

Gardening the Mind

Transdisciplinary veggie burger + fries

www.nicholasstanger.ca/veggieburgerandfries

A teacher's guide and inter-discussion

Grade 6/7 curriculum

written/designed/photography by:

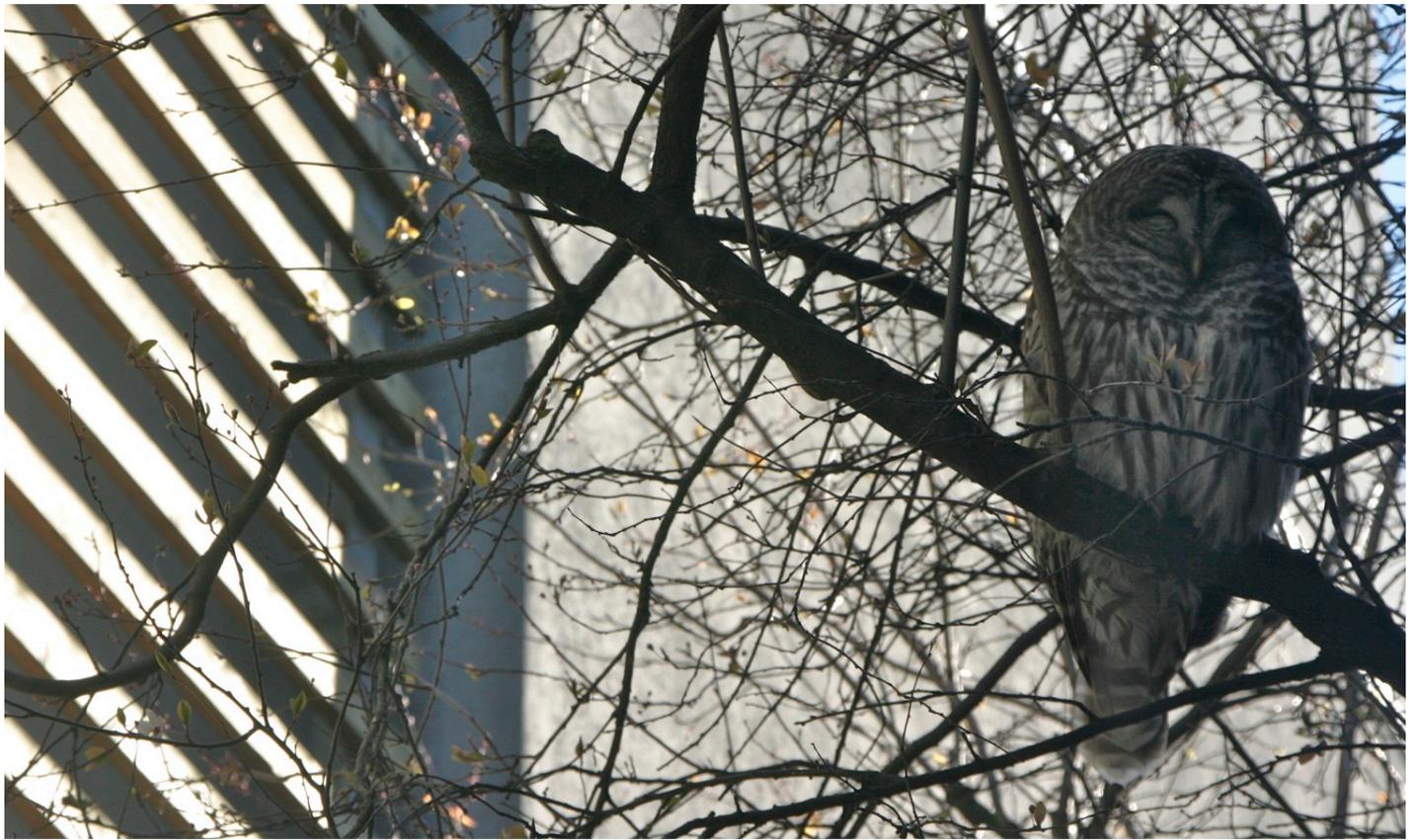
Nicholas Stanger

EDCI 532

I believe that education is a process of living and not a preparation for future living.

(Dewey, 1897, p. 78)

Pedagogic Caveat



That scholarly dispersal of “knowledge” should adapt to reflect the complexity and mindfulness of ecological intelligence (Bowers, 1995). Other than the spontaneous, intuitive, and interactive activities of some academics, the primary method for knowledge sharing has been couched in the restrictive text of journal articles. This “paper” seeks to stretch outside of the linear, singular-identity-forming boundaries of academia through hypertext, praxis, and author-reader collaboration.



Seeding Preamble

[Click here to engage in the online dialogue for this introductory text](#)

Human identity is built through the ecological and cultural inter-discursive experiences of our lives (Bowers, 1995; Stanger, 2011, forthcoming). As humans we are blessed with the abilities to imagine, communicate, and connect with not only our own species, but many other species and places. If I were to ask you about your childhood special place, you would likely be able to describe it with incredible detail and clarity, even eliciting the complexity of smell, sounds, and textures. Of course, many of the childhood special place experiences occurred in our most inquisitive years. If we participate in human and ecological societies with the same curiosity and recognize when we are in an opportune place at an opportune time, special learning experiences that transform us can still occur (Johnston, 2009; Rathzel & Uzzell, 2009). These transformative places and times can be physical, like a food garden, or be entirely in our mind, like thoughts or ideas. Yet, despite acknowledging our abilities to connect with nature and society in transformative ways, many humans in western culture pay scant attention to the local and global environment and spend little time engaging in community activities (Louv, 2005; Yamauchi & Purcell, 2009).

I believe our disconnection from our societal or ecological communities is due to living in a consumerist daze which is contributed to by the confounding political landscapes where we focus the majority of our attention on irrelevant abstractions of wealth (ex. Dow Jones Index) and expressions of affluence (ex. electronics, cars, shoes). Many people have pointed to the education system as “the solution”, be the problem video game addictions, health quality, environmental ignorance, or a wash of other “issues.” And still the underlying challenges of “enlightening” education systems so that the powers-that-be rebuild, redesign, and reform curriculum to resemble ecological and cultural connectedness are hypocritically built right into this very text. Scholars, academics, and researchers pontificate in prodigious and recursive quantities through formal and frankly dull documents. Understandably, information for discussion should be presented in clear, simple, and lexically-appropriate methods but considering Marshall McLuhan's wisdom, the message of this medium is one of an elitist inaccessibility that doesn't reflect the complexity and creativity of learning (McLuhan & Fiore, 1967). I also question whether, documents such as this really change the way we think and do as teacher-scholars. Of course, with the advent of post-modern writing styles with performative techniques (eg. Hurren, 2009), colour and texture has been added to many research papers, but almost entirely through metaphoric imagery.

In that stream of thought, I will cease to write with my flowery speech impediment and continue this exposition on gardening one's mind through a playful and performative approach. This will require you to play along and embrace flakiness (or if you prefer, interact with this knowledge through ulterior means). I need you to take a risk, which is something very appropriate for the topic of ecology, gardening, and Mind. For, like gardening, all learning is a risk worth taking.



The Transdisciplinarity of Learning through Gardening



Benefits of trans-disciplinary curriculum

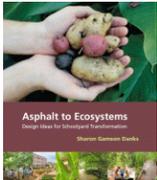
- Seeks to engage diverse disciplines to contribute to the whole
- collaborates by exploring multiple and redundant worldviews and lenses
- includes affective, spiritual, and intellectual knowing and encourages them to bump into one another
- enables pattern-recognition and thinking complexly
- decentralizes control

Gardens can be grown anywhere: balconies, rooftops, polar greenhouses, and schoolyards. Humans have been tending gardens, and adapting local environments with edible species for approximately 9000 years. With this food legacy comes deep knowledge, not only of the plants, but of ecology, math, humanities, art, and ourselves. This project explores the pedagogical opportunities of learning through gardening and the theoretical notion that over the course of our lives, we nurture our own understanding of the world like a garden. We plan, plant, water, experiment, reflect, harvest, and adapt all within social and ecological communities. We also let our minds lay fallow to recover from over use, trauma, and sickness. Our minds and bodies and community, like gardens, require tending so that they remain healthy.

Along with a selection of transdisciplinary curricular activities, the act of gardening is woven through this document with the final goal of growing all of the ingredients necessary to create veggie burgers and fries with a grade six or seven class. These activities are meant to involve you as the reader through interactive webpages and outdoor activities that I ask you to do throughout the project. Ultimately, there are three layers in this document. The first layer is a gardening activity to be conducted with a class of your own. The second layer contributes to the first layer through activities that exemplify transdisciplinarity as a possible support to teaching. The third layer is the discussion between you and me about our experiences in and with this project. Each activity is framed with pedagogical pontifications that warrant response from the reader. This last layer utilizes an interactive website: www.nicholasstanger.ca/veggieburgerandfries. You can also connect with all of this material through the website itself.

Resources

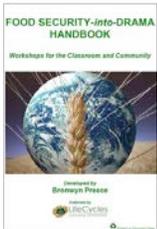
Growing a garden in a schoolyard setting can be incredibly rewarding as evidenced by the enormous quantities of research and resources on the subject (Alaimo, Reischl, & Allen, 2010; Hoffman, Morales Knight, & Wallach, 2007; Phelps, Hermann, Parker, & Denney, 2010). Of course, gardens used to be part of most western schools (Kohlstedt, 2008), and are often still part of many schools around the world (FAO, 2005). So, the idea that school food gardens can be useful in teaching is not new or cutting-edge by any means. Also, this project should not be considered a primary resource for starting, growing, or continuing a garden. However, there are a few fabulous websites and resources that I want to point you to for building your own school garden and considering complexity as part of your practice:



Danks, S. G. (2010). *Asphalt to ecosystems*. Oakland, CA: New Village Press. <http://www.asphalt2ecosystems.org>



Evergreen School Ground Greening Program
<http://www.evergreen.ca/en/programs/schools/>



Lifecycles: Cultivating Communities - Sustainable Agriculture Teacher Resources:
<http://lifecyclesproject.ca/resources/index.php#teachers>



Kidsgardening.org: helping young minds grow: <http://www.kidsgardening.org/>

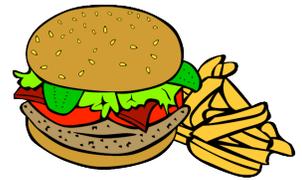


FAO. (2005). Setting up and running a school garden. *Food and Agriculture Organization, United Nations*. <http://www.fao.org/docrep/009/a0218e/a0218e00.htm>



Kelsey, E. (2010). *Not your typical book about the environment*. Berkeley, CA: Raincoast Books.

Veggie Burger and Fries



Veggie Burger Ingredients

makes four servings

quantity	ingredient
4 tbsp	canola oil
500 ml	brown mushrooms, diced
100 g	onion, diced
500 ml	mixed pole, lima, or garbanzo beans, shelled
1 tbsp	hot pepper, diced (like early Jalepeno)
200 g	red pepper, cored, seeded, and diced
2 cloves	garlic, diced or smushed
2	eggs
1 tbsp	mustard
6 tbsp	dried breadcrumbs
4	sourdough red fife wheat buns
4	tomato slices
4	lettuce leaves

Baked fries

makes four servings (recipe pg. 16)

quantity	ingredient
4	yukon gold potatoes, peeled cut lengthwise
2 tbsp	canola oil
1 tsp	sea salt

Recipe, Seeds, and other stuff

At first it might seem counter-intuitive to be celebrating unhealthy foods like burgers and fries. However, this project is so full of physical work and alternative cooking practices, that this indulgence is well worth it!

Look closely at the ingredients to the left and consider their planting and harvesting times, quantity, and diversity as part of a mathematical process that you can engage your students in. For example, how many pepper plants will you have to successfully grow in order to produce enough peppers for the quantity of students in the class?

Below you will find some loose recipes for the veggie burger and fries. An alternative would be to invite your class to adapt these recipes and thus the ingredients. I have heard of this being done with Pizza, salad, and preserves.

Planting times are indeed an art form - so please consult your local gardeners, watch what is being planted in neighbourhood gardens, and consult websites like this one: <http://plantharvest.com> before you get too deep into this project.

Day One through Six

Mix 5 g of red fife with 5 g of filtered water, place in a large covered glass jar and leave for 12 hours. Keep adding these quantities until you have enough.

Day seven morning

Mix all the dry ingredients in a bowl. Add the starter and stir it in. Add enough water until a shiny dough has formed. Leave for 10 mins until "gluteny." Cover and refrigerate.

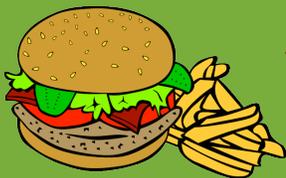
Day seven evening

Take the dough out of the fridge and let it come to room temperature. After two hours pre-heat the oven to 500° F. Fold and stretch the dough three times. Let it rise for one hour in a metal pan, then transfer it to a earthenware or clay baking dish to bake for 40-45 minutes until the internal temperature is about 200° F

Sourdough Red Fife Wheat Buns

makes four buns

quantity	ingredient
300 g	Red Fife Flour
200 g	hard bread flour
15 g	sea salt (evaporated from the ocean!)
200 g	sourdough starter
350 g	filtered water



Veggie Burgers + Fries Gardening Activity

You will see this logo throughout the document - it is an indicator of a seasonal activity to help you prepare and grow your veggie burger and fries garden. These are separated by seasonal activity and will likely require you to refer to other gardening resources as shared on the previous page.

Ecology and Senses

[Click here to engage in the online dialogue for Ecology and Senses](#)

Pedagogy

Learning about ecological systems is at the very centre of learning from gardening. Understanding that systems are connected, reliant, redundant, and recursive comes from the very act of digging, planting, watching, watering, and fertilizing. However, there is still a deeper concept that is being learned when one gardens. It is the notion that humans are intrinsic to a system's health, and that our bodies and brains are connected to that system of growth. The magical nature of seeing life sprout, grow, and produce is just that: a magical and awe-inspiring event. Botany has provided us with an understanding of the physiological and genetic processes that we are witnessing. But before we explore the scientific approach, we must engage all five (or six) senses in the process of growing a garden in order to help us deeply connect with where we are.

Pedagogy Question: Considering the reductionist education system of the past 100 years (or more), what modalities of ecological knowledge should we explore through post-modernistic frameworks?

Senses Activity (Do this right here and now!)

Find yourself a few coloured pens and pencils and at least two pieces of paper. I want you to go outside and find an edible plant. This could be as simple as going to your own garden, or finding a local plant ID book, identifying a plant, and then going on an adventure. Whatever the method, you need to find an edible plant. Remember that many plants are edible, but the few that aren't can be really bad for you. So if you are in doubt, do not eat it! Now, sit with that plant. You know, like you would sit with your loved one on a picnic. Without drawing or writing consider the following senses:

- What do you hear?
- What do you see?
- What do you smell?
- What do you feel?
- What do you taste?
- What are your thoughts?

Now try to draw, write, smudge, or glue, what you hear, what you see, and what you smell using your pencils or the earth around you.

Activity Questions: Can you see how your plant connects with where it is? How did it get there? What sustains it? How do you feel sitting with this plant?

If you are a technologically-inclined individual and have a camera or phone in your pocket, play with capturing your experience. Refer to the links at the tops of the pages to share your videos, photos, images, and thoughts for all of the questions posed in this paper.



Frankia says "It's February!"

Dear Gardener-Teacher,



You really need to be thinking about me, Frankia bacteria, and my other bacterial siblings now that it is February. Yes, it is the soil bacteria talking to you. We are in that punneled garden plot or unused baseball diamond in the back forty of your schoolyard. We need you and your students to help grow our community so that we can help you build Nitrogen, a macro-element that all plants really need.

First of all we really like lasagnas. Not that Italian stuff with noodles. The cardboard variety. I know you might think we are dumb, but our ecological intelligence can get us on the internet too. Take a look at [this site](#) to help you figure out how to enrich our habitat of soil with nutrients, create a positive space for my bacterial friends to grow, and develop a moisture maintaining environment for your plants. Here are some extra tips:

- No need to remove the grass
- Put some good manure down at the base of your garden (this is full of bacterial friends!)
- Cover the paper with one to two inches organic material (leaves)
- alternate your layers with grass clippings, sawdust, dolomite lime, sawdust, seaweed, and compost until your garden is about 12 inches high.
- Water until the garden is the consistency of a damp sponge.
- Plant, plant, plant and mulch, mulch, mulch (to protect us down under ground).

From,
Frankia spp
(and friends)



Gardening and Systems

[Click here to engage in the online dialogue for Gardening and Systems](#)

Pedagogy

Our pattern-seeking minds are driven to recognize and interpret systems (Mansikka, 2009; Richards, 2001). Gardening and permaculture provides an incredible opportunity for young students to engage with these systems. Consider the complexity of a garden ecosystem for a moment. There are multiple integral systems that contribute to the garden system (ex. water, soil, sun, seeds, plants, insects, mammals, and birds all represents multiple scientific disciplines). For example, what is the sun's role in growing the wheat that you need for the veggie burger bun? The answer to this question can be approached through an understanding in physics (photons and wavelength), chemistry (photosynthesis), ecology (speciation and wheat's tolerance of climate), history/social studies (origin of wheat, politics of wheat), arts (cooking, drawing, prairie art). And yet, how might we connect all of these understandings of the role of the sun and it's relationship to wheat? One way is to step back and talk about systems and how they connect seemingly unconnected elements.

Pedagogy Question: Consider your discipline, how might you use gardening to explain aspects of what you teach?

Crazy Garden Systems (An activity for you and your students!)

Creativity is contagious. When people are laughing and having fun, they tend to play off of each other's imagination. This activity allows for the group to share in a creative process and explore how systems work without knowing everything about a system. Think about the systems in a garden. Below are some examples. Can you think of others?

- Ecological systems (rain cycle, plant reproduction system, pollination system)
- Physics systems (sun and season systems, gravitational systems in plant tips, soil and water systems (osmosis and water tension).
- Chemical systems (nutrient cycles, pheromone communication among insects, leaf colouration, photosynthesis)
- Historical systems (the first gardeners, crop rotation, human-plant relationships)

Form groups of five to eight people sitting in a circle. Each person should have a piece of paper and a few pens and pencils. Tell each person that they have 45 seconds to draw the first part of any garden system (e.g. rain from a rain-cloud). After the first 45 seconds, call out "pass to the left." Ask them to try to figure out what the system is that they just received and add to it and have fun with it! Give them another 45 seconds and call out "pass to the left." Keep repeating until the papers have gone around the entire group. The point of this activity is to create a 'crazy' system on each piece of paper. These systems will not all be accurate, but they create fabulous pictures to start great conversations.

Activity Questions: Once the systems have been passed around, ask your group members to write the original system's name on the top of the page, and then a new name for the system at the bottom of the page based on their interpretation. Ask the groups to share their systems with each other on a voluntary basis. Then ask your students to look at each others' systems. Are there any common ideas, relationships, or functions? What do they look like? Do they remind people of other systems?



Permaculture and Complexity

[Click here to engage in the online dialogue for Gardening and Systems](#)

Permaculture represents a complexity theory approach to gardening and is a great way to include a mindful and inquiry-based investigation into a school garden. Below are the 12 Principles of Permaculture - [click here for more info on the 12 Principles](#) (adapted from Holmgren, 2011).

Pedagogy Question: What are the bridges and barriers for using these twelve principles as a framework for your curricular activities?

	Observe and interact - by taking the time to engage with nature we can design solutions that suit our particular situation.
	Catch and store energy - by developing systems that collect resources when they are abundant we can use them in times of need.
	Obtain a yield - Ensure that you are getting truly useful rewards as part of the work that you are doing.
	Apply self regulation and accept feedback - We need to discourage inappropriate activity to ensure that systems can continue to function well.
	Use and value renewable resources and services - Make the best use of nature's abundance to reduce our consumptive behaviour and dependence on non-renewable resources.
	Produce no waste - by valuing and making use of all the resources that are available to us, nothing goes to waste.
	Design from patterns and details - By stepping back, we can observe patterns in nature and society. These can form the backbone of our designs with the details filled in as we go.
	Integrate rather than segregate - By putting the right things in the right place, relationships develop between those things and they work together to support each other.
	Use small and slow solutions - Small and slow systems are easier to maintain than big ones, making better use of local resources and produce more sustainable outcomes.
	Use and value diversity - Diversity reduces vulnerability to a variety of threats and takes advantage of the unique nature of the environment in which it resides.
	Use edges and value the marginal - the interface between things is where the most interesting events take place, these are often the most valuable, diverse, and productive elements in the system.
	Creatively use and respond to change - we can have a positive impact on inevitable change by carefully observing and then intervening at the right time.

Humanities in Gardens

[Click here to engage in the online dialogue for Gardening and Systems](#)

Pedagogy

What does it mean to learn about place through a lens of human expression? And how does working with nature affect us in our day to day lives? Humans have been struggling with their existence on this earth for hundreds of thousands of years and through gardening we can learn more about how this existence has helped and hindered us throughout the ages. We are incredibly connected to edible plants, even in our industrial models. Ecological limitations of plant species help us understand where certain plants prosper, and where they don't. However, humans have been intervening in where plants live, and how they develop for thousands of years. Consider the potato that is part of this veggie burger and fries. Potatoes originated in the South American Andes, and have become a cultivated staple crop across Africa, United Kingdom, Europe, and North America (Kiple & Ornelas, 2000).

How complex is the history of the potato and how does this relate to human movement around the planet? We know that the monocultural crops (single species plantings) of Ireland were completely wiped out due to a potato blight. This caused more than a million Irish to die or emigrate to other countries in search of food. What else has the potato been involved in?

Pedagogy Question: Can plants be considered pivotal historical characters? How might the History of North America look if the potato didn't exist?

The mindful potato (you need to eat potatoes for this!)

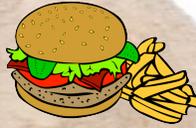
Prepare potatoes for yourself in your favourite way. Of course, because this project revolves around fries, my favourite potato recipe is below. If you are doing this with your class, this could be fun homework. You could ask your students to do this activity with their favourite fries. Once you are ready to eat, take a moment to breath. Breath in the smell of your food. Consider where your potato came from? Is it grown locally? PEI? The United States? Who planted that potato? Where did they get that seed potato from? Did that potato relate to any long-ago potato that your ancestor ate?

After you have done your yummy potatoes. Research and draw your "potato family tree." Try to find evidence of a potato connection, and if you can't find evidence, imagine their connection to a potato. Go back at least five generations.

Activity Questions: Where are your ancestors from? Were they indigenous to North America and harvested camas-root "potatoes"? Were they South American and revered sweet potatoes as spiritual food? Were they Irish and forced to flee their home in search of food during the Potato famine? Do you have any ancestors who farmed the land themselves as subsistence farmers?

It's Spring and time to plant!

Dear Gardener-
Teacher,



Spring has come and it is time to start organizing your seeds. If you have bought seeds, you will see on the back of the package that there are instructions on when to start growing them. Typically there are "start inside" seeds and "direct-seeding" seeds.

Some seeds don't even come as seeds! For instance, me, the potato. I can be purchased as a seed potato which means that I am found as a real potato that has been kept in a dark and cool place from last year's crop. I can be planted in the middle of the Spring, and love lots of space (around 50cms). I also love being on a little loose hill, with lots of mulch (about 6 inches) because when I start to grow, I put out tubers into this loose soil. You can then tickle my tubers out to eat whenever you want! I am really easy to grow and like lots of sun and lots of water (especially when my green tops are showing). I really like being planted with some beneficial friends too (also known as companion planting). Curiously enough I like being planted with plants that taste good when I am cooked with them, like onions, chives, horseradish, and bush beans!

Other seeds need to be carefully started indoors in a little greenhouse- while some hardy plants can be put right into the soil early in the year. Almost all seeds require heat and water to get going. Refer to gardening books for the particular timing of when you put seeds in the ground. However, don't take all gardening books for their word. Getting to know your garden is the most important thing. Remember the first and last permaculture principles: **observe and interact** and **creatively use and respond to change!**

Your friend, Yukon
Gold.

Poetry in Gardens

[Click here to engage in the online dialogue for Gardening and Systems](#)

Pedagogy

Humans have shaped language so that we can accurately resemble thoughts, concepts, and experiences. Prose and poetry being among the most powerful methods for eliciting images and expressing understanding. The Romantic Poets (circa. 1700/1800s) were known for their interest in intuitive natural poetry (a reaction to the enlightenment rationalist movement going on around them at the time). In their poetry, one sees ecological literacy, or the understanding and use of knowledge about the environment (see definition below). For instance, take Wordsworth's poetry of "The world is too much with us" to the right on this page. His understanding of the industrial revolution as destroying the very earth that supports him is uncannily foreshadowing considering the environmental movement in North America occurred 200 years later: "for this, for everything, we are out of tune."

Pedagogy Question: How has poetry and prose influenced your understanding of the world?

Garden Field Poetry (Do this right here and now!)

Grab your paper and pencil/pen and go out into a garden, or to a garden near you (your neighbour's or nearest community garden or farm). Walk around the garden slowly, and be aware of your breath as you go. Try the mediation: "Breath in, I recognize that I am breathing in. Breath out, I recognize I am breathing out." Imagine that your thoughts are leaves floating on top of a stream. Let them flow through your mind but do not catch hold of the first one. Keep walking around the garden, and acknowledge what you are seeing, smelling, tasting, touching, and hearing as you go. Be aimless in your approach. When your attention finally latches on to something, like a flower's shape, or the sound of leaves in the wind, or the moisture of the soil, hold onto that for a moment and be there with it. Deeply listen to the rustling or deeply look at that shape. Now find a quiet area to sit down and think about this experience you just had.

Activity Questions: What was there for you? Take some notes on your paper. They could be prose, single words, or drawing. What does this experience remind you of you in your own life? How does this experience connect with other elements in the garden? Can you express the colour or shape or sound or taste in words? Give it a try and use any form you would like. Here are some forms that I have fun playing with:

- Haiku (5 syllables, 7 syllables, 5 syllables)
- Free prose for around 10 minutes (then go back through your text without reading it but just circling the words that pop out for you, rewrite those words below your prose - tada! you have a poem)
- Field poetry (mix technical and ecological understanding with juxtaposed words. For example, the stigma-style remnants of the lily annoyed the buzz out of the honey bee.)

The World is too much with us William Wordsworth, 1807

The world is too much with us; late and soon,
Getting and spending, we lay waste our powers;
Little we see in Nature that is ours;
We have given our hearts away, a sordid boon!
This Sea that bares her bosom to the moon,
The winds that will be howling at all hours,
And are up-gathered now like sleeping flowers,
For this, for everything, we are out of tune;
It moves us not.--Great God! I'd rather be
A Pagan suckled in a creed outworn;
So might I, standing on this pleasant lea,
Have glimpses that would make me less forlorn;
Have sight of Proteus rising from the sea;
Or hear old Triton blow his wreathed horn.

Ecological Literacy - working definition

Ecological Literacy is "how people and societies relate to each other and to natural systems, and how they might do so sustainably" (Orr, 1992, p. 93). Further to this, an ecologically literate person understands ecological systems, and how people and communities impact the systems in which they live (Cutter-MacKenzie & Smith, 2003).

Mapping Math in Gardens

[Click here to engage in the online dialogue for Gardening and Systems](#)

Pedagogy

Mathematics is an abstraction of nature. It allows us to represent complex thoughts, processes, and relationships through a fundamental and transferable language. It is in that representation and abstraction that has become such a burden for some learners. As teachers we see this when they question the real-life uses and relevancy of the problems they are being asked to solve. Some Math teachers have turned to physicalizing their problems by engaging the student in the measurement of stars, or the projectiles of potato guns. Gardens are also a way to connect students with math and this is done through mapping, planning, constructing, and ongoing management of that garden (Mazor, 2011; Moore & Deming, 2010). Of course, the students are learning mathematics in combination with various other disciplines. For instance, in the conservation of irrigation water, one must ascertain the quantity needed for effective watering, thus you measure the use of water over time. This not only allows you to practice complex questions of averages, standard deviation, and relational algebra, it also helps you understand relationships between water and the sun, water and the soil, and ultimately water and the plants.

Pedagogy Question: Why do we spend so much time practicing rote memorization in Math class when supporting open ended discovery can be said to help so much with deep learning? How might we provide alternatives to memorization in other physicalizations?

Mapping and Geometry (an activity to do with your students)

Ask your students to design a scale layout of the garden beds that fit within the gardening area that you have define. Encourage accurate measuring and use graph paper. There should be calculations around length, perimeter, area, volume, and capacity. Depending on the limitations of your space or the wood you might use to build your lasagna beds (as mentioned on page 8 by Frankia), you can provide conditions that apply to their design. For instance, recycled railway sleepers, used for defining edges are 2.4m in length. Or, you might need to have wheelchair accessible paths. This activity is sometimes enhanced (and made easier) when the students are outside and can see the garden area and even take measurements to corroborate their math.

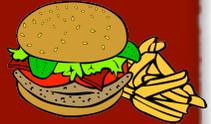
Ask your students to consider the plant sizes as well and look up where the sun will be over the course of the year. If you know you have shadier parts of the garden, perhaps shade-tolerant plants like beans can go there. There is even a mobile phone application that can tell you in real time where the sun will be at any time of the year: [click here to read about it.](#)

Activity Question: How might you measure where the sun will be on any given day without a mobile phone App?

Gardening the Mind: Trans-disciplinary veggie burger + fries

Summer watering, waiting and watching

Dear Gardener-Teacher,



So you think that you and your students can just take the summer off, go on vacation, slack off and when you come back to school you will have a thriving veggie garden? How wrong you are! Unless you have an army of ladybird beetles and electric fencing around each plant, there is no way you can keep me and my buds away. That is right - this is Rocky Raccoon and Daisy Deer come to munch on your increasingly dry garden.

If you don't want us around, munching on your garden, you are going to have to either connect with the summer students at your school or connect with the local community. Perhaps your community is really in need of a garden to grow their own food in and will gladly water, weed, and maintain your garden over the summer.

Alternatively, have you and your school board thought of connecting with young local organic gardeners who could be both mentors and caretakers on your site in exchange for their ability to sell market garden vegetables?

You probably haven't thought about any of this, you were just merrily sailing on your little curricular way, without any thought of the summer, other than what lake you are going to swim in. Classic!! Well all the more food for us. Just make sure you plant lots of corn and potatoes. We really like those.

Hey - anytime you need your compost bin knocked over give me a call: 1-800- RAC-COON

Your friends
Rocky and Daisy

Measuring in Gardens

[Click here to engage in the online dialogue for Gardening and Systems](#)

Pedagogy

Perhaps one of the most magical elements of growing your own food is seeing how things grow and the diversity of their growth among different species. Even the most experienced gardeners feel their hearts flutter when they see new shoots popping out of the soil. Seeing plants grow helps connect us with the food that they provide through the sense of mindful cultivation. We spend hours watering, weeding, trimming, harvesting, and preserving, sometimes for just a few morsels of food. Yet, this tenderness of cultivation not only teaches us about the differences among different plant species, it helps us understand ourselves, and how we interact with each other and the systems that sustain us. We can see different approaches to growing food, tending gardens, communicating knowledge and observations, all through simply witnessing a plant grow.

Pedagogy Questions: How might we continue to develop that sense of growth within ourselves? What would happen if instead of immediately wanting to be good at something (say a musical instrument or math problem), we re-orient our accepted ways of learning to be more of a cultivation practice?

Measuring Growth (activity to do with your students)

Ask each of your students to select three specimens that they will follow in the garden from seed to full growth. Each of these specimens will be tagged with their name, so that they can follow it from the seedling greenhouse to the garden. Ask your students to measure the growth, reminding them that not all plants grow up - some grow sideways! What measurements should they take of the plant? Help them brainstorm a list such as this:

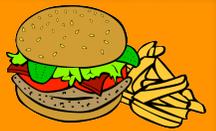
- height
- width
- number of shoots
- diameter of the main stem
- number of flowers and/or fruit

Each student should develop their own way of tracking this growth. They can plot it in a spreadsheet, or create a list, or draw the plants in their garden journal (as described on page 15). Take ten minutes out of every week to do this measurement exercise and then four times per year ask them to create some simple statistics of their plants:

- growth (one of the above variables) over time
- width over height
- number of flowers versus number of fruits
- average diameter among all of the plants

Activity Questions: What other growth observations do you have from spending such intimate time with these plants? How might this be measured in terms of the permaculture principles? Could you adapt planting next year based on this data?

Veggie Burger Recipe makes four servings



Heat 2 tablespoons oil in a large frying pan over medium heat. Add mushrooms, onion and bell pepper. Cook, stirring occasionally, until pepper begins to soften, 4 to 5 minutes. Add beans and garlic. Cook, smashing beans with the back of a spoon, 1 to 2 minutes more. Transfer mixture to a bowl and mix in eggs, mustard, and breadcrumbs. Form into 4 patties. Wipe out frying pan; heat remaining 2 tablespoons oil over medium heat and cook burgers until brown and feels firm, 6 to 7 minutes each side. Place on buns; top with, lettuce and tomato. You have just made a burger that came entirely from your own garden!

Journaling in Gardens

[Click here to engage in the online dialogue for Gardening and Systems](#)

Pedagogy

Gardens are art themselves. Where you plant, when you plant, and the species that you plant combine into a complex assemblage of interacting components. As gardener-artists, we can play with colour, texture, aromas, fuzzyness, and taste. We have been planting gardens as art forms for thousands of years. Just think of all of the types of gardens that exist: Italian, English country, Japanese, rock, rose, topiary, and of course kitchen - which is what this project is most interested in.

Pedagogy Questions: How does ongoing reflexivity through journaling influence our understanding and abilities to think deeply in artful, creative, and intuitive ways?

Garden Journal Activity (Do this right here and now!)

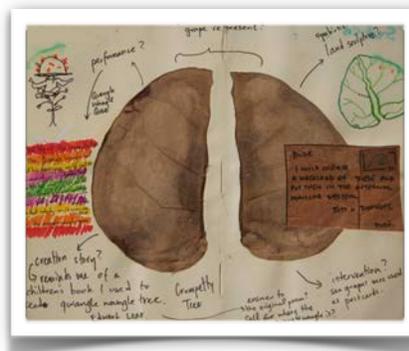
Harvesting from your garden is an amazing experience. Part of the experience of growing a garden is that of witnessing. Marking the change of your garden by sketching, drawing, and collecting leaves will help you understand the patterns occurring in your garden and provide you with an artful and creative experience. Creative journals have few boundaries, and thus you can paste leaves, smear mud or dirt, and press the journals against plants to get impressions.

Connecting your journal with the nature around you can help you experience nature more fully and have a keepsake that immediately takes you back to the moment you created that journal entry.

As you did with the field poetry, find a quiet spot in your garden. Select a piece of your garden (like a leaf, soil, or berry) to glue, smear, or imprint onto the paper. Draw arrows to label your piece and identify the species if you can.

Consider colouring your drawing. If you paint with watercolours, try to use water from your water supply, then there will be even more connection to place on your page. Provide context for your garden, draw a map of your garden and locate your plant on it. Also, write the day, month, year, and time.

Activity Questions: Other than humans, are there other animals that like the plant that you drew? (ex. aphids, slugs, birds, bees?). What time of day, month or season have you seen them? Is there any evidence of them passing through?



Harvest-time for veggie-burger and fries



Dear Gardener-Teacher,

Well you are back at school, teacher. And we, the plants have definitely missed you. We have been well looked after by the community, even harvested when the beans came up early - and they were frozen for your class. My sister red life has been cut and is still drying in Neighbour Smith's garage. She is anxiously waiting the flour mill, but it is her destiny, so she will have to come to terms with it.

We really want to see the kids again, and show off our growth. I think they will be impressed by how productive we were. We know that they put a huge amount of effort into us, provided the right nutrients, got us off to a great start, and now that our roots are hitting the manure way down in the lasagna, we are eternally grateful. Well at least until we are consumed. But really harvesting us is like a rebirth. When we are harvested, our leaves or stems will eventually turn back to earth and we will feed another class of students.

That being said, how have you set up your compost? Did you know that compost, like plants needs to be watered? That same bacteria that we love in our soil, needs to be in huge quantities in compost. This means that lots of water and sunlight on the black plastic, or wooden box is important. It also means that lots of air flow is great. Have your students poke holes in the compost every so often. And if they are courageous, ask them to grab a handful of red wiggler worms and toss them in too.

Until next season, your friends
Veggie Burger + Fries plants

Sculpture in Gardens

[Click here to engage in the online dialogue for Gardening and Systems](#)

Pedagogy

The expression of a person's ecological literacy reinforces and supports their development in a local environment. Art can act as an extremely powerful tool for young people to explore their creativity and integrate their knowledge among different disciplines which helps develop their worldview and belief systems. Young people that are encouraged to take risks outside of their normal comfort zone in their surroundings are able to act on their new knowledge in profound and useful ways, like restore damaged ecosystems, limit environmental degradation, and create beautiful art. This knowledge and action translates into transformative experiences, which allow the student to develop, or at the very least expand, their worldview to include the environment (Stanger, 2007).

Pedagogy Question: What supportive structures might we design in a curriculum that help students learn about ecology through expressive and artistic means?

Garden Sculptures (you can do this here and now!)

This activity is designed to get you working with natural materials to create three-dimensional objects. Creating environmental sculpture requires patience, vision, and acceptance of failure. Often pieces can be very delicate, and can be changed by nature (floating away on the breeze, being washed away by rain, or falling over). This ephemeral nature of garden sculptures is what makes them exciting as living projects.

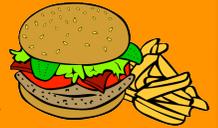
Nature sculptures in gardens can be functional and fun and can also be as much about the process as it is about the end product. Find materials that will be easy to work with and that you feel comfortable with (eg. rose stems are ouchy).

Consider your garden environment. What would be enhanced by sculptural elements? Many plants need climbing walls, nets, or poles. Is there a way to enhance the structural elements of your garden? Do the peas need a crazy shaped net? Could you build a spiral garden mound for your pumpkins?

Take some time to consider your materials as well. Can you find the materials you need to build the sculpture from the garden itself? Are there pruned branches that you could use? Or could you grow other plants (corn) as part of your wall? The first few efforts you make might just be the beginning of your process. You might not get to finish the sculpture today but maybe you can come back and work on it later, or start again somewhere else. After 20 minutes to 45 minutes, make a record of your sculpture (eg. photo, quick sketch or video clip).

Activity Question: What did it feel like building this sculpture? What were you thinking about?

Baked fries recipe
makes four servings



Place rack in top third of oven and preheat to 400°F. Place potato strips on rimmed baking sheet. Drizzle with canola oil; toss to coat. Roast 25 minutes. Using spatula, turn chips over. Roast until tender and golden brown around edges, about 25 minutes longer. Toss them in sea salt to taste. Hooray for home grown fries!



Harvest Postamble

Grade 3, Mr. Broadhurst, and a Daffodil

Mr. Broadhurst was one of those teachers that we all hopefully have had. He was an inspired Scottish exchange teacher that certainly spent much of his time finding new ways to teach and inspire. It was grade three and I was completely in love with going to school. This love wasn't because I knew I was learning how to add and multiply so that when I grew up I could file my taxes in an orderly fashion. It also wasn't because I really wanted to know that "an animal" should be "an animal" in my story exercises. It certainly wasn't because our classroom was in the basement of a 100 year old brick school house next to the gurgling and groaning oil heating system that clanked at odd times, lending a rich timbre to our Hallowe'en party. This love of school was because Mr. Broadhurst revitalized our experience every single day that we showed up. His eyes twinkled and he led us on journeys beyond the damp brick walls. Field trips into our minds and field trips into the weird and wonderful school property. Though, now that I have gone back there it seems rather normal!

Before I keep not-so-eloquently waxing about my love for school, I have to get something off my chest about Mr. Broadhurst. It was my chair that was selected when Mr. Broadhurst asked if anyone had an old chair at home that he could borrow for the year's reading corner. I was overjoyed at being specially chosen, and felt that my chair was evidence of being a responsible and giving person. Every time we would lay on the cushions in that corner to hear his Scottish brogue reading Roald Dahl, my body would quiver with delight. Even writing this now, I am getting some distant quivers. Oh, the glee of hearing about the countenance of *The Twits'* faces. I was so enraptured:

A person who has good thoughts cannot ever be ugly. You can have a wonky nose and a crooked mouth and a double chin and stick-out teeth, but if you have good thoughts it will shine out of your face like sunbeams and you will always look lovely. (Dahl, 1998, p. 9)

Not that I am saying anything about Mr. Broadhurst's teeth. They were very respectable. It was this sparkle of enthusiasm that engaged me every day. And when spring came along, he took us on an adventure. The adventure of growing a daffodil. We all piled out our basement door onto the concrete play area. This was the very same area that I learned about the birds and the bees from a grade five, scarred my knee forever, and played in the piles of Garry oak leaves. He had set up a miniature raised bed, right there on the concrete. I said, "You can't grow flowers on concrete!!" and his response was, "Why not?" We then set about growing our daffodil bulbs in that raised bed for the rest of the spring. How cool was this? I was completely into doing this. Yet, the transformational experience that I had from growing that daffodil wasn't anything to do with the fact that we were learning about bulbs versus other root types, or that daffodils are among the first flowers to bloom in Victoria BC, or that their latin name was *Narcissus* like that self-obsessed Greek God. It was the magic of planting, watching, leaving, returning, and witnessing this plant grow under my own care. That daffodil spring-boarded my interest in plants, and subsequently influenced me to explore botany in my undergraduate degree such that I practiced as a canopy epiphytologist for six years, climbing some of the tallest trees in the world.



Rambling Postamble

Transformational ecology of mind

This experience was more than simple gardening of a daffodil. This experience transformed my outlook on life. I saw the world in a different way, through different eyes now that I was the father of a daffodil. That cliché of “planting seeds in young minds,” I think only works if you support that seed in its growth, and recognize that it is part of an ecology of mind and place that occurs within a cosmos of connecting ideas. Bateson’s (1972) *Steps to an Ecology of Mind*, frames this concept from an anthro-ecological lens (that is, a lens in which humans and ecology are considered completely inter-related):

The questions which this book raises are ecological: How do ideas interact? Is there some sort of natural selection which determines the survival of ideas and the extinction or death of others? What sort of economics limits the multiplicity of ideas in a given region of the mind? What are the necessary conditions for stability (or survival) of such a system or subsystem?
(Bateson, 1972, p. xxiii)

Why did the daffodil experience find comfortable habitat in my brain, so that I would refer back to it years later in this reflexive act? I believe that this experience was completely transformational for my life direction. These transformational moments of knowing one’s direction are beyond curricular design. They exist almost in happenstance. We know, as teachers, that we can build great opportunities, and then hope for the best. Sometimes curriculum works and sometimes it doesn’t. It seems to depend on such a complex system of factors like students, weather, food, teaching space, time, among a large list of factors not apparent to me. Part of the experience of building a curriculum and then enacting it gets snared inside of ego and expectations. Perhaps we need to see that the curriculum is also part of the ecological system. That being facilitators of experiences and place is only part of our role. The other part of our role is as participants. We help generate ideas within the complex ecology of thoughts and also react to ideas and thoughts with our own experiences.

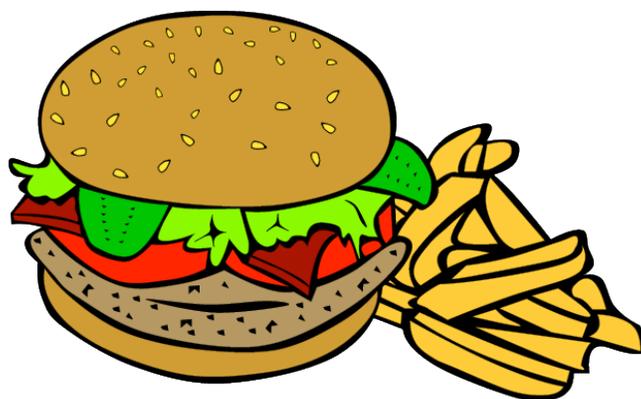
Extending the notion that gardening (especially permaculture) is the conservation of ecology, where humans tend systems for their own benefit (and sometimes the benefit of the systems around them), we could say that Minds are like gardens. They are where we plant seeds, add nutrients, water, soil and within that matrix, a complex system of interacting thoughts develop. Imagine now that all of our minds form a system of interacting sub-systems or mind-gardens and that this system is vital to our own existence through its integrity, complexity, redundancy, and resilience. This system of thought (or Ecology of Mind) suggests that we need to spend time tending each other’s gardens by sharing, supporting, and experiencing alternative ways of knowing as best we can. Perhaps then, we can move even beyond what we know of as “transdisciplinarity” to a place of sacred disciplinarity, where mindfulness, empathy, and compassion play integral roles in our conversations. Sometimes sacredness comes in the simplest moments, like when we take time to watch the plants grow.

Pedagogy Questions: The evidence that gardens can be used in transformative curriculum is strong. However, a few questions remain for me. [I invite you to help me trouble them further by clicking here.](#)

- Beyond the transdisciplinarity of garden curricula, what are we learning about ourselves when we create gardens in schools?
- Are there ways to achieve transformational experiences, similar to what gardens offer, through a curriculum without a garden or even a place?
- How might we further extend the analogy of gardening to our minds? How does spirituality, morality, and science fit into this notion?

If we are planting the seeds in a child to blossom in the community, we must tend the entire garden, ourselves, and each other.

(Willard, 2010, p. 29)



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