

Pedagogies of Empowerment in the Face of Climate Change Uncertainty

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Responses

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Introduction

Since the 1980's, anthropogenic climate change has become an increasingly pressing concern for scientists, policy-makers and citizens (Barnett et. al., 1999; Weart, 2003; Walker & King, 2008; Nordhaus & Sheelenberger, 2010). Figuring centrally in the challenge is to adequately understand and respond to the present and future impacts of climate change in its associated uncertainty. There is significant debate surrounding the causes (and attendant attribution of responsibility for mitigating and adapting to climate change), the scale of consequences to anticipate, and the urgency with which we must respond to climate change.¹ Though a degree of uncertainty is present in all human knowledge, within the climate change discourse it functions as an obstacle to action. Simon Shackley and Brian Wynne (1996) remind us that “the mere occurrence of uncertainty talk is not interesting unless we can document and interpret its construction, representation, and/or translation” (p. 277). The express purpose, therefore, of this article is to examine the “construction, representation, and/or translation” of uncertainty in climate change discourse as it relates to pedagogy. In the spring of 2010, six graduate students in the Faculty of Education at York University initiated a collaborative research project taking as our subject of inquiry climate change and pedagogy.² One of the outcomes of the collaboration is this paper. We take seriously Bruno Latour's (2004) petition that academics reconsider the iconoclastic ends of critical theory, and his caution that we not simplify, or worse dismiss, matters of concern because a degree of uncertainty is present.³ After Latour, the structure of the paper can be described as a gathering, or assemblage, of perspectives on the pedagogical nature of uncertainty in climate change and the pedagogy of climate change uncertainty (ibid).⁴ We are interested in the socio-political mechanics of what and how uncertainties in the discourse of climate change and climate change pedagogy reveal and obscure climate change as a matter of concern. For example: How do we respond? How must we respond? What do we need to learn to respond ethically? What is at stake in our response or lack thereof? How are our responses structured pedagogically? How are our responses (or lack thereof) pedagogical? We examine the partial particularities, rich histories, local contexts, affective dimensions, and diverse politics that uncertainty performs and provokes pedagogically. By enacting a gathering of perspectives, we endeavor to model the possibilities of coalition and alliance-building between and among diverse sectors despite uncertainties. Following a brief discussion of articles that inform our

¹ The Earth is naturally warmed by the greenhouse effect whereby energy from the Sun is trapped by the atmosphere. Without the greenhouse effect, the Earth would be much cooler. Carbon emissions from the burning of fossil fuels, as well as other gasses and pollutants, are trapped in the atmosphere and enhance the greenhouse effect. The result is anthropogenic or human-induced climate change due to global warming.

² With Faculty Advisor Steve Alsop

³ In a move to avoid relativist arguments about the “true” nature of the real, Latour opposes “matters of fact” with “matters of concern” preferring the latter.

⁴ Latour invokes Heidegger's conception of “a gathering” as a metaphor for describing a constructivist approach to critical theory.

thinking, each graduate student offers a perspective on a specific pedagogical domain in its relation to the framing articles. Formal, non-formal, and informal education is examined within this contextual framework.

The Four Framing Articles

Four framing articles were chosen to review and act as a stage for grounding discussions within this paper. The articles by Wynne & Shackley (1996), Megan Boler (1997), and Elizabeth Ellsworth (1992) refer to uncertainty as positive and manageable. Wynne & Shackley (1996) legitimize the existence of uncertainty within the field of climate change science. Uncertainty is seen as controllable through the use of boundary ordering devices, which are discourses that stabilize and mitigate the unknown. Boler (1997) speaks of the risk of empathy and compares “passive empathy” to “testimonial reading” (p.257). Passive empathy, Boler (1997) states, is directed at a “distant other,” leading to no action toward justice (p.256). Testimonial reading allows people to accept responsibility, to rethink their own assumptions in self-reflection. Testimonial reading is opposed to pure theory; it is neither fixed nor certain. Ellsworth (1992) describes critical pedagogy as a practice that does not properly address issues of oppression. Ellsworth (1992) feels that rationalism and scientism are made possible through the exclusion of the socially constructed “irrational other” (p.97). Critical pedagogy assumes that all students have equal power to speak within the classroom. Ellsworth (1992) suggests that confronting unknowability, knowledge is seen as contradictory, partial and irreducible. Bruno Latour (2004) recognizes the power of uncertainty in the world as it relates to many issues including climate change science. He expresses concern about the almost 'new age' type of uncertainty that has become prevalent within our capitalist society. Latour refers to the social construction of scientific facts as being a theme in society. He has a skeptical view of the idea of uncertainty suggesting that the public has been lead on a path of limitless questions and uncertainty. There is uncertainty in climate change science just as there is uncertainty in life. There needs to be a balance between knowing and unknowing. With all knowledge there is a degree of uncertainty (Latour, 2004).

Empowering Youth through Education in an Uncertain Climate

Empowerment is a multi-level construct that in a broad sense occurs when individuals, singularly or collectively, gain control and mastery in their social, economic, and political lives so that equity and quality of life is improved.

(Jennings, Parra-Medina, Messias & McLaughlin, 2006).

Complexities of Climate Change and Formal Education

The complexity of climate change, education and personal experiences can become disempowering events for youth. Students need to learn and understand about the concept of scientific uncertainty and how it is applied to their world. Students should be aware that people have different agendas where scientific uncertainty is concerned. Certain individuals use scientific uncertainty to deny climate change, others to restrict policy developments, and yet others to learn more and reduce the uncertainty (Shackley & Wynne, 1996). The question becomes how do we teach uncertain and controversial socio-scientific issues (such as climate change)? How do educators empower students to take action? How can educators assist

students to push through disempowering experiences? What characteristics does an empowered youth demonstrate?

The complex issues surrounding climate change present an interesting opportunity for teaching this topic in science classrooms. This would include teaching the realities of doing science and the levels of uncertainty and debate associated with this topic in the science community. To properly teach climate change, we need to encourage critique (Latour, 2004) and to question the certainty of information provided. This is critical since the scientists themselves do not agree on the level of uncertainty of current data and findings in this area (Shackely & Wynne, 1996). The goal of covering such dynamic topics in the science classroom is to hone critical thinking skills coupled with scientific literacy.

According to Barnett (2000), a curriculum weighted highly in favour of the sciences does not respond sufficiently to the challenges of a supercomplex issue such as climate change. He proposes that in order for education to adequately address supercomplex issues it must satisfy conditions of knowledge, interaction, and communication (2000, p. 134). Recognizing that knowledge is partial and that individual perspectives are limited, Mueller (2009) asserts that mitigating ethical uncertainty with respect to climate change action requires that “multiple stakeholders” with different perspectives to participate in ecological decisions (connecting with other limited views helps policymakers increase degrees of confidence)” (p. 1036). Similarly, Ellsworth’s (1992) classroom-based engagement with anti-oppressive and anti-racist pedagogy led her to argue that effective learning and organizing for social change requires solidarity across particular narratives. She makes two important points that bear consideration in the context of the politics of climate change in the curriculum: 1) individuals must acknowledge privilege and complicity in oppressive politics and histories; and 2) political action requires more than the rational dialogue “but coalition-building among the multiple, shifting, intersecting, and sometimes contradictory groups carrying unequal weights of legitimacy within the culture and classroom” (p. 317).

Youth and Scientific Literacy

Scientific literacy is a key component to youth taking action on socio-scientific issues for social and environmental justice. The following two components have been deemed a part of what constitutes scientific literacy, “a commitment to critical understanding of contemporary socio-scientific issues...with a willingness to take appropriate and responsible action, and encourage others to do so” and “the capacity and willingness to address moral-ethical issues associated with scientific research and the deployment of scientific knowledge and technological innovations” (Hodson, 2008, p. 173). Students must feel a personal sense of investment in an issue before they can act authentically on that issue. An empowered student can take the action necessary to achieve his/her aims by combining knowledge and skills with motivation, attitudes, hope and visions. Students must believe that even though their actions are small scale, they do lead to empowerment and further action (Schreiner, Henriksen & Hansen, 2005).

Empowering Youth in Non-formal Learning Environments

Students need to practice being empowered, to have a safe space in which to carry out learning and actions regarding climate change. This can move beyond formal curriculum into non-formal learning environments. Environmental clubs, youth groups, student councils and other such groups can help

students to achieve smaller, more localized actions and changes. If students can feel success in the classroom, or similar learning environment, then they are more likely to carry through on learning and actions in their lives outside of school. The Critical Youth Empowerment (CYE) is a conceptual framework that utilizes both individual and collective youth empowerment process and outcomes (Jennings, Parra-Medina, Messias, & McLoughlin, 2006). CYE encompasses six key dimensions: a welcoming safe environment, meaningful participation and engagement, equitable power sharing between youth and adults, engagement in critical reflection of interpersonal and sociopolitical process, participation in sociopolitical process to affect change, and integrated individual- and community-level empowerment (Jennings, Parra-Medina, Messias, & McLoughlin, 2006, p. 32). Schreiner and Sjoberg (2005) propose the following prerequisites for empowerment when dealing with environmental issues: 1) hope and vision for the future, 2) a general feeling of being able to influence the future, 3) motivation to act, 4) believe that protecting the environment is important for society, and 5) be interested and engaged. Such a framework could provide a good starting point for educators working with youth in climate change action.

Changing the Unchangeable

Since a main avenue of collective action is petitioning governments, industries and other such organizations to change laws and policies, students must have a clear understanding of the decision-making powers. Youth will become empowered when they are educated in the political aspects of climate change as well as the science. When student action leads to no large-scale policy change, students/youths can begin to feel that while their small-scale local actions are effective, the real change that needs to be happening is beyond their circle of influence. In this way students may feel empowered with their own decisions but globally students are feeling disempowered and pessimistic. Students hear scientists making claims as to the future effects of climate change and the anthropogenic causes, yet governments are not moving on policies to stem carbon outputs. If politicians and lobbyists cannot get governmental policies changed, how can youth?

Policy, Climate Change, and Uncertainty

Elementary Teacher's Federation of Ontario (ETFO)

At the annual meeting in Toronto on August 16th 2010, delegates of this public elementary teachers' union passed a motion to uphold the nine priorities of the previous operating year, which included such items as collective bargaining rights, defending public education, professional development, social justice, health and safety and of particular note 'to promote the care and protection of the environment.' (ETFO Annual Meeting Workbook, 2010). This relatively new priority was introduced four years prior to the 2010 meeting along with an environmental standing committee that consists of primarily teacher members. The committee's mandate follows four terms of reference: supporting green initiatives, recommending action on environmental issues, advise on environmental programs, and advise on protection of environmental education. (ETFO Standing Committee Report to the Annual Meeting, 2010).

Green Street, and ImagineAction

In 2007, ETFO and the Canadian Teacher's Federation (CTF) partnered with an environmental project called Green Street. The program was designed to actively engage students and teachers in environmental learning and sustainability education. Beginning in September 2010, this program will be replaced by a new initiative called ImagineAction. This new program is an online student-driven educational community that supports and promotes social action and the development of individual responsibility through engagement with communities. ImagineAction promotes the following themes: to connect (relationships), to engage (active and participatory citizenship), to thrive (health and wellness), to lead (leadership), to live (environmental sustainability) and to care (poverty). The move towards this redesigned program is a response to increasing evidence that students are requesting for education to provide them with skills in order to be active participants in society, to learn how to make decisions and how to deal with issues properly, as researched by the CTF. Under this new model, ImagineAction has the potential for being one conduit to evoke critical thinking and challenge students to think about themselves as members of a global community (Canadian Teachers Federation, 2010).

Moving Forward

Two specific resolutions were also brought forward at the 2010 annual meeting, to develop professional learning opportunities provincially and to encourage more local commitment to environmental issues. Building professional learning opportunities requires an integrated approach to environmental education. By passing the motion, the provincial office of ETFO is allocating \$19,500 in order to provide specific workshops to ten local branches in order to support and promote new and effective approaches to environmental education. For the past four years, ETFO supported and implemented environmental programs from other sources, such as Green Street, EcoSchools and the most recent Imagineaction. With the passing of this motion, the committee now has funds to potentially create and implement their own resource to support climate change that focuses specifically on the priority of caring and protecting the environment. The second resolution will encourage local ETFO branches to set up their own environmental committee in the hopes that each will take more responsibility and leadership on climate change issues and to better support students and teachers in their particular district areas. However, there still appears to be some disconnect in their ideas and their actions. To promote global environmental citizenship, critical thinkers and an eco-literate population, there is a need for more programs such as ImagineAction that contain at least some focus on the environment. There is a need to utilize the technology of the present to connect with the young thinkers in our classrooms, to be able to connect them with others in their local and global communities.

Ontario Curriculum

The Ontario Curriculum does not explicitly address climate change. Rather, issues for education concerning climate change are embedded in the Ministry of Education's 2009 Environmental Education Policy Framework titled: *Acting Today, Shaping Tomorrow*. The policy framework was adopted as a result of a report, *Shaping Our Schools, Shaping Our Future: Environmental Education in Ontario*, tabled in 2007 by the

Ministry's Working Group on Environmental Education which was chaired by Dr. Roberta Bondar. The aim of the policy is to integrate environmental education into every discipline. The document begins by recognizing the role that schools have to play in securing the future of the environment and offering a vision that the policy will support students to "understand the nature and complexity of environmental challenges and build their capacity to take appropriate action" (2009, p. 3).⁵

As one reads the policy, tensions begin to emerge around the challenge of organizing complexity, or integrating the inherently transdisciplinary complexity the environment and climate offer, into an institution accustomed to sorting, grouping, categorizing, and assessing (i.e. grades, test scores, academic stream, and disciplinary boundaries). The policy attests to a will to "move beyond a focus on symptoms...to encompass the underlying causes of environmental stresses, which are rooted in personal and social values and in organizational structures" (p. 4). However, structurally it proceeds to reproduce those very underlying causes. Global climate change is just that: global. Weather recognizes neither international borders nor policies. Changing individual behaviour alone will not mitigate the effects of climate change. Climate change as a political issue requires that our mitigating responses must be strategically coordinated. Even if our local culture and community embodies environmental sustainability in our values and actions, as many Indigenous peoples do, we are still affected by climate change. Ironically, it is the awareness of this interconnectedness that informed the Canadian governments' amendment to the Copenhagen Accord.⁶ They argued that without the United States also committing to the same emissions reductions they put themselves at an economic disadvantage. Importantly, this points to a value system that privileges the short-term economic impacts over long-term global climate justice. It is exactly the kind of collaborative leadership that Canada's current government fails to provide that is required to mitigate present and future effects of climate change. Ontario's Expert Panel on Climate Change (2009) cautions that "no single country or province will be immune from changes occurring elsewhere on the Earth" (p. 28). Therefore, "piecemeal, uncoordinated efforts will be insufficient and costly" (ibid).

Curating Advocacy Through Architecture: How An Art Museum Responds To Climate Change

Like formal curricula, informal educational experiences add to the tapestry of learning. In a museum, one salient image or model can speak louder than volumes of scientific data. Through interactive exhibits, a museum can educate and communicate the complexities of climate change in an engaging way. By bringing greater awareness both experientially and pedagogically museums have the potential to be powerful instruments for social change. However, climate change exhibitions that adopt neutral positions or fail to adequately portray the interconnected relationship between science, technology and society run the risk of decontextualizing one of mankind's greatest challenges. Ironically, trying to persuade visitors through scientific evidence that climate change is real can equally engender further skepticism. While science museums are now trying to balance their roles on this polarizing issue by avoiding overstatements and presenting all sides in order to gain the public's trust, the Museum of Modern Art (MoMA) Art in New

⁵ The Ontario Expert Panel on Climate Change Adaptation (2009) places the responsibility for climate change action on present leadership. They argue that decisions must be "made in the next decade not when today's schoolchildren are in government" (p. 71). That being said, the panel recognizes that we will experience the consequences of climate change for unknown years to come. Therefore, it is imperative that students "understand how and why [climate change] will increasingly drive decision-making" (ibid).

⁶ See Paavola and Adger (2002) Justice and Adaptation to Climate Change...

York City (an unlikely institution) has taken an alternate approach. The exhibition *Rising Currents: Projects for New York's Waterfront* showcased in 2010 at the MoMA boldly affirmed the certainty of sea level rise due to rapid glacial melt. Using the upper limits of 41 to 55 inches projected by the *New York Climate Change Panel* instead of the likely 12 to 23 inches by the year 2080 (2009, p. 3), the *Rising Currents* exhibit does not shy away from the uncertainties of climate change predictions but brazenly used them to create innovative architectural solutions.

Exhibit Background

Going beyond a mere artistic display, this project was conceived to address the apocalyptic effects of rising water levels. The project was successful in that it brought together key players to kick-start the dialogue: policy makers, the public and scientists. Five teams of engineers, architects, and designers were challenged to re-imagine and transform the coastlines surrounding New York City's harbour, with the intent of applying principles that could have global applications for ecological sustainability. Each team submitted proposals for shielding the city from encroaching waters using 'soft' infrastructure versus traditional defensive seawalls. The soft infrastructure would absorb and filter storm water and sewage, attenuate waves, and create artificial reefs to encourage greater biodiversity. The project culminated in a display of dioramas and renderings at the Museum of Modern Art.

Pedagogy of the Exhibit

Artistically our environment has been depicted in many ways, but how would an artist or architect relate to an uncertain futuristic landscape riddled with apocalyptic images of melting polar caps? Climate change does not have a face to communicate its challenges without the use of images or models. Using violent storm surges as its backdrop, the *Rising Currents: Projects for New York's Waterfront* exhibition was an impressive attempt to re-visualize the damaging effects of climate change. Paradoxically, it is a representation of a certainty in a context that is in itself uncertain. Yet, the exhibit failed to address the root causes for the rapid melting ice caps or to implicate the influence of human activity. Instead it deflects attention away from global thinking, focusing only on New York's local ecological infrastructure. In my opinion the project seemed more like an attempt at stimulating financial and technological innovation for the city. As a visitor I never once felt implicated or uncomfortable in either the creation of the climate change problem or its solution, and therefore experienced what Boler describes as, pleasurable detachment (1997). Instead I had an enjoyable experience through artistic visions "without guilt or blame", an "abdication of responsibility" (Boler, 1997 p.265). In the end, *Rising Currents* did nothing to connect people and landscape. The solutions proposed by the five teams were supposed to offer global application to coastal communities experiencing devastating erosion. Regrettably, most proposed solutions would be too costly to implement requiring extensive re-construction of existing infrastructure.

Pedagogically the Oyster Tecture exhibit by landscape architect Kate Orff, held the greatest potential for natural inexpensive water restoration not just in the polluted waters surrounding New York but globally as well. Turning away from using new and expensive technology, the Oyster Nursery is constructed using rope and wood serving as a framework for seeding native oysters. The oysters can filter pollution, increase oxygen levels in the water and attenuate waves. The engineering here is soft, alive, adaptive. Orff first looked at the past in order to re-examine the future. The oyster reef had once been a thriving estuary until

the turn of the century. Unlike the other teams, Orff's main focus was not on million dollar budgets or radical transformations but on affordable construction and more importantly the building of coalitions involving students, researchers, and community activists. Her vision was to create a different urban landscape for today's youth, reconnecting them with their once vibrant harbour. Constructing new models of engagement encourages environmental awareness and stewardship.

Using Art for Advocacy

The very existence of the exhibit is itself confirmation of melting polar caps as part of our apocalyptic future. Unfortunately the exhibit does nothing to deepen our understanding of climate change science or the global ramifications. While the landscape displays are imaginative, they do not help visitors measure their personal impact on the environment or to critically think about the issues. Art can be a powerful human medium to communicate the face of climate change. It has the potential to empower people, stimulate discourse and acts as a catalyst for advocacy. Unfortunately, *Rising Currents: Projects for New York's Waterfront* misses an incredible opportunity to change or activate behaviour.

Apocalyptic Narratives as Informal Education

Well they say the ocean is rising

Not too surprising

We've been warned

And you say, there's no use in even trying

Because after all, we're all dying

From the day we are born

-Kristen Grainger & Dan Wetzel (2007)

Apocalyptic narratives are used as a way to communicate to the public the importance of climate change and climate change science. The hope is to inspire action through video, music, art, drama, poetry and other narrative compositions. They have as their main component, the pathos or doomsday scenario, which create an emotional response from the audience, often eliciting fear (Spoel, Goforth, Cheu & Pearson, 2009). This rhetoric form of persuasion is more effective when all three components: the pathos (the emotional), ethos (the ethical), and logos (the logical) are woven together (Spoel et al., 2009) and the translation of uncertainty in climate change within these narratives is communicated by using future projections. According to Wynne and Shackley (1996), these projections act to stabilize and mitigate the unknown. As a pedagogical tool the effectiveness of these narratives increases when the discourse of climate change science goes beyond previous deficit models of science communication (Spoel et al., 2009).

When considering a model for informal education, the role of culture in the production of knowledge should be an important component (Colucci-Gray, Camino, Barbiero & Gray (2006); Spoel et al., (2009).

The verses above are part of a song called *Oceans Rising* written and performed by Kristen Grainger and Dan Wetzel (2007), which became an award video produced by Katie Salisbury (2007) at Willamette University in Salem, Oregon. The lyrics represent an example of an apocalyptic narrative written to create awareness on climate change. Following is a brief comparative analysis of the video and three types of narratives: *Please Save the World*, *An Inconvenient Truth* (AIT) and *Climate Change Show* (CCS). The analysis is meant to critique their effectiveness in decreasing uncertainty and empowering the public toward action on climate change issues, as well as addressing the ethical implications of climate change as an oppressive act in power relations, between privileged and oppressed nations.

Comparative Analysis

Using sound and imagery, the music video *Oceans Rising* does not depict the earth in a negative way; instead it shows images of the ocean as a serene environment. There is no shock factor, or images of environmental catastrophes as seen in other apocalyptic narratives. *Please Save the World*, the opening video at the Copenhagen Summit on Climate Change, displays images of disaster from children's perspectives, to create a sense of guilt and fear. *Please save the World* is 'purely pathos', with an initial shock factor that is short lived due to the lack of logical and ethical proofs. There are no solid solutions presented to address the problem of climate change; without which citizens are left feeling disempowered and paralyzed to act.

Compared to the visual representation, the lyrics of *Oceans Rising* communicate a much stronger message to the public. An apocalyptic narrative, such as *Oceans Rising*, attempts to communicate a strong message to the public to change before it is too late; providing some solutions for change, only if action is taken. The ethos of this type of communicative narrative is to create a culture of caring, and to empower society to act in the face of uncertainty. What is lacking within the verses is the logos; there is no form of logical reasoning. It does not create informed citizens in the science and culture of climate change.

Promoting Public Scientific Literacy

Spoel et al., (2009) believe that apocalyptic narratives should promote scientific literacy; inspiring by means of persuasion to increase participation of an informed public in science policy discussions. AIT and CCS communicate science in a way that appeals to the public, through a movie and a play. To be truly effective in engaging the audience, these narratives should weave together the ethos, pathos, and logos. AIT and CCS contain these three components. The ethos of the narrator is more effective when there is a nonscientist explaining climate change science (Spoel et al., 2009). As a pedagogical form of discourse, AIT and CCS are more informative than *Oceans Rising*, as they incorporate a framework of "cultural rationality" within the logical proof, increasing its appeal to the audience (Spoel et al., 2009).

Effectiveness and Apocalypse Fatigue

According to The Pew Research Center, “apocalypse fatigue” is increasing in the American public; they are losing interest in the certainty of climate change. Americans are uncertain about the threat of climate change, and the belief that it is purely a man-made phenomenon (Nordhaus & Shellenberger, 2010, p.1). Americans do not see global warming as a serious problem facing the country, as other environmental problems, such as air and water pollution, are rated with more concern. According to current Pew Survey of apocalyptic narratives, AIT appears to have had more impact upon elite opinion than public opinion (Norhuas & Shellenberger, 2010).

Why has the American public not been responsive to these persuasive forms of communication? The “System Justification Theory” is one reason why apocalyptic narratives have changed the actions and opinions of the public (Norhaus & Shellenberger, 2010, p.2). System Justification theory is a psychological theory whereby people have a need to maintain a positive view of their culture, whatever it may be. Apocalyptic threats act as a trigger to raise the system justification response (Norhaus & Shellenberger, 2010). The second reason why our society does not act, is that human behavior is wired to react only in a crisis, and climate change poses no immediate threat to developed countries (Struck, 2010). How can we mobilize and empower the public to act in the face of uncertainty?

Uncertainty, Empowerment, and Ethics

Developed countries have not directly experienced the effects of Global Warming, but it is evident in other areas of the world. The consequences of extreme weather events have already emerged in Bangladesh, Cambodia, and other areas of Asia and Africa. There is an inverse relationship between who is responsible, and who is the most vulnerable to climate change (Bangal & Blum, 2010). It is human behavior to react in crisis; yet climate change is already a crisis for some developing countries. The social construction of uncertainty is riddled with distributive and generational issues. This is an ethical issue that needs to be addressed. Climate Change should be considered a serious concern for moral philosophers and humanity at large (Gardiner, 2004). These ethical dilemmas call for political action. To truly identify with the other we must reflect and understand how we are implicated in the production of the oppression (Boler, 1997). Knowledge always has a degree of uncertainty, and we need to look at what Latour (2004) calls matters of concern when faced with issues like climate change; instead of deconstructing knowledge which results in meaningless solutions.

Conclusion

The uncertainty that surrounds anthropogenic climate change can act as a barrier, to empowering the public towards action. The question is not whether climate change is occurring, but rather the underlying causes and effects of extreme weather events. Scientific uncertainty is often considered manageable and tractable. Boundary-ordering devices are used by scientists and policy-makers to increase the certainty of unknowing. Wynne and Shackley (1996) suggest that uncertainty in climate change science can become a symbol for action rather than a problem for policy domains. The real barrier toward action is the social construction of climate change uncertainty. The underlying causes of uncertainty are rooted in social values. Science alone does not address the complexity of climate change.

Due to its complexity, Climate Change should be considered as a multi-disciplinary topic in pedagogies of empowerment. Education is seen as one of the best efforts to promote awareness and change on socio-environmental issues (Bangay & Blum, 2010). Any discussion of Climate Change has only addressed the science and technological aspects. This narrow pedagogical approach is not effective when dealing with these complex environmental issues. Science and technological rationale alone will not empower students to take action. Incorporating multi-disciplines such as ethics, law, and culture, must be considered to connect Climate Change with students on a personal level. Cultural rationale is an important part of the framework in communicating climate change to the public (Spoel et al., 2009).

This paper has shown the perspectives of different forms of education including: formal, non-formal and informal and how they relate climate change issues. The formal Ontario curriculum deals with environmental education, and not the underlying ethical uncertainties. In order to empower youth towards action, it is important to provide non-formal learning experiences outside of school such as Youth Groups. Non-formal and Informal learning opportunities for the public often come in the form of apocalyptic narratives. In this paper plays, art exhibits, music, and video were explored for their effectiveness in eliciting the public to act in the face of climate change.

It will take more than individual lifestyle changes to combat the complex nature of climate change. Governments need to do their part to mobilize the public to take action. Social justice and global collaboration are also a key component that must be present in the pedagogy of empowerment when facing climate change issues. Initiatives like ImagineAction begin to lay the groundwork for combating, the underlying social power struggles; we however are still in the infancy of legitimate action in our efforts to combat climate change.

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