Developing Environmental Responsibility Through Place-based Education

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Abstract— **In response to the release of the Intergovernmental Panel on Climate Change (IPCC) *Fifth Assessment Synthesis Report*, Dr. John P. Holdren, Director of the U.S. White House Office of Science & Technology Policy stated "The IPCC's new Synthesis Report is yet another wake-up call to the global community that we must act together swiftly and aggressively in order to stem climate change and avoid its worst impacts". Realizing this call to action will require the active participation of governments, industries and global populations. Unfortunately governments and industries often let short-term economic considerations govern their behaviors contrary to the efforts required to address long-term environmental and social issues associated with climate change. Communities, NGOs, families and schools often lead the way in the development of informed populations whose citizens are supported in their personal responsibility for social actions towards climate change. Schools that follow place-based educational principles actively involve students in a range of community concerns with goals of informing and encouraging action in a wide variety of environmental and social issues. Research identifying long-term development of responsible citizenship is linked to place-based education. This paper describes long-term analysis of a program utilizing place-based science education and how these practices have effected the students' perceptions of their social and environmental responsibilities as citizens. It then explores how these approaches have led to responsible citizenship in northern Canada.**

Keywords- Place-based Education; Social Responsibility; Environmental Stewardship; Critical Pedagogy; Active Citizenship.

I. INTRODUCTION

The *Sixth International Conference on Bioenvironment, Biodiversity and Renewable Energie*s provides opportunities to address a wide range of topics relating humans and their interactions with the natural world. Most recently, the United Nations Intergovernmental Panel on Climate Change IPCC released the first of four chapters of its *Fifth Assessment Report* AR5 in November [1]. The report calls for a strong, concerted global effort to combat climate change. This is seen as necessary to protect the health of our economies, communities, children and future [2]. Such a concerted global effort will require that populations are informed, critical and actively involved in a wide range of climate related issues. In North America, various governmental, industrial and economic forces have strenuously opposed such action out of concern that these efforts may negatively impact their own economic wellbeing. Canadian Prime Minister, Stephen Harper characterizes this ideology as he recently stated, "No matter what they say, no country is going to take actions that are going to deliberately destroy jobs and growth in their country. We (Canada) are just a little more frank about that" [3]. Some governments and industry groups have undertaken aggressive, pervasive, and persuasive advertising programs in an attempt to assuage environmental concerns. A pro-development campaign within Canada has not gone unnoticed: "Responsible resource development, Canadians now accept, is something we cannot afford. The mantra of economic growth at any cost has made us willing participants in the rape that Harper and his corporate masters have enabled" [4]. Many resource development groups, along with political representatives, often distort and manipulate conditions so as make critical analysis undesirable and label those dissenters as 'radical' and 'unpatriotic'. A common narrative that has emerged in Canada is that citizens who express concerns about environmental conditions are often labeled 'extremists' [5]. Currently, numerous social media platforms consistently include rhetoric attempting to persuade Canadian citizens that pipelines, fracking and the Alberta tar sands bitumen development benefit the whole Canadian population through 'job creation' and 'national prosperity', with little to no reference to the cost to environments, health and to the social fabric of communities.

In the face of such public campaigns, it has become increasingly important to have an informed and critical citizenship prepared to embrace responsible environmental and social behaviors. Barr's research on environmental and social responsibility shows that public relations campaigns and advertisements are not sufficient to develop this type of citizenship [6]. This type of critical citizenship finds its origins rooted in active involvement at the level of community. Active citizens dynamically embrace the social responsibilities associated with environmental citizenship and see, as part of their civic roles, the necessity of becoming informed, maintaining critical perspectives and becoming actively involved in social, political and environmental issues [7]. The genesis' of such citizenship rests in family, community and schooling that promotes responsible environmental behaviors. Hines et al. in their study on the analysis and synthesis of research on environmental behavior determined the following variables were found to be associated with responsible environmental behaviors: knowledge of issues; knowledge of action strategies; locus of control, attitudes; verbal commitments, and; an individuals

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sense of responsibility [8]. A follow-up meta-analysis conducted by Bamberg and Möser twenty years later had similar findings. They found results that support "the conception of pro-environmental behavior as a mixture of self-interest and pro-social motives. … There is also progress in the understanding of factors/processes contributing to the development as well as activation of pro- environmental moral norms" [9, p. 22].

We posit that the conditions that give rise to responsible environmental and social behaviors are a major focus of place-based educational initiatives [10][11][12]. This paper explores the ways in which place-based initiatives may be incorporated in school instructional strategies. These place-based educational initiatives focus on the development of citizenship focusing on a critical knowledge of social, environmental and political issues and associated action strategies, locus of control, attitudes, verbal commitments and an individuals sense of responsibility within a community.

This paper is structured as follows: in Section II, we define citizenship and posit that critical thinking is a central foundation. In Section III, we introduce the field of place-based education. We proceed to describe two related longitudinal research projects (Section IV), and their methodologies (Section V), that examine the extent to which an experiential education initiative has fostered responsible citizenship through place-based activities. In Section VI, we discuss our findings, and finally, Section VII gives a summary of the main findings and highlights compelling evidence indicating that educational processes involving place-based activities that encourage data collection, refection and action are important antecedents to responsible citizenship.

II. CRITICAL PEDAGOGY AND CITIZENSHIP

Here, we use Glaser's definition of citizenship: "Good citizenship calls for the ability to think critically about issues concerning which there may be a difference of opinion and apply democratic values to the issues. Critical thinking has three components: an attitude of carefully considering problems, knowledge of logical inquiry methods, and skill in applying those methods". [13]

In the examination of the educational processes and social actions that lead to good citizenship, we posit that critical thinking is the central foundation [7][14][15].

> *Learning to think critically is conceptualized as the acquisition of the competence to participate critically in the communities and social practices of which a person is a member. If education is to further the critical competence of students, it must provide them with the opportunity at the level of the classroom and the school to observe, imitate and practice critical agency and to reflect upon it. Learning contexts must be chosen which students can make sense of and in which they can develop a feeling of responsibility for the quality of the practice in question.* [16, p. 359]

A crucial condition to critical pedagogy is it needs a context to be relevant and therefore be sustainable [15][17]. Community issues in which frame place-based learning provide the context for critical thinking, situational conditions, and for attributes such as locus of control. Place-based educational activities focus on environmental and social values, situational characteristics and psychological variables; as community action is open to a range of varying and competing interests [6].

III. PLACE-BASED EDUCATION

Place-based education (PBE) provides the learning context. PBE is an approach to teaching that is grounded in the context of community, both natural and social. It connects place with self and community. The field has emerged from the strong roots laid by thirty years of environmental education in North America [18][19]. PBE provides a purpose to the knowledge and reasoning taught in schools. It provides a contextual framework for much of the curriculum (i.e., gives meaning to the studies) and engages the student in the conditions of her/his own reality. Tyler examines an educator's ability to influence the environment to promote learning: "It is desirable that the problems be set up in the kind of environment in which such problems usually arise in life. This is more likely to result in his viewing this as a real problem worth of his effort to solve" [20, p. 69].

A survey of the literature on PBE reveals characteristic patterns to this still-evolving approach that make it distinctive:

- It emerges from the particular attributes of a place. The content is specific to the geography, ecology, sociology, politics, and other dynamics of that place. This fundamental characteristic establishes the foundation of the concept.
- It is inherently multidisciplinary.
- It is inherently experiential. In many programs this includes a participatory action or service-learning component; in fact, some advocates insist that action must be a component if ecological and cultural sustainability are to result.
- It is reflective of an educational philosophy that is broader than 'learn to earn'. Economics of place can be an area of study as a curriculum explores local industry and sustainability; however, all curricula and programs are designed for broader objectives.
- It connects place with self and community. Because of the ecological lens through which place-based curricula are envisioned, these connections are pervasive. These curricula include multigenerational and multicultural dimensions as they interface with community resources. [11]

IV. RESEARCH

We describe two related longitudinal research projects [21] that examine the extent to which an experiential education initiative has fostered responsible citizenship through place-based activities. The research project follows students from ten to twenty years following their participation in an integrated secondary science program

focusing on place-based activities in which science data collection and peer-driven social, political and environmental actions are promoted. The Experiential Science Grade 11 (ES11) program was created as a pilot in 1994 and is now in existence as a territorial education model. The ES11 program is a Yukon Territory public-school program of studies open to all Grade 11 students. Students from a wide range of schools choose to take part in the program. Students spend 35-45 days of a 93-day semester conducting field studies related to community issues and strategically connected to integrated curriculum science-related studies. During a ten-year study period, 357 students have participated in the program and three different educators have taught the ES11 program. About two hundred place-based activities covering a wide variety of issues have been the focus of student learning over the decade of research.

The ES11 program integrates Biology 11 (a survey course including studies related to population ecology), Geography 12 (studies of Atmospheric dynamics, geomorphology and resource utilization), Chemistry 11 (introduction to quantitative chemistry), Art 11 (focused on scientific illustration and landscape), Field Methods 11 (applied studies in environmental monitoring protocols) and Physical Education 11 (focused on physical well-being and outdoor education). Students are engaged in two full-day labs a week (Chemistry and Biology), housed in the local post-secondary institution Yukon College. Field studies expose students to a wide variety of 'experts' associated with a range of resource management issues. Rigorous field methods, reliable well-kept data and valid scientific methodology are the foundation of the program. The GLOBE program (Global Learning and Observations to Benefit the Environment) is an instrumental educational platform utilized to assist in engaging ES11 students in the field of experiential science. GLOBE is a worldwide hands-on, school-based education program that was crafted to develop an awareness of one's "Place" in the natural world. Through the use of environmental science related activities and an integration of traditional ecological knowledge, students develop an enlightened recognition of the proper relationship of self, community and global world. Students collect field data and analyze various aspects of environmental study issues before developing strategies to address and take action related to community concerns.

During an ES11 semester, students take part in a wide variety of place-based activities, often in the company of scientists who have been working in a related field. They take part in an intensive month-long trip that involves field studies and community activities conducted in a range of settings. Most of the activities involve environmental monitoring and most are longitudinal in nature as they span over a period of years. The community issues students address during their time in the ES11 program are typically characterized as PBE initiatives. The ability to infuse an outdoor activity with related environmental field studies benefits the whole educational enterprise. The linking of environmental field studies with an outdoor pursuit gives both the study and the activity additional educational value and meaning. In addition, field studies reinforce both labs and lectures in specific subjects, addressing a traditional education problem: integrating theory and practice [22]. Courses such as geography, survey biology, quantitative chemistry, ecology and environmental studies are often integrated and lend themselves to field studies that link to a range of outdoor activities. The field studies approach often takes on the mantel of PBE since many of the field studies are centered on responding to community concerns, studying and collecting data and proposing possible responses to the community-defined problem. Addressing 'real' topics and finding ways to apply the prescribed learning outcomes to these studies have proven to engage students in ways that secure knowledge and strengthen positive community attitudes. In this respect, including field studies with outdoor pursuits has been proven to be a successful educational approach [19][23][24].

V. METHODOLOGY

This longitudinal mixed-methods research [25] examines the extent to which various educational strategies foster long-term commitments to responsible citizenship. The research followed two distinct yet related paths. The first was a tracking of the post-secondary educational activities of the students who took part in the ES11 program. We were able to compile information related to students' choices of post-secondary institutions, program of studies, course results and employment. The preliminary results of an initial survey, combined with interviews and anecdotal discussions with many of the former students pointed to the value of early student involvement in place-based activities leading to social and environmental action and responsibility. We conducted "a spiral of cycles" [26] in our research, thus the preliminary results allowed us to refine not only the questions, but also the research techniques for following surveys and interviews. This gave rise to the second stream of research designed to collect more detailed information about the choices and actions of this cohort of students and how their ES11 experience may have influenced their subsequent values and actions. To this end, an intensive survey addressing many topics including questions related to their values and actions associated to active citizenship were distributed to students of this cohort. At present both of these research projects are ongoing. This paper reports on our preliminary findings.

Many features of this research are possible because of the size and nature of the community. The city of Whitehorse, in the Yukon Territory, Canada, is a relatively small isolated northern city. Many students opt to carry on their post-secondary education in different 'southern' universities and technology institutions. The Yukon Government offers students, who complete their secondary school (Grade 7-12) in the Yukon Territory, a *Yukon Student Grant*. This grant provides each student $5500 each year over five years towards post-secondary education. Students are required to maintain and report their academic standing to qualify for the ongoing grants. Our research has been able to use these features to track and keep in touch with former ES11 students. Based on the relatively small size of the Whitehorse community (approx. population 20,000), personal,

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community and educational relationships that develop during the program's field studies and place-based activities give rise to frequent encounters with former students and /or their family in various environments. These conditions result in opportunities to engage with students and collect valuable data. Research information related to the students' post-secondary education gained during the formal and in-formal student interactions are recorded in a database of student post-secondary records. Records of students receiving the *Yukon Student Grant* are also used to contribute to this database. To date, 150 of the 357 students have been added to the post-secondary database. Of these, 37 out of 45 have submitted completed surveys. The detailed survey takes more than an hour to complete. Some students have chosen to complete the survey through a personal face-to-face interview process.

VI. PRELIMINARY FINDINGS

A. Post-Secondary Educational Pathways

The initial stage of research followed 150 former students. In a number of cases, the students followed more than one path. Since the *Yukon Student Grant* program is provided within the registered five years, information following the five years has been obtained through interviews of students within the cohort.

The previous tables tell only part of a 'story' related to the activities undertaken by this student cohort. In depth review of results show that 90% of the ES11 students tracked, to date, went to university. Of these, the greatest number followed a science program. More than half of these pursued fields related to environmental studies.

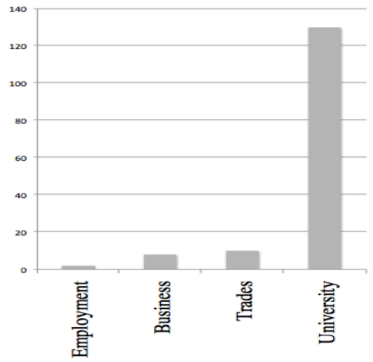

Figure 1. Post-Secondary Choices

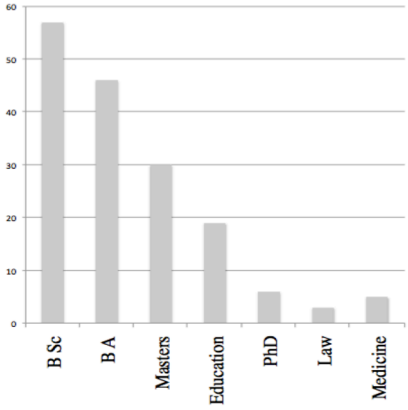

Figure 2. University Program Selections

B. Citizenship Survey Results

The second ongoing research project, that includes the intensive survey, paints a more comprehensive understanding of the impact the program had on long-term student engagement and citizenship. To date, 37 of 45 surveys have been returned. The detailed survey includes a bank of open-ended questions that address seven broad topics: education and training following high school; employment history; service to community or society; friendships persisting from high school; personal background; travel and recreational interests; impacts of high school on subsequent choices, and; a concluding open ended section that invites further comments. The first four banks of questions provide quantitative information while the last three banks of questions provides qualitative information. Overall, the intensive survey provides a blend of quantitative and qualitative information that yields insights into the individuals' citizenship and the extent to which the ES11 program may have influenced subsequent life choices. Each of these topics is summarized below.

1) Interim Quantitative Findings

a) Post-Secondary Education

- All 37 respondents took part in post-secondary education and training.
- All completed more than one program of studies and completed more than one degree.
- 25% attended their first course at the local post-secondary institution-Yukon College and then went to southern Canadian post-secondary institutions.
- 20% have attended university and training institutions in other countries (UK, US, NZ and Australia).
- 45% of respondents have completed graduate studies-Masters, PhD or professional degrees.

b) Employment

- Employment histories indicate that 85% of the students worked part-time in the Yukon during their time at studies and then took jobs in many different Canadian and international locations.
- All respondents had jobs when they responded, and 20% indicated they were looking for other positions.
- The most interesting result as it relates to this paper is 45% held employment in fields related to environment or environmental monitoring.

c) Travel and Recreational Interests

- All respondents have traveled to 2 or more continents and all indicate an interest in more travel.

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They have collectively visited and/or worked in every continent.

- All respondents have remained active in outdoor activities and attribute many of their secondary school activities as the origins of these pursuits.
- 40% of the respondents indicate they coach in areas related to their outdoor interests.
- Some respondents listed a wide variety of outdoor activities while others describe their interests as outdoor activities and healthy lifestyles.

d) Personal Background

- 70% of the respondents indicated they were married or in long-term relationships, 55% have children and only 25% indicated they were single. Only one respondent had been divorced after six years of marriage.
- 60% considered themselves to be settled in their lifestyle, but of these, half indicated they were settled in their personal lives but not yet settled in their employment and also on where they live geographically.
- 25% of respondents live in the Yukon, and 60% of the respondents living outside the Yukon indicated they would like to live in the Yukon or in the province of British Columbia (just south of the Yukon).

2) Interim Qualitative Findings

To best represent the qualitative findings, we have chosen in this section of the analysis to provide representative quotes from the student responses that demonstrate key themes. Their voice, expressing common themes over a period of years, time and again provides compelling evidence regarding the values and subsequent actions of the former students.

a) Impacts of Experiential Science on Subsequent Choices

Three quarters, 75% of the respondents indicated that the ES11 program impacted their subsequent career and educational choices. The following quotes represent the scope of these views.

> *The extended trip in ES was an invaluable learning experience for me regarding my ability to interact and communicate with others. As we (students) were tangled in socially intense learning environments (due to traveling with many adolescents), we were forced to learn and adapt to other peoples behavior. My ability to communicate has continued to grow and is an integral part of my job. I started learning about tolerance, empathy, charity, and patience when I was in ES, and it has allowed me to grow into the medical provider that I am today.* (Male, 1998)

> *Motivated, engaged and challenging teachers with an awareness of current events reinforced my interest in global politics encouraged my interest in development studies and sustainable communities…it had a lasting impact on my decision to pursue an education that included an environmental component.* (Female, 1996)

> *From the ES experience, I value opportunities to learn through practical experience and trying –and possibly failing. I value innovation. I value environmental sustainability and policy decisions that have been informed by science.* (Male 1997*)*

> *Collecting salt from the side of the Alaska Hwy and taking it into the chemistry lab at Yukon College and actually figuring out how much salt was present in the gravel to link to caribou occurrences there, integrating chemistry, biology, and ecology. This experience as holistic learning changed how I viewed education and the world around me. I also learned that education could be fun and if I found something I enjoyed learning about, like how humans encounter their environment, it was up to me to figure it out for myself.* (Female, 2003)

> *My high school experience cemented my interest in natural sciences. I sought out programs that could offer field-based studies.* (Male, 1996)

> *My educational experience shaped my long-term employment goal to be part of an organization that promotes global sustainability, environmental awareness and social conscience while building networks between governments and civil society. Ultimately, it reinforced my interest in development studies with a focus on environmental issues.* (Female, 1999*)*

b) Relationships

It is important to reiterate that students who took part in ES came from different schools and different communities. Even though they were only together as a cohort for a four-month semester and many now live in different parts of the word, 60% of respondents indicated they remain in contact with friends they formed during the time they spent in ES11.

> *I have maintained friendships with some people that I only met through this program and would have otherwise not know. Although not all people I kept in contact with, there are a select few that our relationship has grown over the years and I talk to on a regular basis (despite our geographical differences).* (Male, 1997)

> *I am very close to a few of the people from my ES class, and continue significant relationships with them to this day. It is always a pleasure to see people from my ES class.* (Male, 2001)

c) Service to Community or Society

95% of the respondents indicated they participate in service for their community and/or humanity. The following two quotes give a sense of his commitment to service and how service is related to citizenship.

> *Volunteer service is an essential aspect of being part of a community. It is an important consideration in how someone chooses to live because to be a volunteer encourages people to pursue activities they are passionate about; it also encourages people to be increasingly aware of issues outside their own social circles; and provides the opportunity to foster attributes like commitment and dedication. With such attributes, volunteers ensure sustainable programs that address*

local issues and needs. I helped the Conservation Society of Sierra Leone facilitate community outreach workshops to encourage increased awareness of environmental and conservation of natural resource issues. I organize and conduct rapid assessment surveys of coastal sea-turtle habitat and local fishing practices. (Female, 1999*)*

One of the things I learned from ES is that everyone has a voice; it's all about how you say what you want to say. One of the most important things is to learn about the matter yourself and not rely on what others (e.g., pamphlets, protestors, etc.) are trying to convince you of. Do your own research, learn about it and you will have a stronger voice for it. People are more likely to listen to a knowledgeable person than a passionate, one-sided rant. And you might learn something yourself that changes your view of what others are saying. Being open to other people's opinions is as much a part of having a voice as knowing what to say. (Male, 1998)

Only 2 of the respondents indicated their voices were not heard and had little opportunity to influence decisions locally or nationally. A number of respondents spoke to problems with electoral systems but they still felt the capacity to influence change. Every participant responded that they vote in civic, territorial, provincial and/or national elections. This contrasts with the turnout of average Canadians as reported in the most recent National May 2011 election; only 39% of Canadians aged 18-24 years and 45% aged 25-34 years voted [27].

d) Open-Ended Section

The survey invited respondent to make comments in an open-ended format. The following are a representative sample of their comments. Most of these relate to the experiential and PBE process:

After being in ES and after having gone through a moderate amount of post-secondary education I think that experiential learning is a more robust way of learning and teaching. Being able to see a medial moraine, a U-shaped valley, the impacts of clear cutting, etc., turned 'learning objectives' into concrete lessons. I think that in a perfect world all curriculums should/would be delivered in the same manner: intensive, tactile and above all meaningful. (Male, 2004)

Innovative experiential programs like these are an excellent model and should be expanded into other regions of Canada and other subject areas – perhaps in physics (engineering) and political/social studies? Decisions on where to move with my family and where to enroll my child for school will be heavily influenced by the availability of programs such as ES. (Female, 1995)

VII. CONCLUSION

The extent and nature of the responses to the detailed survey shows a community of practice [28] of young adults involved in community and a heightened understanding of 'place' in active ways. They express the significant role this type of educational experience has influenced subsequent life choices. Most participating students felt a sense of social and environmental responsibility, we suggest are values and attitudes needed to address issues such as climate change.

Data from the quantitative and qualitative analysis show complementary results. Those participating in the ES11 program demonstrated an uncommon level of engagement and civic and environmental responsibility. These students refer to the challenging and significant place-based field studies, the co-operative work relationships that develop during their semester and diverse instructional processes used throughout the program as features that left lasting change. Field studies resonated with those students who learn best experientially and in social contexts. Students consistently reported the short and long term benefits attributed to their participation. A number of students indicated they struggled with conventional classes yet found success and engagement in the environmental field studies approach to courses. In terms of conventional academic scores, students in ES11 consistently outscored all other high school classes taking similar courses.

The development of citizens who internalize community and global challenges related to social and environmental goals appears to be an essential aspect of addressing phenomena related to climate change. This research sheds light on how public schooling may contribute to such development. In summary, the actions and values expressed by ES11 participants reflect those qualities of responsible citizenship needed to address the challenges identified by the IPCC *Fifth Assessment Report* [1]. This research provides compelling quantitative and qualitative evidence indicating that educational processes involving place-based activities that encourage data collection, refection and action are important antecedents to responsible citizenship.

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