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In the last four years, the Ministry of Education in Ontario has put forward a series of policy and curriculum documents including *Acting Today, Shaping Tomorrow* (2009) and *Shaping Our Schools, Shaping our Future* (2007) that call for the implementation of environmental education in all publically funded schools across the province. This is not an isolated move on the part of the Ontario Provincial Government as different provinces in Canada and other countries are implementing similar environmental education policies or have been doing so for many years now (Brazil, New Zealand and Sweden are three good examples).

Embedding environmental education within the current teaching practices can be a difficult task for teachers everywhere, especially when confronted with a wide range of existing possibilities and resources (*Shaping Our Schools, Shaping Our Future*, 2007, p. 7). In the current process of ecologizing (i.e., greening) our schools, teachers find themselves searching for approaches that have been successfully implemented in other classrooms and schools and that could be easily integrated into their own programs.

The present issue of *Education Review* brings a series of four peer-reviewed articles around the *doing* of environmental education. More specifically, the intent of this issue is to provide members of the Faculty of Education's extended family and education partners in the larger community access to current educational research as effectively conducted, and experienced by practitioners in the field. More so, the different perspectives provided by the authors are meant to illustrate the interdisciplinary and global aspects of environmental education. Each article is intended to inform teachers about possible ways that environmental education can be implemented in their own contexts. May you find interesting ideas and practices in these articles that prove useful to you in your work as an educator.

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Enjoy your reading.

Dr. Giuliano Reis, University of Ottawa
Dr. Jeff Scott, Nipissing University (Guest Editors)

CONTENT

Environmental Clubs as a Venue for Action: Mediating Youth Involvement in Environmental Action	2
The Environment and the City: A Neglected Pedagogical Tool In/For/About Environmental Education	4
Arts-based Environmental Education: Children May Know It Better	6
Environmental Story-telling with Dirty Hands	8

ENVIRONMENTAL CLUBS AS A VENUE FOR ACTION: MEDIATING YOUTH INVOLVEMENT IN ENVIRONMENTAL ACTION

Ashley Kerckhoff & Giuliano Reis, University of Ottawa

Representatives from around the world have made an urgent call for environmental education (EE) initiatives within the formal school system in order to help address the drastic, human-caused environmental issues of today (United Nations Educational, Scientific and Cultural Organization, 2009). Concomitantly, Ontario's Ministry of Education developed their first EE policy framework: *Acting Today, Shaping Tomorrow* (Ministry, 2009). It emphasizes that one of the goals of EE is to "increase student engagement by fostering active participation in environmental projects and building links between schools and communities" (p. 14). In other words, the Ministry's EE policy aims to instil the idea of environmental activism¹ into students' lives through encouraging their participation in environmental action. More so, as activists, students create a society that exists in harmony with earth's natural systems. How can teachers promote the achievement of this vision? More specifically, what current school-related experiences are influencing student engagement with environmental activism? To answer these questions, we turn to a group of youth and their teachers who are involved in a secondary school environmental action club titled *EcoAction*² and who consider themselves to be environmental activists. In the words of one of the teachers, and also creator of the club, Dawn Baker

EcoAction is a student action group that [was] started here at [North Gate Secondary School] . . . by myself and my colleague. So it's a group of students that fluctuates from semester to semester and from beginning to end of year, but we have about 20 kids who are involved all the time and we are the eco club in the building. So we are responsible for recycling, we are responsible for all the eco-initiatives that happen here, all the awareness that goes on. It all kind of funnels through that student action group. So each year we try to pick or target a few small goals that we can accomplish in a school year and then we also work towards one or two larger goals. And the kids identify what those will be, and then we, over the course of the calendar school year we will go through and try to work towards accomplishing those goals.

According to the participants' stories, the EcoAction club at North Gate Secondary School is the most relevant form of school-related experience that mediates their involvement with environmental activism. Greg, a

student participant, explained: "It's kind of always, you know, plant a tree, clean up after yourself, don't litter, very basic things really, until, [EcoAction] was really where we started doing things". This demonstrates that EcoAction, as an environmental club is the venue for participants to learn action skills and work as a team; thus facilitating students' involvement in action.

School eco-clubs have the potential to increase students' motivation to carry out environmental projects that may encourage them to see themselves as catalysts for change (Carlsson & Sanders, 2008) and also benefit the changing practices in education (Boyes & Stanisstret, 2011). However, to reap these benefits, students need to buy into the philosophy of the club, develop ownership of it from the very beginning stages, and follow through in carrying out the actions that were discussed and formulated by other eco-club members (Kennelly, Taylor, & Jenkins, 2008). In this context, the role of a teacher mentor is fundamental for student involvement. For instance, teacher Dawn Baker is considered a mentor in the school, a source of information for the students and a catalyst for their involvement with activism. As Greg says:

I really wasn't even that interested in it but, Ms. [Baker] said you know, 'just come out and check out some meetings' and I was really busy with sports and different groups. Um, and I thought 'yeah, okay, if I've got the time I'll check it out' and I'm glad I did. (Greg)

In summary, our findings indicate that *teachers' mediation* of student involvement through mentorship in environmental activism and the creation of a *venue for activism* are the two most important factors in improving students' overall EE experience at schools. *Learning about/in the environment*, while less prominent than *teacher mentors* and a *venue for activism*, is another important factor influencing students to become involved in environmental activism. These three overall factors each consist of smaller sub-categories of school-based influences that were discussed by the club members. Table 1 offers a visual of the three overall school-based factors and sub-categories that are important to keep in mind when striving to encourage environmental activism. All of these factors combined improve participants' experiences, creating opportunities to work with others, overcome obstacles, and carry out their ideas for improving the environment.

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¹ Environmental action and environmental activism are used interchangeably throughout this paper.

² Note, all names, including the name of the town, schools, and environmental club are pseudonyms to maintain confidentiality of participants.



Teacher Mentors	A Venue for Activism	Learning About/In the Environment
Club leader	Opportunity to influence others outside of the club (children, peers, community members)	Opportunity to be outdoors in nature/ Opportunity to connect with nature
Support for students	Opportunity to engage in activism (having a pre-created group rather than starting something on their own, anew)	Teachers including education about the environment in their units/lessons
Other teachers involved in, but not leading the club ³	Social networks (friendships, community links)	Teaching that matches student's different learning styles
	Positive attitude about overcoming obstacles to activism	

Table 1: Three Overall School-Based Factors and their Sub-Categories for Activism

This article is a sharing of ideas developed in hopes that teachers become inspired to take the first steps in influencing students to develop more environmentally-oriented actions while meeting the Ministry's EE goals. The journey of becoming an environmental activist requires a combination of time, motivation, and experi-

ences regardless if you are a teacher or a student. Each person's journey begins from a unique perspective that impacts on how they work through the situation to develop their own ecological knowledge. The resulting actions on this journey to responsible stewardship definitely has positive effects for the planet as whole.

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³ Several teachers are involved in the club (i.e., attend meetings, assist in carrying out action projects, support student initiatives, share ideas) but do not directly lead or take responsibility for the running of the club.

THE ENVIRONMENT AND THE CITY: A NEGLECTED PEDAGOGICAL TOOL *IN/FOR/ABOUT* ENVIRONMENTAL EDUCATION

Alishia Valeri & Giuliano Reis, University of Ottawa

Within environmental education discourse there is a perception of cities to be the antithesis of nature and the source of society's ailments like crime, poverty, and pollution. Amidst the discussion on the place of the city *in/for/about* environmental education (EE), urban environments and their inhabitants' knowledge remain largely marginalized in EE even though an increasing number of people live and work in cities. Therefore, understanding how to live more sustainably within our cities becomes of utmost importance to teachers and students as citizens in an ecologically literate society.

Urbanization is a common phenomenon in various regions of the world. For instance, more than 85% of the population in Ontario live in urban centres; that is, areas that contain at least 1000 people and where the density is no fewer than 400 persons/km² (StatsCan, 2009a, 2009b). In the context of a growing number of people living in urban centres, it becomes important to widen the lens of environmental education (EE) to incorporate urban students' own knowledge sources and personal life stories (McClaren, 2009). Doing so could make the invisible nature *in* and *of* cities more visible (i.e., underground water system, urban heat islands, urban plants and animals species, etc). It could also help students to see the relationship between human constructions and natural (non-human) ecological processes. Thus, incorporating the city perspective into EE has the potential to create an education *in/for/about* the environment that is relevant for those people living in urban centres. Such an approach to EE would serve as a source to achieve knowledge that reaches ecological information and promotes activism in students' local community (see also Lima & Reis in this issue). The following provides three ideas for including urban knowledge into the EE practice of teachers.

First, since cities possess their own bounty of *biodiversity*, they offer opportunities for learning about biotic communities and biodiversity conservation. For example, urban biodiversity provides ecosystem services, education about species' evolution and adaptation, and links small species habitats to nearby habitats on the fringe of the city. For students to learn how to preserve biodiversity in cities, they can embark on EE-related projects by incorporating plants in building spaces and by starting school gardens (Examples of local projects in Ottawa can be seen at biodiversitymatters.org and biodiversityyouth.blogspot.com). By adding various plant species within schools and/or classrooms, students can learn about the growing and breeding of plants as well as then utilizing those plants for food and restorative ecological practices (i.e. starting green roofs, donate plants to city parks, and botanical gardens). Indeed, there is now a growing interest in learning how indoor plants can increase people's pro-environmental motivation and productivity (Smith,

Tucker & Pitt, 2011). In addition, students can partake in environmental monitoring (i.e. monitoring frog and bird populations) by visiting local rivers and water sources in urban centres (See Adopt-A-Pond Wetland Conservation Programme at <http://www.torontozoo.com/adoptapond/>). The information can then be shared with scientists or urban conservationists as a form of citizen science. Thus, conserving urban biodiversity can help dispel the myth that nature and humans are essentially distinct from one another (Dearborn & Kark, 2010).

Second, one can bring urban knowledge into EE by recognizing that the design and layout of human constructions within cities have both negative and positive consequences on the natural environment. Specifically, any design forms that follow living ecological processes, rather than against them, represent a way of "minimizing energy and material use, reducing pollution, preserving habitat, and fostering community, health, and beauty" (Van der Ryn & Cowan, 2007, p. x). Therefore, an idea for bringing urban knowledge into EE would be to provide students with direct experience in learning about and designing ecological buildings. This can occur by exposing students to green construction techniques (i.e. presence or absence of green roofs and solar panels) via an exploratory walk around the local area or a community-mapping project. As well teachers can consult literature on urban design (i.e. Sustainable Urbanism) and/or websites that discuss green building initiatives, such as Home Depot (www.homedepot.ca) and National Geographic (Environment) (www.nationalgeographic.com). Allowing students of all ages to investigate, design and craft their own buildings will assist them in understanding the impact of urban development on the environment. Besides, it could encourage them in all disciplines to become aware of what is, or is not, happening in their local urban communities (see also the arts-based approach to EE described in this issue by Oliveira-Jayme).

A third approach involves reconnecting students to their home environment by examining urban issues. With the direct experience and knowledge gained by exploring environmental issues in their immediate surroundings, students may feel impacted to take leadership roles in the betterment of their community when given opportunities to problem solve real-life situations like waste management. Utilizing waste management curriculum (i.e. City of Ottawa) can illuminate personal patterns of consumption as well as understanding how waste becomes accumulated either through improper waste disposal, or excessive use of "stuff" (i.e. paper, plastic packaging). Once students understand their personal consumption patterns exploring the school community is a plausible next step. Hence, as connections are made, students' sense of place and belonging as well as environmental awareness and stewardship are heightened. Students

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(with the guidance of teachers) could form waste management clubs in schools as a way to spread the message of waste reduction. In addition, it may lead students to choose career paths with an urban environmental focus, just as in the case of some environmental educators who pursue green careers due to their inseparable ties to non-urban settings (McClaren, 2009).

In conclusion, the existence and importance of urban centres in today's society is undeniable. Learning to incorporate urban centres and their population knowledge into EE requires a shift in perception and definition of what constitutes nature (or natural) within

current EE discourse. Beginning this task is as simple as starting to pay closer attention to your city home. Available resources on cities range from municipal websites on waste collection and/or removal and water consumption and conservation initiatives. These resources could serve as points of reference in understanding how to change current (unhealthy) practices. Since the city is a mosaic of interaction between species and a myriad of processes (i.e. social, cultural, economic, environmental, etc), the study of urban centres *in/for/about* environmental education should continue to broaden students' and teachers' perception of the field on an interdisciplinary basis.

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ARTS-BASED ENVIRONMENTAL EDUCATION: CHILDREN MAY KNOW IT BETTER

Bruno de Oliveira-Jayme, University of Victoria

«ART IS ANYTHING WE THINK ART IS. IT IS SOMETHING THE MIND MARVELS AT AND ADMIRES. ART IS A CHAIR, A SOCCER BALL ON A FIELD, A PICTURE OF YOUR FRIEND. ART IS EVERYTHING YOU LIKE »

(Geovana, 13 years old)

«ART CAN BE ANYTHING, JUST AS LONG AS IT IS YOU AND YOU SAY IT IS ART »

(Luciana, 10 years old)

What is art? More so, what is arts-based environmental education? What does it look like? There may not be a unique answer to these questions, but in this essay I invite the reader to consider the possible implications of an art-based approach to environmental education. In the following paragraphs I attempt to provide a conceptualization of art as proposed by my art students. Next, I briefly sketch some of the goals of environmental education and the connection to the arts. Finally, I describe the lessons learned from an arts-based environmental education project at an elementary school in Victoria, British Columbia.

As an art teacher, I frequently ask my students what art is to them, thus the quotes above. Looking more closely, the use of the personal pronouns 'we' and 'you' indeed entitle my students (we) and anyone else (you) as individuals to perceive art. That is, everybody (artists and non-artists) has the capacity to perceive and define art. This definition of art is important because it opens opportunities for anyone (even those without previous art experiences) to engage in creative processes and this is what I believe to be the starting point for an art-based perspective on environmental education.

Environmental education and the arts

Environmental education aims to understand the relationship between society and nature by taking into consideration the emancipatory character of education, which is critical and context-specific (Loureiro, 2004). Such emancipation enables a more democratic and respectful dialogue amongst students. These commitments to emancipation found in much of environmental education contexts emerged from a more long-standing education tradition that follows in the work of Paulo Freire (1970). Freire was a Brazilian philosopher who believed that a "truly liberating education" (p. 35) opens up opportunities for students to be part of their "historical process as responsible subjects" (p. 36). For him it is crucial to involve students in the process of understanding that we are history and not just part of it. As protagonists of their own history, students can be empowered to critically engage in meaningful dialogue around issues of the world they inhabit, such as environmental ones. These dialogues enable personal and collective environmental learning because they form social subjects who are critically aware of whom they are and

the social structures that perpetuate the current environmental crisis.

Concomitantly with the work of Paulo Freire in the late 1970's, the arts started to spread its roots to the environmental education arena by offering teachers and students a unique way of externalizing and understanding their experiences in the world (Clover, de Oliveira-Jayme, Follen, & Hall, 2010) by promoting critical thinking. In the classroom, the combination of arts and environmental education, referred to as *arts-based environmental education*, can inspire students to promote social and environmental changes by focusing on the educational objectives of an exploration of environmental issues (Boeckel, 2009). In such cases, students situate themselves as engaged citizens within their communities by employing the arts as a process to understand their local environmental issues (Krenksy & Steffen, 2009). Through artistic interaction with their environments students become the investigators of their surroundings, making this type of art-based education well suited to mediate social and environmental responsibility and a more democratic participation of students (Krenksy & Steffen, 2009). The Bottle Cap Project, described below, exemplifies the ways in which the staff and students of an elementary public school can explore environmental issues faced by their own community. In this situation, students are able to externalize their individual and collective identities through artistic interactions, which enable them to (re)discover their perceptions about their local environment.

The Bottle Cap Project

In 2010, an elementary public school located in Victoria, British Columbia, through their "Artist in the School" program, invited me to involve their grade 5 students in an art intervention project that could spark the students' interests about recycling in their community. After numerous meetings with the teachers and principal, the "Bottle Cap Project" was developed. This multimedia art project aimed to produce an installation based on the perceptions attributed by participants of their community. In class, each student was invited to create symbols that represented his or her community. Later, the students painted these individual symbols on bottle caps, often seen as just plastic waste. Afterwards, the bottle caps were assembled on wooden boards creating a collective and larger image.

Following the production of the pieces, the school organized a local art gallery to display the Bottle Cap installation and invited the local community members to a gala evening. Upon entry to the gala, each visitor received a handful of recycled bottle caps and was invited to paint symbols that would represent their community. Trees, salmon, the oceans among a multitude of other symbols were created. These bottle caps were also attached to the wooden boards, complementing the previous symbols created by the students, forming an even larger picture (Figure 1). The resulting product stemmed from participants' collaborative creative efforts and curiosity.

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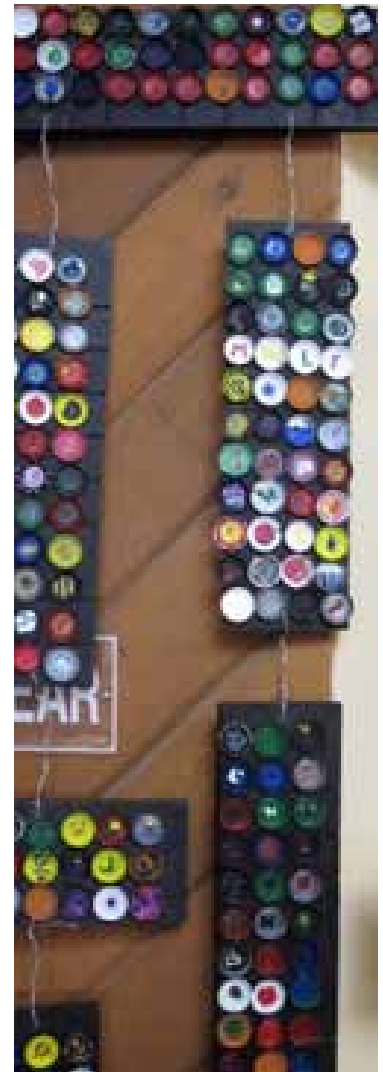


Figure 1: Community working on the Bottle Cap Project (L) and their final products (R).

The experiences learned during the Bottle Cap Project suggest that arts-based environmental education requires one to pay attention to issues around individuality and identity as participants may find that collaboration constrains their individual identity expression. If this is the case, it is important to remind participants that creativity is a collaborative process, where new ideas emerge and are challenged through dialogue and participation.

Finally, in the same way my students defined art as “art can be anything, just as long as it is you”, arts-based environmental education takes into account student’s personal experiences and knowledge to increase individual and collective consciousness about the environment. Eventually, participants have the opportunity to do art and see their environment in a way that they would not have dared to try on their own.

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ENVIRONMENTAL STORY-TELLING WITH DIRTY HANDS

Kevin Wallace, Ottawa-Carleton District School Board (OCDSB)

It is interesting how our society, and particularly our youth view the natural world as a place full of disgusting and dangerous things. Although the grotesque and the resulting feeling of disgust have a potential teaching and learning value (Holstermann et al., 2012; Weinstein & Broda, 2009), the lack of information and exposure to natural ecosystems can mislead people to avoid nature (Louv, 2005). In this context, story-telling has been deemed an effective way to teach environmental education (Reis & Harrison, 2011). Along the same lines, if students go outside to hold, touch and observe the topic of the story while it is being told, their learning experience is magnified through the use of their senses. The present article outlines four stories about fungi that represent the type of knowledge about the intricacies of life that is relevant to ecologically literate citizens. Here, these stories are meant to be told while teachers and students explore the outdoors with their hands in the soil, holding a mushroom or examining a tree with a magnifying lens. The idea of these stories happening in our hands makes an image connection to the story that picture books cannot provide. The spoken word can bring characters and images to life in any listener's mind.

Most fungus lives underground and they come in many different forms: puffballs, jelly fungi, cup fungi, and truffles (No, those chocolates truffles you eat are not fungus!). The Northern flying squirrels, which live in forests around Ontario, glide through the forest at night searching for these underground truffles. The truffles are found by scent which can smell like garlic, fruit or even excrement. Once the squirrel has pinpointed the location of the truffle, it digs it up from the soil and eats it. Then, the squirrel carries the spores of the truffle in their belly until it excretes the spores out in their scat - wherever it lands, that is where a new truffle will grow. The next time you are digging a hole in the sand, you could be feeling truffle spores or maybe some flying squirrel scat.

Best be holding onto a mushroom for this story. Fungus has quite the appetite and they'll eat anything organic including dead leaves, wood, rotten apples, and even bugs. For instance, the *Massospora cicadina* fungus lives off cicada, those loud buzzing insects you hear on hot summer days. The fungus is very patient: the cicada takes a long time to mature and the fungus will wait the 13 to 17 years it takes for the cicada to develop underground before it emerges as a grown-up cicada. Once the cicada has emerged, it eats the fungus, which then grows inside the abdomen of the cicada eventually causing the abdomen of the cicada to fall off. The fungus kills the cicada but the cicada's abdomen is used to feed the fungus and create spores so the fungus species can live on. You may

never look at a mushroom in the same again!

Fungus also makes friends. Have you ever examined with a magnifying lens and touched those dried-up crusty looking cornflakes that stick to a rocks or tree trunks? Although one might think it, no one threw green cereal at the rocks or trees! This stuff is in fact two good buddies: Fun Gus and Al Jay. Once upon a time, Al was hiking through the woods and fell into a deep dark hole. Al had the ability to make his own food just by lying in the sun. But he was stuck in the hole with no sunshine so he had no food or water and he started getting very thirsty. Suddenly, he heard a noise and looked up to see his big tall friend Fun, who was hungry and only had a bottle of water. Then, they had an idea: Fun would lift Al out of his hole and give him some of his water. In return, Al would generate food and give some of it to Fun. These mutual friends "lichen" the idea so much that they have been working together since then. The friendship between an algae and a fungus is called 'Lichen': the algae can carry out photosynthesis to feed the fungi and the fungi supports the algae and collects and stores water like a sponge to keep the algae from drying out. If you would like to meet Fun Gus and Al Jay, they can be found on almost any tree, rock or building near you.

Finally, the last story requires trees or soil to investigate and explains how nature invented the Internet. In the case of this Internet, it is called a forest, which is in fact a network of trees, roots and fungi called *Mycorrhizal* all under your feet. Actually, one pinch of healthy soil could contain about 2 km worth of fungus! Fungus lives in and around the roots of living trees and as the tree grows, it creates a root network that spreads and connects with other trees and fungus. The result is a highway of fungus and tree roots that move carbon, water, and nutrients throughout the entire forest. Bigger and older trees feed young saplings from this network so the saplings can grow and mature. This is why trees planted individually require so much more maintenance and care. Sometimes if the mother tree falls down displacing its roots, its saplings may have a hard time surviving because of the disconnection from the mother tree's nutrient-network. Unlike our Internet, the entire forest won't crash if it loses just one tree. The dead tree will be consumed by the fungi and its nutrients absorbed by the rest of the forest network. Nothing is wasted in the forest network! In conclusion, fungi is more than the topping of pizzas or the favouring of soups. They are the miners, appetizers, hunters, sponges, recyclers and highways of the forest and play a keystone part in our local ecosystems.

Kevin Wallace is the Coordinator of the Ottawa Carleton District School Board (OCDSB) Outdoor Education Centres. The OCDSB Outdoor Education Centres provides hands-on outdoor and environmental educational programs to 23,000 students from the city of Ottawa every year.



Finally, in telling interpretative stories including these and allowing students to experience the topics, the end result is the multiplication of experiences and the dissemination of information to friends, family, and

other educators. In this society of instant information and images, some of the most interesting information for students is the ones from a good storyteller. Please, don't forget to wash your hands after reading this article!

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