ENVIRONMENTAL LITERACY AND PLACE-BASED ENVIRONMENTAL EDUCATION

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INTRODUCTION

Some argue that climate change is the defining issue of our time. The UN Intergovernmental Panel on Climate Change (IPCC) released a report in late 2018 suggesting unprecedented changes are needed to prevent catastrophic impacts of a changing global climate. The types of problems and the solutions needed are complex in nature and will require students to be environmentally literate citizens of the world.

BC's New Curriculum states that students are expected to "experience and interpret the local environment", "analyze cause-and-effect relationships" and "contribute to finding solutions to problems at a local and/or global level through inquiry", among many others (BC Ministry of Education, 2018). Aligning almost identically with these competencies is the definition of environmental literacy. It is defined as the ability to perceive and interpret the health of environmental systems and to take appropriate action to maintain, restore, or improve the health of those systems (Desinger and Roth, 1992, p. 3). While environmental education is popular in many schools and classrooms, it should be evaluated on its effectiveness at increasing students environmental literacy in order to make the changes needed for the future of the planet and to best reach the curricular competencies of BC's New Curriculum. The purpose of this research is to assess any increase in students environmental literacy after participating in place-based environmental education activities.

This research aims to answer how place-based environmental education activities increase themes in written work indicating increased environmental literacy among students.

LITERATURE REVIEW

Environmental Education

Environmental education has grown in popularity in recent decades. Many school districts have, or have proposed, fully outdoor schools many of which are based on the Environmental School Project in Maple Ridge, BC (Environmental School Project, 2019).

The work of Sauvé (2005) provides an overview of literature in the field of environmental education and found that most teachers recognize the important role of education in solving environmental issues, however teachers are adopting a large variety of ways of teaching environmental education for this purpose. This article celebrates the diversity in the field but also suggests it may be a starting point for critical analysis of the various methodologies.

Place-Based Design for Environmental Literacy

A clear purpose for the activity and what we are hoping students will gain from it is needed. Work by Desinger and Roth (1992) provides a definition of environmental literacy which they suggest should be the base for setting standards of environmental education.

The authors argue "knowledge, skills, affect, and behavior need to be addressed in education designed to increase environmental literacy"(Desinger and Roth, 1992, p. 5)

There is a body of research to support both the use of place-based education and environmental education in the development of environmental literacy among children and youth. In the article *Place-based education: Connecting classroom and community* (Sobel, 2004), place-based education is defined as "the process of using the local community and environment as the starting point to teach the curriculum" (Sobel, 2004, p. 6).

The three qualities of activities for effective development of environmental literacy were: cognitive development (being able to determine stronger vs weaker arguments), holistic development (taking responsibility for what you believe and thus a change in one's sense of self/ agency/ ethics) and active learning (physically active and in small groups). (Reynolds, 2010, p. 117-124)

Other Projects

A 2005 study examined the effects of a neighbourhood-based urban environmental education program on grade 3 and 5 student's awareness of their local biophysical environment. The program aimed to foster a sense of stewardship by allowing the children to "wonder and discover" through examination of both the social and natural history of their local urban environment (Fisman, 2005).

This study is an example of teacher action research which successfully used both quantitative and qualitative methods. The qualitative methods used were analysis of student journals, classroom observation, and informal interviews with teachers. The results of this study showed a significant positive effect of the program on student's awareness of the local environment and their knowledge of environmental concepts.

In a study by Shume (2016), the author examined a place-based approach to developing environmental literacy through third grade students' participation in a prairie restoration project. The purpose of this study was to examine teachers' perspectives on how the project impacted students' environmental literacy.

The research methodology for this study stemmed from an interpretivist worldview and was qualitative in nature. Data was collected from field trip observations, classroom observations, interviews, and products over one academic year by seven different teachers. Data were categorized using an open coding process. Segments of data related to broad themes associated with environmental literacy were identified and labelled. These labels became the organizational codes that served as "bins" to sort data. Six interrelated themes emerged from data analysis describing teachers' perspectives on how the project impacted students' environmental literacy. They were: at ease with nature, appreciation and respect, wonder and curiosity, awareness of ecological interdependence, sense of agency, and responsibility and service.

METHODS

Middle school with diverse student population	• Elective Food Sustainability class
Participants	• Grade 8 students • Students with consent form and ethics approval
Unit	• Native plants and traditional indigenous uses and, • Promotion of native bee health

Data Collection

- Students were asked to complete two written responses, one pre-unit and one post-unit
- Students were asked: what is an environmental issue in your area you are aware of? What skills do you have to help with this issue? How likely are you to help and why?

Themes

- After reading the written responses, and my reading of the literature, five general themes were developed
- Cognitive abilities (thinking and problem solving), responsibility (morals/ethics), affect (appreciation/respect), awareness of ecological interdependence, and sense of agency

Data Analysis

- Themes were analyzed for their frequency in the responses
- Examples of each theme were color coded using highlighters

UNIT OVERVIEW

The unit was as follows:

Lesson	Activities
1	Building Planter Boxes
2	Building Planter Boxes
3	Plants of Cultural Significance for the Secwepemc People
4	Bee Garden Needs
5	Planting Seeds for the bee garden and field journaling (seed growth timeline)
6	Culturally Significant Plant of the day: Devils Club • make salve
7	Culturally Significant Plant of the day: Saskatoon • Saskatoon berry jam
8	Research Project • Chose a culturally significant plant of the Secwepemc people, uses, it's role in the environment, and how it supports local bees
9	Research Project
10	Research Project Presentations
11	Guest Speaker- Trudi Neilson (SD73 Ab Ed) - Juniper and sage lip balm

This unit was delivered in the middle of a unit on local pollinators. Before the unit, the students heard a presentation on local bee's and their needs by Elaine Sedgman, a local Master Gardener, and a presentation on the use of field journaling by plant ecologist Dr. Lyn Baldwin of Thompson Rivers University. Utilizing local experts further connected this unit to place and local knowledge.

Both the field journaling and bee elements were combined in the unit in addition to the incorporation of local native plants and traditional Indigenous uses of these plants as a way to link the two concepts and further connect it to the local geographical area.

After this unit, the students were going to participate in a bee capturing event for examining and inventorying of the bees. The students were also going to continue to create bee-supporting garden space at the school. After this unit, creating a larger indigenous bee-supporting garden was proposed for next year.

RESULTS

In the pre-unit response there were 28 instances of these themes. In the post-unit response there were 48 instances of these themes.

Sample statements:

"…I want and am likely to help (agency) because I know it is a global issue and lots of animals can die from it (ecological interdependence)…"

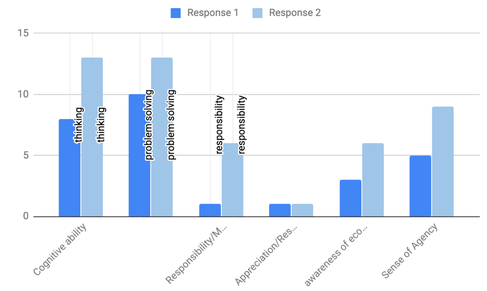
"this is an issue because people aren't being smart about their decisions (responsibility)…"

"…I could take a group of people on a walk (agency) and ask them if they were an animal, would they want to be in the same place as them (cognitive ability/ecological interdependence)…"

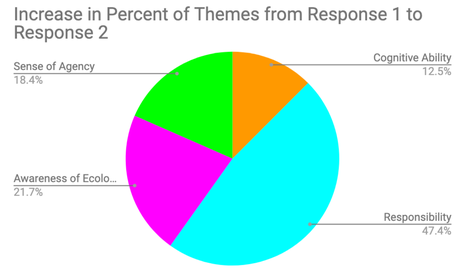
Number of Instances of Themes in Each Written Response

Theme		Response 1	Response 2	Colour code
Cognitive ability	thinking	8	13	Orange
	problem solving	10	13	Orange
Responsibility/Morals/Ethics	responsibility	1	6	Blue
Appreciation/Respect (Affect)		1	1	Yellow
awareness of ecological interdependence		3	6	Pink
Sense of Agency		5	9	Green

Comparison of Number of Instances of Themes in Written Response 1 and 2



The most statements by number indicating environmental literacy were cognitive ability statements. There were 18 pre-unit instances, and 26 post-unit statements. However, this represents the lowest increase over the unit. The largest increase in statements indicating environmental literacy were responsibility statements, with a 47% increase in number in the second response. There was a similar increase in sense of agency and awareness of ecological interdependence (approx. 20%).



CONCLUSIONS

These results are consistent with the literature and suggest that place-based environmental education can be a tool for increasing environmental literacy among students.

These results represent the success of the choice of the objectives for the components of the unit. The inclusion of the Indigenous world view, native plants, and bees focus on interconnected relationships. The hands on learning opportunities were positioned as ways in which we can engage with the issues facing our global systems on a local scale (such as creating a bee garden with native plants). Positioning these activities as a response to a problem was intended to instill responsibility in students. It is hypothesized that these learning opportunities fostered a sense of agency and an "I can do this" feeling among students.

It should be noted that the questions posed to students were designed to elicit certain themes in their responses. Longer and more open responses may be a good avenue to discover more themes. More research such as follow through on their commitments for action would be an interesting next step.

REFERENCES

Disinger, J. F., Roth, C. E., & ERIC Clearinghouse for Science, M. and E. E. C. O. (1992). Environmental Literacy. ERIC/CSMEE Digest. Retrieved from https://ezproxy.tru.ca/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=ED351201&site=eds-live

Fisman, L. (2005). The Effects of Local Learning on Environmental Awareness in Children: An Empirical Investigation. Journal of Environmental Education, 36(3), 39–50. https://doi.org/10.3200/JOEE.36.3.39-50

Intergovernmental Panel on Climate Change. (2018). *Global Warming of 1.5° C: An IPCC Special Report on the Impacts of Global Warming of 1.5° C Above Pre-industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty*. Intergovernmental Panel on Climate Change.

Reynolds, H. L. (2010). Teaching environmental literacy. [electronic resource] : across campus and across the curriculum. Bloomington : Indiana University Press, c2010. Retrieved from https://ezproxy.tru.ca/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=cat03106a&AN=tru.a866694&site=eds-live

Risya Pramana Situmorang, & Sari Dewi Tarigan. (2018). Cultivating students' environmental awareness by creating bottle garden in school: A qualitative study. JPBI (Jurnal Pendidikan Biologi Indonesia), Vol 4, Iss 3 (2018), (3). https://doi.org/10.22219/jpbi.v4i3.6785

Sauvé, L. (2005). Currents in Environmental Education: Mapping a Complex and Evolving Pedagogical Field. Canadian Journal of Environmental Education, 10(1), 11-37.

Shume, T. (2016). Teachers' Perspectives on Contributions of a Prairie Restoration

Sobel, D. (2004). Place-based education: Connecting classroom and community. Nature and Listening, 4, 1-7.

Wong, C. A., Afandi, S. H. M., Ramachandran, S., & Kunasekaran, P. (2018). Conceptualizing Environmental Literacy and Factors Affecting Pro-Environmental Behaviour. International Journal of Business & Society, 19, 128–139. Retrieved from https://ezproxy.tru.ca/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=129553789&site=eds-live