Our Living Ecosystem: What are the Interconnections among the Elements Surrounding Us? A Classroom-based Activity in Nunavik

INTRODUCTION

Natural environment (water, soil, air, etc.) and built environment (houses, schools, roads, etc.) are part of a larger global ecosystem; all elements are tightly interconnected and affect each other. People, plants, animals and other living beings are also integral components of the ecosystem. An ecosystem includes not only elements that we see, but also intangible ones such as culture, spiritual beliefs, music, arts, and the economy. Emphasizing the dynamic links among these elements and how they relate to each other is central to understanding the intimate interdependence between an ecosystem and the health of all its living beings.

Drawing from this premise, we developed an environmental education activity that was conducted in high schools in two villages in Nunavik (Northern Quebec) during February and March 2012. In this report, we share our methods and rationale to promote the adaptation and modification of this activity in other schools.

THE COMMUNITY STORY

This environmental education activity is a result of our collective research efforts to promote ecosystem approaches to health, also known as Ecohealth, a research method that embraces complexity, transdisciplinarity, social justice, gender equity, multi-stakeholder participation, and sustainability (Webb et al., 2010). We saw this activity as a way to merge our respective research interests, i.e., environmental contaminants and country foods' health benefits and risks, as well as the social determinants of Inuit health, with a focus on housing, health, and well-being.

This activity was conceived during an initial visit to Nunavik for research purposes on the above mentioned topics in October 2011. At a community event, we had the opportunity to meet and talk to high school teachers. We discussed the possibility of presenting our research to the students, and eventually offering educational activities to encourage high school students (grades 9
to 11) to learn more about the natural and built environments of their communities. Often, teachers in the North are required to teach all subjects and some of them mentioned having a limited science background (e.g., in geography or natural sciences). They were enthusiastic about the possibility of external input to help include local environmental issues in their teaching program. They strongly favored hands-on and outdoor interactive activities to engage students in learning and sharing their knowledge and concerns about their environment. Between October 2011 and February 2012, we developed the content and learning objectives of the activity in a joint effort with the high school science teachers. The school directors and school board then gave approval for the activities to take place in the two schools. Additional support was provided by Let’s Talk Science (www.letstalkscience.org), a Canadian charitable organization that funds and delivers hands-on/minds-on educational activities to promote interest in science among children and youth.

We developed this activity independently of our respective research projects, as a means of collectively acknowledging the involvement of communities in our research, building innovative research-based relationships, and establishing ties with new stakeholders. We also wanted to share our results and increase our awareness of young Inuit perceptions of their ecosystem in order to better involve them in our own research and intervention projects.

**DESCRIPTION OF THE ACTIVITY**

The overall goal of the environmental education activity was to stimulate students’ interest in both natural and social sciences. We used hands-on exercises to explore the links among the different elements of the surrounding ecosystem. We also included health issues related to environmental contaminants, diet, food security, physical activity, smoking, diabetes, etc.

The learning objectives of the activity were to:

1. **Explore notions of natural and built environments, the interconnections between them, and how they form a global system (an ecosystem) that includes all living beings and intangible elements such as culture, spiritual beliefs, music, arts, and the economy.**

2. **Explore how their community ecosystem relates to their health and well-being and to the health of other living beings in the community ecosystem.**

3. **Allow the students to share and express their knowledge and concerns about their ecosystem through interactive games, discussions, photography, and mapping.**

The activity was composed of two classroom-based activities and one outdoor activity. They were held on the same day but ideally should be done over two consecutive days.

**Activity 1: Notions about natural and built environments—the circle of interconnections**

**Location:** Classroom  
**Duration:** 20 minutes  
**Materials:** Yarn; pictures representing elements of the surrounding natural and built environments, local country and market foods, Inuit arts and culture, and youth day-to-day life. Each picture was slipped into a transparent folder that could be worn around the neck using a length of yarn.

- Sitting on the floor in a circle, we first introduced ourselves (where we are from and who we are), and then students and teachers did the same.

**Circle 1:**

- We presented notions of natural and built ecosystems using different pictures displayed on the floor (water, air, soil, school, housing, transportation, etc.).
- Everyone was given a different picture (to wear around their neck) representing tangible elements of the surrounding natural and built ecosystems.
- Students were asked to identify and discuss links among the different pictures/elements by throwing the yarn ball from one person to another in such a way to create links—like a spider web—between the different pictures (a circle of interconnections).
- Questions to promote discussion with the students during the activity included:
  - Where do you fish the Arctic char? (The student with the Arctic char picture throws the yarn ball to the person with the ice picture.)
  - How do you go seal hunting? (The student with the seal picture throws the yarn ball to the student with the picture of the Ski-Doo.)
  - Where can you find children in the community? (The student with the picture of children throws the yarn ball to the person with the school picture.)
  - How do the vegetables get into the village? (The student with the vegetable picture throws the yarn ball to the student with the picture of the Air Inuit plane picture.)
  - Where does the soft drink can go after you drink it? (The student with the can picture throws the yarn ball to the person with the photo of the dump site.)

- A discussion then took place on the dynamic web of yarn that was created during the activity and how each element was interconnected. Some examples of discussion questions were:
  - Do you realize how many things are interconnected?
- If you pull the pieces of yarn in your hand towards you, do you realize how it will affect the others?
- What do you think could happen if one piece of yarn is broken? What do you think could happen if the climate changes?
- What are the recycling possibilities in your community? (Why, how, etc.)

Circle 2:
- Ideas of more intangible aspects of an ecosystem were then presented using pictures representing culture, social media, arts, and music.
- We redistributed some pictures from Circle 1 while adding new pictures to represent social and cultural elements.
- Students recreated a circle of interconnections by throwing the yarn ball from one person to another, considering the new pictures/elements.
- A discussion then took place on how all the different elements in the circle are integral parts of an ecosystem and how they influence the health of living beings in the circle.

Activity 2: Photo voice—pictures of the village ecosystem

Location: In the village and surrounding locations (the duration and areas to be visited were determined with the help of the teachers)

Duration: One or two classroom lessons

Material: Digital cameras, photographic paper, and photo printer
- Facilitators invited students to form groups, with each group accompanied by a researcher or teacher.
- Each group was given a camera and assigned different sectors of the village. Their instructions were to take pictures of the ecosystem of this sector and return to class after 30 minutes to one hour.
- Students then had an introduction to the third activity: mapping. They were asked if they could find additional pictures or objects related to their ecosystem at home and were encouraged to bring them for the map during the next activity.
- The research team printed the pictures taken by the students before the next activity began.

Activity 3: Mapping the village ecosystem

Location: Classroom

Duration: One lesson

Material: A very large piece of paper, printed pictures taken in the previous activity, pictures used in the first activity, scissors, pens, pipe cleaners, markers, glue, and students’ objects from home (according to the suggestion given at the end of Activity 2).
- Researchers drew a map of the village on the paper before the activity began.
- In the classroom, students were asked to look at the printed pictures and to decide together how they want to recreate the village ecosystem.
- Students glued the selected pictures and other objects (e.g., an igloo made with pipe cleaners) on the map (see Figure 1).
- Discussions took place about how the community ecosystem influences health and well-being. Discussion questions included:
  - How important is the community freezer for health? Country food is very good for the body, but do you think it is also good for the mind? Why?
  - What do you know about the possibility of finding environmental contaminants in some country foods?
  - How important is it to go on the land (the larger ecosystem in which the village ecosystem is embedded)?
  - How can the smoke that comes from the dump [trash is burned periodically in the villages] affect your health? Who can be more affected in the village? What about the animals? The berries?
  - What happens if there are not enough places to stay in the village? Can living in an old, broken down house affect the health of your family?
  - Who is the best singer in town? The most famous carver? What do you find in his/her craft that relates to you? How does it makes you feel?

Following the three activities, we gave the pictures, cameras, and printer to the teachers so they would have the materials for similar activities in the future. Teachers received more information about Let’s Talk Science and were given the contact details of the program supervisor for future interactive web-based activities. They also were given a list of useful websites with innovative material for teaching science to high school students. These websites emphasize Ecosystem approaches to health and teaching methods; cover issues such as environmental contaminants; and feature photo, voice, and interactive activities that were designed for other projects.
THE CONDUCT OF THE EDUCATIONAL ACTIVITY: TAKING STOCK

Overall, the first and second activities worked very well. The students were enthusiastic and happy to participate in the circle of interconnections. They even created unexpected links. Some young hunters were very proud of their knowledge of their ecosystem and how to get country foods. The students were also dedicated and very creative photographers. Ideally, the third activity (see Figure 1) should have taken place the following day in order to have time to print the pictures between the two activities, and make sure students focused solely on the activities. Unfortunately, due to logistical and time constraints, we had to do the third activity right after the second. It was challenging to motivate students to participate during the mapping exercise. One solution could have been to print a Google Maps or Google Earth image of the community on a large piece of paper (instead of hand drawing the map), although in some communities satellite images are of low resolution or outdated. Sometimes, high quality maps are available from local or provincial government institutions. A more precise map would have helped capture the students’ attention by giving them a more accurate representation of their community. It also would have required less preparation. The map could have been divided into different sectors, one for each group of the second activity. Each group could have taken pictures in their respective sector of the community, designed their own map in smaller teams, and merged all maps into a single, larger one at the end of the activity. Discussions about the overall ecosystem of the village could then have focused on how the different sectors of the community (smaller ecosystems) relate to each other. Although discussions on the links among the different elements of the community’s ecosystem flowed easily, it was more difficult to elicit students’ ideas about how these might influence their health and daily life, as well as the health of other elements of the ecosystem. Other approaches to better facilitate group discussions or stimulate students’ critical thinking should be explored. An entire virtual map posted with the student pictures is also a possibility.

As academic researchers, we are not always able to stay in communities for long periods of time. It was therefore important to organize the activity well before our visit, but also to be flexible, patient, and prepared to quickly adapt to the day-to-day reality of students, schools, and communities. For example, the outdoor temperature—frequently dropping to -30°C during this time of year—was important to consider for the second activity.

The pictures for the first activity were selected to represent both past and present Inuit culture and lifestyle. Everyone sat in a circle on the floor, which is a familiar way of sharing in the Inuit culture. In the school in the first village, high school students (grade 9 to 11) were very enthusiastic, and quickly and spontaneously wove together the links among the different elements of the ecosystem. By contrast, high school students in the second school needed prompting to become engaged in the activity. These differences may be due to several sociocultural factors, such as the importance of the transmission of Inuit culture and traditional way of living to the youth (both in the schools and from the Elders), the dietary transition towards southern foods, and the social cohesion in the village. As part of the widespread effort to promote Inuit culture in Nunavik high schools, it would be interesting to hold this activity in collaboration with Inuit Elders to discuss traditional knowledge and intergenerational issues as they relate to living ecosystems and health.

We first designed this activity to promote exchange and knowledge sharing between researchers and high school students in two Nunavik villages. However, based on our experience, this activity could possibly be adapted for younger students or integrated into a science class curriculum or science fair. Regardless, this exercise proved to be a rich and enlightening researcher-community experience. We strongly encourage masters’ or doctoral students to integrate similar activities into their time spent as researchers in First Nations, Inuit and Métis communities. This will help them develop innovative ways of interacting with community members and translating scientific concepts into concrete examples that youth can understand, learn from, and potentially use in their own education.
These maps were made by the students in the two villages where the activity took place. The maps show the villages—delimited by roads—with images (also used in Activity 1) and pictures (taken by the students during Activity 2) representing the surrounding natural environment (rivers, sea, land, etc.), built environment (local institutions, community facilities, place of worship, etc.), and living beings found in or near the communities. Craft supplies were used to create 3-D objects: igloos, houses, caribou, flowers in the cemetery, trees, and fish. Interestingly, there are no trees in the first map since the village is located above the tree line.
ACKNOWLEDGEMENTS

We are grateful to all the students for their active involvement, and we also thank the teachers, school directors, and Let’s Talk Science for their support and participation in the design of the activities. Additional environmental education activities may be realized in other villages over the coming months.

APPENDIX

Checklist of material:
- Yarn (three balls)
- Pictures or images representing items of the surrounding natural and built environments, dietary habits, Inuit arts and culture, and youth day-to-day life (according to the number of students)
- Transparent folders (according to the number of students)
- Digital cameras (according to number of groups)
- Photographic paper
- Photo printer and ink
- Large piece of paper, large map, or printed Google Map of the community
- Scissors
- Pens and markers
- Pipe cleaners
- Glue and tape

REFERENCES


ENDNOTES

i Pictures (available on request) were selected according to the number of students and the possibilities of interconnections. When possible, we used photographs of the villages where the activities were held. Subjects included: the natural environment (atmosphere, ice, river, tundra, caribou, seal, beluga, Arctic char, goose, ptarmigan, mussels, polar bear, children, Elders, dogs); built environment (house, school, health care centre, igloo, Ski-Doo, 4-wheeler, boat, pick-up truck, Air Inuit plane, dump [specifically, the metal section in the dump nicknamed Canadian Tire because people go there for metal parts and furniture]); dietary habits (berries, community freezer, soft drinks, plastic bottles, fruits, vegetables); and culture, arts, and other social elements (hunting, fishing, computer, iPods, Facebook icon, Elisapie Isaac CD, Lady Gaga CD, throat singers, carving, Inuksuk).

ii More information on ecosystem approaches to health, including an online teaching manual can be found at www.copeh-canada.org. Other relevant websites include the Nqiiit online course on environmental contaminants in the Arctic (www.inuitknowledge.ca) and the following:
- www.ecokids.ca/pub/kids_home.cfm
- http://magma.nationalgeographic.com/ngexplorer/0403/quickflicks
- http://forest.mtu.edu/kidscorner/ecosystems/definition.html
- www.kidsgeo.com/index.php
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

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