond Inlet
Nanisivik
Clyde River
Victoria Island
Baffin Island
Qikiqtarjuaq
Igloolik
Cambridge Bay
Taloyoak
Kugluktuk
Hall Beach
Umingmaktok
Gjoa Haven
Kugaaruk
Pangnirtung
Repulse Bay
Bathurst Inlet
Iqaluit
Cape Dorset
kimmirut
Hudson Strait
Yellowknife
Baker Lake
Coral Harbor
Chesterfield Inlet
Rankin Inlet
Whale Cove
Arviat
Hudson Bay

Stages of the Development Process

A. Diagnostic Phase (Year One):

- Nunavut Government & QSO consent.
- Initial meetings with stakeholders in each community – parents, elders and LEA, 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).

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

"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)

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 curriculum development and provide examples of school development processes in science education consistent with Inuit Qaujimajatuqangit (IQ).
- This stage was financially funded by SSHRC

Stages of the Development Process

c. Implementation Phase (Years 2- …)

- Researchers in communities for total of 2 months per year (late fall & late spring)
- Targeting 14 learning in science topics – e.g., weather, rocks, seasons, plants, structures
- 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)
- Always working with interviewers & translators

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 diagnostic and formative assessment to inform planning and teaching and monitor student learning.
6. Engage students by starting lessons by providing first-hand experiences for students or drawing upon common experience.
7. When using story to engage students, use the interrupted-story-line as a vehicle to prompt first-hand investigations.
8. Deliberately promote scientific attitudes of mind (curiosity, problem-solving, working to end) student through thoughtful independent consideration of questions and challenges posed.

9. 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.
10. Assist students in their consolidation of ideas only as an extension of the initial experiential and psychological learning experiences.
Within the lesson and throughout the unit, move from concrete to more abstract ideas.
11. Provide opportunities for student-initiated and directed investigations.
12. Provide opportunity for students to make connections among science and all other learning areas.
13. Foster student independence, creativity and curiosity by providing opportunity for students' ideas and questions and follow-up opportunities for problem-solving and investigation.
14. 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

Ulus from Rock and Metal:

This is an adaptation of an interview with Therese Qillaq Ijjangiaq of Igloolik.

… I recall that ulus were also made out of rock material. These were long ago. Ulus used to be made from Uluksarnaak (for making ulu). Today we call this slate. It is in layers and very dark, sometimes even black. This was used a lot because it was easy to find in this area and it was easy to make it in flat pieces so it could be used to cut. It was not very strong but it was still good for fleshing and cutting. They would make very good scrapers against the hides to remove the flesh from the hide and make the hides softer. The sharpness did not wear out easily. I can remember making them when I was young because it was easy to take the rock and change it into ulus. It was something we liked to do.

Resource Development

- Manuscripts developed by the researchers
- Being used by the teachers 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…
- Imperative they are in Inuktitut
- Some components (stories & activities for teachers & students in Inuktitut)
- Applied for a SSHRC Northern Development grant for translation of resources.
- Posted on CRYSTAL site:
  http://www.umanitoba.ca/outreach/crystal/nunavut%20resources/Rocks%20Grades%201-3.doc

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.

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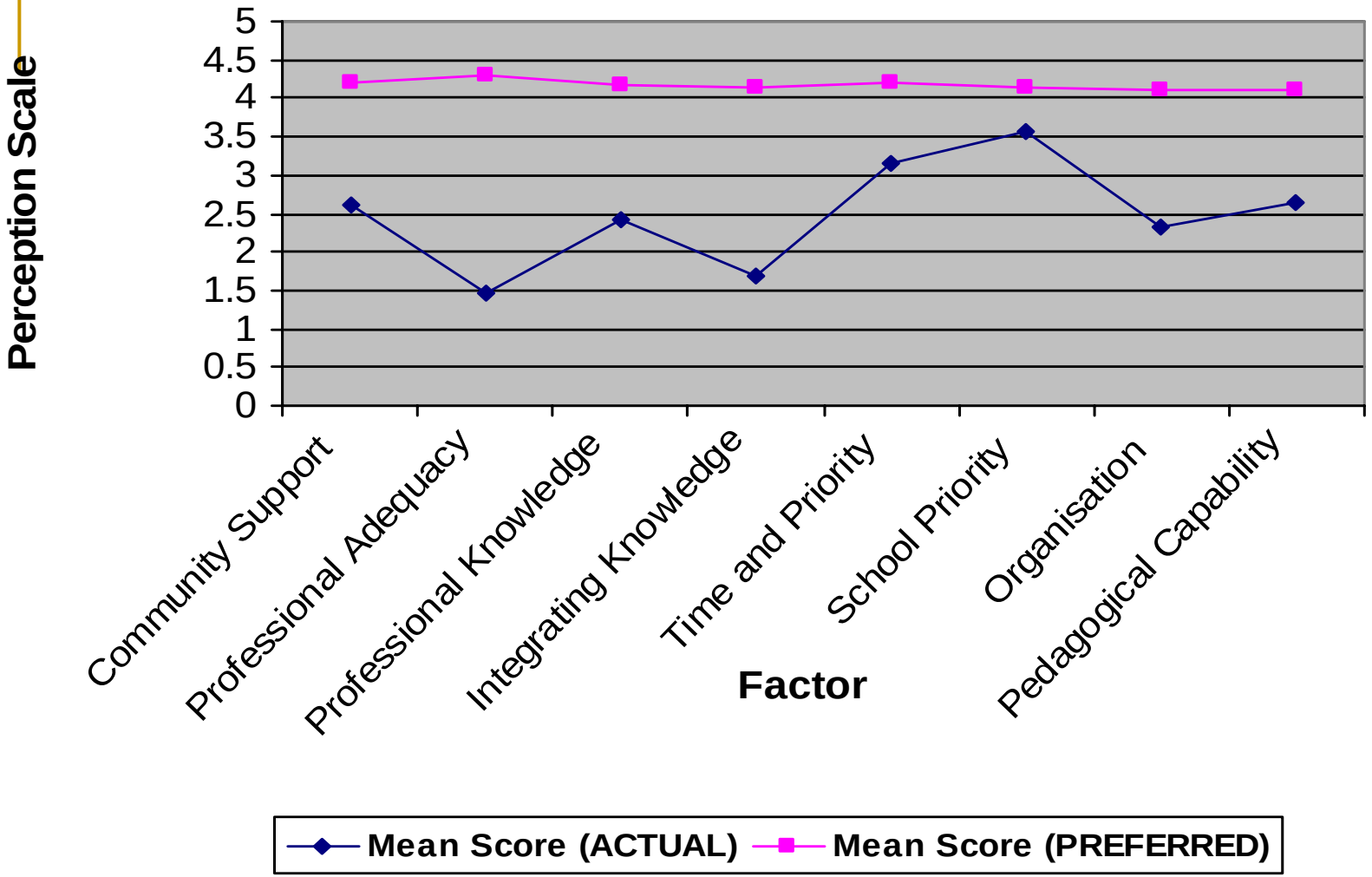

Figure 3 **:** Actual & Preferred SDEIIS Comparison (Clyde River)

Evaluation of Project

- Year 2 & 3: Student development:
  - Clusters of students in each school over the duration of the project
  - NWT (External) performance indicators: skills, knowledge and attitudes (Levels 1-5 and applied rubrics)
  - Portfolios of student progress: language development, “two-way” collateral & secured learning
  - Development of a further internal performance indicator: Instrument “Student Perceptions of Success”.
  - Funded by Imperial Oil Academy for the Learning of Mathematics, Science and Technology
  - Examples of responses:

    “Inuit knowledge (IQ) is important to my life”

    “The knowledge my parents have is valuable today”

    “Knowing science is important for my future”

    “Inuit knew lots about the world around them”

Summary Comments

- Complex development project because of the many risk factors impeding development of ‘two-way’ learning experiences
- Conscious awareness of the need for change the strongest supportive factor
- Similar to NZ Maori education: move from paternalistic to autonomous model of action
- Significant in terms of examples of ‘process’ and ‘outcome’
- Beneficial for other Indigenous settings working towards similar ends
- After 300 schools, most demanding yet satisfying school development project in which I’ve been involved
- Only possible because of NSERC funding.