LEARNING IN THE LANDSCAPE;

an arts-based eco-literacy curriculum

AN INTERDISCIPLINARY APPROACH

to strengthening students' connection to local ecologies through empathy, exploration and activism.

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Curriculum Rationale – Theoretical Framework

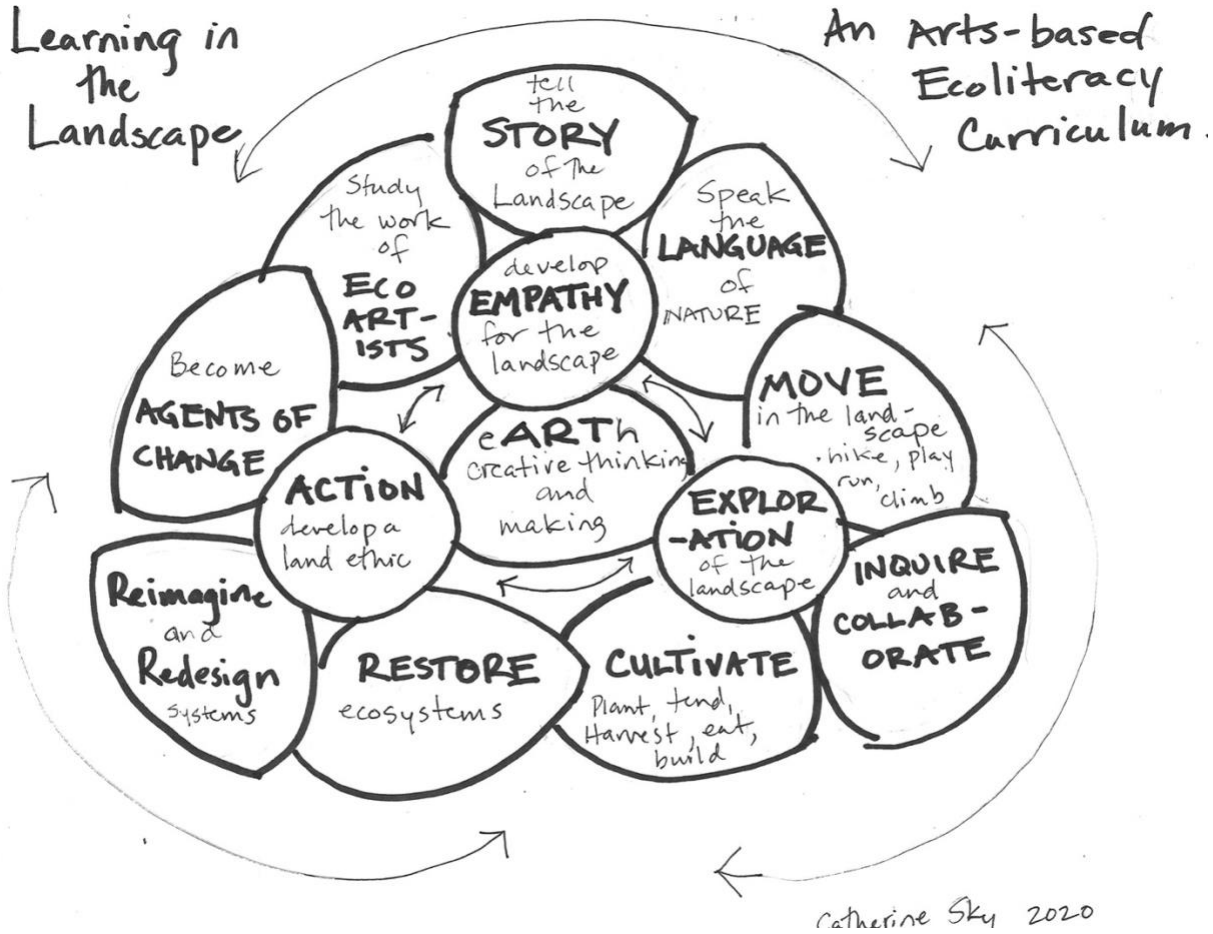
Introduction

After 15 years of teaching visual art at the elementary level in the Chicago public schools, I experienced severe burnout. Working long hours behind locked doors and grated windows with students, who for a variety of reasons were denied recess, had left us all anxious, irritable and nature deprived. Maybe out of desperation, or a need for oxygenated air, I began conducting my art classes in a greenhouse on the school's roof. The experiences that I envisioned there seemed like a logical extension of the kind of hands-on, sensory learning I had been fostering in the art room. I was thrilled but my colleagues were skeptical. "It's too hard to control them in there." "They'll throw dirt, have water fights." I was determined to at least give it a try. I couldn't resist. It was grey winter, but the greenhouse was warm and alive. The cycles and relationships of life were breathing all around us and we could sense their iterations. The greenhouse, where nature and all of its mysteries could be experienced, seemed to be what art should be about; what learning should be about.

By the end of the school year, we had defied expectations and managed to grow enough greens to enjoy a salad together. Yes, there were a few water fights but, woven into my regular art curriculum was tending, nurturing, cooperating and perceiving in ways that were quite out of keeping with the way things were done in the rest of the school, where standardized testing drove the curriculum and extras like art and gardening were expendable. The experience showed me that immersion in nature could breathe much needed life into my art teaching practice and since then, I have continued to look for ways to connect visual art pedagogy with the natural world.

As it turns out, many others have made the connection between ecological learning and the arts. In fact, beginning in the late 1980s a number of art educators envisioned a transformative art pedagogy which could engage students in environmental issues. (Jagodinsky, 2008; Lankford, 1997). This practice, known as eco-art education (Inwood, 2008), drew on the eco- art movement of the 1960s and 1970s, in which artists addressed issues of social and environmental justice through drawing, painting, sculpture, installation and performance art (Blandy, Congdon and Krug, 1998). In designing this curriculum, I have been inspired by a new generation of eco art educators who have looked outside of the traditional classroom to their own school grounds, local parks, woods, and wetlands for creative inquiry and production (Inwood, 2018; Bertling, 2015; Creel, 2005; Gaylie, 2011; Sommerville, 2013).

This curriculum draws on my experiences teaching in a variety of settings, from inner-city classrooms to school gardens, to wilderness areas, all of which lend themselves in different ways to the combination of art and ecological awareness. Having relocated to California in the years of extreme drought, wildfires and now a global pandemic, I am adamant that a new relationship must be created between humans and the land that supports us. I believe that the hands-on, sensory and subjective nature of art education, which lends itself easily to interdisciplinarity and is capable of fostering open ended, creative thinking is fundamental to bringing students into a socially active and responsible relationship with the natural world.



Curriculum Module

The goal of this curriculum is, in the words of environmental educator David Orr, "to open young minds to the forgotten connections between people, places and nature. (1992)." Orr coined the term eco-literacy which refers to an understanding of the basic principles of ecology, or according to physicist and systems theorist, Fritjof Capra, "speaking the language of nature (2005)". Capra maintains that by applying an understanding of the systems by which nature sustains itself, we can redesign societal structures to function sustainably. With systems theory in mind, I have designed this curriculum to function as a cycle of three interdependent networks based on Sobel's (1997) identification of *empathy, exploration* and *action* as the

fundamental elements in children's relationship with the environment. Lessons cycle through these three networks as activities deepen students' fluency in the language of nature. And because nature speaks in patterns, colors, proportions and contrasts, visual art is the key to decoding her language (Capra, 2005). For this reason, visual thinking, in the form of observation, creation and communication, is the foundational center around which the networks cycle. Equally central is the concept of place. Students' connection to their community, region and land sets the cycle in motion and leads the way to ecological awareness and responsibility. (Sobel,1997; Graham, 2007)

Empathy: Telling Stories in Nature's Language

Art has been shown to facilitate a deeply affective connection with natural places and their non-human inhabitants (Bertling. 2015; Gaylie, 2011; Somerville, 2013). Whether it is through observing the work of local artists or through their own creative responses to the landscape, the empathy network facilitates a deep understanding of nature's diversity and complexity and guides students to see natural elements as living systems, deserving of care.

Younger children especially make imaginative connections with flora and fauna (Sobel, 1997) which are deepened through telling the stories of the local plants and animals. Stories can take many forms. Myths, folktales and poetry are one way to introduce kids to natural elements in a right-brained, metaphorical way which traditional science teaching often overlooks. (Eisner, 1994). Visualization through drawing allows a seed's transformation to fruit and back to seed to be told through cartooning or animation. Students can draw or paint the evolutionary story of the hummingbird and the trumpet flower through shape and color. Stories can link disciplines, such as the historical to the botanical to the mathematical. For example, the story of a sunflower can be told through indigenous people who used their seeds for nutrition, through the pollinators who

make the seeds possible and through the Fibonacci sequence of numbers which determines the placement of the seeds in perfect spirals.

Stories are well told through pictures and art history is full of artworks for students to observe, analyze, reinterpret and recreate. Just as scientific illustration has a long tradition of narrating natural history and ecological processes, post-modern and contemporary artists have made profound work on environmental themes, including restoration of natural areas with living sculptures, underwater reefs, toxin accumulators and wildlife shelters. (Blandy, Condon, Krug, 1988; Lankford, 1997). In addition, maps are a great synthesis of historical, visual and scientific information. Students can experience this multi-dimensional story of the landscape through drawn, painted and sculpted maps, illustrating the way water moves or how the land has changed over centuries.

Local history and indigenous knowledge contribute greatly to an understanding of who has power over our life sustaining systems (Graham, 2007). Places have economic, ecological, social, political and spiritual stories in whose telling, we connect students to an authentic experience of their locality. The stories of European settlers and the immigrants who followed are embedded in the way land is used today for farming and agriculture. Conflicts between land use and conservation are contemporary stories that belong in schools just as much as foreign wars fought across oceans (Bowers, 2002; Graham, 2007). Visual artists (including myself) have found rich subject matter in the relationships between human infrastructure and the land that supports it.

When we can read the story of our immediate landscape with fluency, we develop empathy for the systems that sustain us. According to Noddings, “caring about” is a motivating factor for justice (2010). Can a care-driven system of justice be applied to care for the natural?

Kimmerer (2014) describes the systems of meaning inherent in the Ojibwe language in which the word for water is a not a noun but a verb, as in "to be water." If we introduce this idea of animism which informs the indigenous concept of natural elements, questions such as "What kind of caring does a river need?" become central lines of inquiry which move through the curricular cycle through exploration and action.

Exploration: Moving in the Landscape

There is clearly nowhere better to learn about the landscape than in the landscape. After empathy, the next network in the cycle focuses on the physical experience of being in nature. Orr (1992), in claiming that learning should no longer be a passive, indoor activity, cites Dewey, the ultimate proponent of learning in the outdoors. Dewey (1925) says

> We cannot overlook the importance for educational purposes, the close and intimate acquaintance got with nature at first hand, with real things and materials, with the actual processes of their manipulations and the knowledge of their special necessities and uses.

Dewey's belief that knowledge is constructed through lived experiences and social interaction, is a powerful rationale for involving students directly with nature. Outdoor experiences require group cooperation, whether it is hiking through a wetland or working in a school garden. This is also a place where students' natural curiosity can drive inquiry and allow them to become curricular informants (Short and Burke, 1991) as learning emerges from students' noticings and wonderings.

Greene suggests the need for individuals to come alive in connection to educational material (1971). The lived experience of material is especially meaningful when the material is living. Planting, tending, harvesting and eating crops from a school garden literally gives life to the student and their learning. Eisner also brings up the idea that curriculum can be embodied in a set of materials. (1994). Expanding on this idea, a relational materialist approach explores the

materiality of natural objects as “non-human teachers” guiding learning through the qualities of their particular properties (Green and Duhn, 2015). In an eco-art curriculum, where the plants are simultaneously subject and material, building a trellis with willow branches instructs students in the form and structure of the plant, its historic uses as well as its properties as a strong, flexible and practical building material. This also provides valuable insight into the life cycle of objects and waste reduction. If students are able to grow their own learning materials, how much is saved in the elimination of transportation and packaging?

Growing food speaks to the story of settlement and farming and deepens students’ connection to the land as they begin to understand its role in sustaining us. This type of learning is physical and sensory. Digging, hauling and watering allow cognition in the form muscle memory. Movements, textures and smells root empathy and exploration in the body.

The opportunities for creativity and innovation are endless in outdoor cultivation. Shaping the soil to accommodate plants, designing water catchment and delivery systems, identifying plants by subtle differences in shape and color. Nature journaling allows students to visually and verbally document the processes and cycles that occur as soil, sun air and water transform a seed into food. The nature journal functions as an artist’s sketch book, informally recording data to be later synthesized into more complete ideas, hypothesis, poems, songs, paintings.

In the exploration network, physical connection to the community is also achieved through walks in the neighborhood or hikes in local parks, farms, woods and wetlands. Field trips facilitate moving through a landscape with senses engaged. Hikes accompanied by nature journaling allow the experience of the place to become the teacher, guiding students to questions that may be brought to the action network. Why do trees thrive in one area of the park and die in

another? Why are new houses being built so close to the river? Why is it important to restore natural areas?

Develop A Land Ethic through Action

Dewey envisioned education as a process of social progress and reform in 1925. In my opinion, today's students, "coming to share in the social consciousness" through education must develop an ethical relationship with the land. We are already seeing the effects of our societal indifference to nature in the form of droughts, floods, wildfires and pandemics. Green's idea that real learning happens through "sense-making in a changing world (1971)" seems meant for this particular moment in time and her position that "the individual is only in a position to learn when he acts upon the world," is a driving force behind the action network, which focuses on rethinking systems to envision and design restorative solutions. This can be as simple as managing a compost bin or harvesting rainwater. More complex activities involve activism around environmental issues in the community and beyond. Environmental injustice is pervasive locally as well as globally and demands the attention of today's students. All students and older ones in particular can be introduced to local issues of land management, development and conservation where their thoughts and opinions matter.

The action network draws on the ideas of Paulo Freire as students are treated as experts in their own experience and given the chance to develop their positions and beliefs. While Graham (2007) faults the critical theorists for not addressing environmental issues, Freire's notion of dialogue as the essential form of education and activism has universal applications. Freirean dialogue consisting of humility, love, reflection and action, is a model for the way this curriculum aspires to reach students.

Art provides unique opportunities for dialogue. Visual Thinking Strategy or VTS is an inquiry-based system of art appreciation designed by art educators. Rather than presenting students with contextual information about art works, VTS allows students to make meaning from images by asking three simple questions: What's going on in this picture? What do you see that makes you say that? What more can we find? Discussion generated from students' authentic reading of images results in knowledge that is student directed and co-constructed through group dialogue. Art historical images can be a starting point for inquiry into colonialism, treatment of indigenous peoples, settlement and development of the land, etc. As the ideas generated through such discussions cycle through the curriculum, they gain dimension and can inspire students to become agents of change.

Art's many modes of communication allow students to take unique action on the issues that are important to them. Drawing on the rich tradition of protest art, students are encouraged create images that effectively communicate their ideas with clarity, wit and beauty. Printmaking, sign making, painted murals, digital graphic design, street art are fun and accessible media. Action can also be taken in the form of educating others in the school and community, through proposals, presentations, puppet shows or public service announcements.

Rethinking and redesigning systems will be easy to accomplish as students become more eco literate. Speaking nature's language automatically enables a new approach to living as students become familiar with natural patterns and processes. The art of good design begins in the limitlessness of children's imaginations and their drawings bring these ideas to life. From the planning of a simple planter box to more complex landscape restorations, a creative approach to drawing plans elicits beautiful artworks whose value appreciates when translated to three dimensions.

Conclusion

It is my hope that as this curriculum cycles through its various iterations, it will become transformational. As I continue to develop it into a cognate project and hopefully, a working place-based eco-art curriculum I wonder where *its* place will be. Interdisciplinarity doesn't align neatly with a standardized, test-driven educational system and an instructional design that draws from so many disciplines may be hard to fit into a school program. Noddings (2007), points out that the siloing of disciplines prevents students from making meaningful connections to subject matter. She believes that love of learning comes from finding connections, between school subjects and the real-life experiences of students. At the very least, I hope that in its interdisciplinarity, this curriculum will offer learning experiences that are meaningful. At the most, I hope it will inspire students to be empowered agents of environmental protection. Somewhere in between, I hope to initiate a dialogue between children and nature that will continue to cycle spiral and tesselate into some healthy and verdant future.

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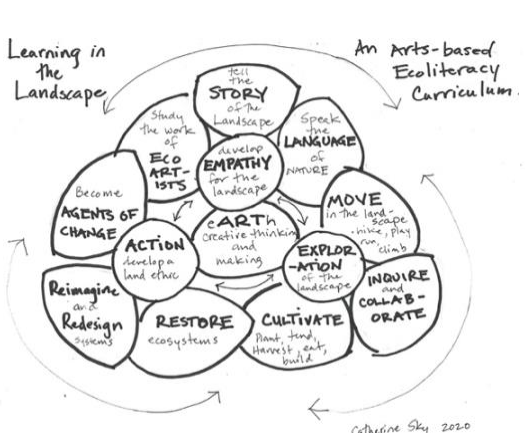
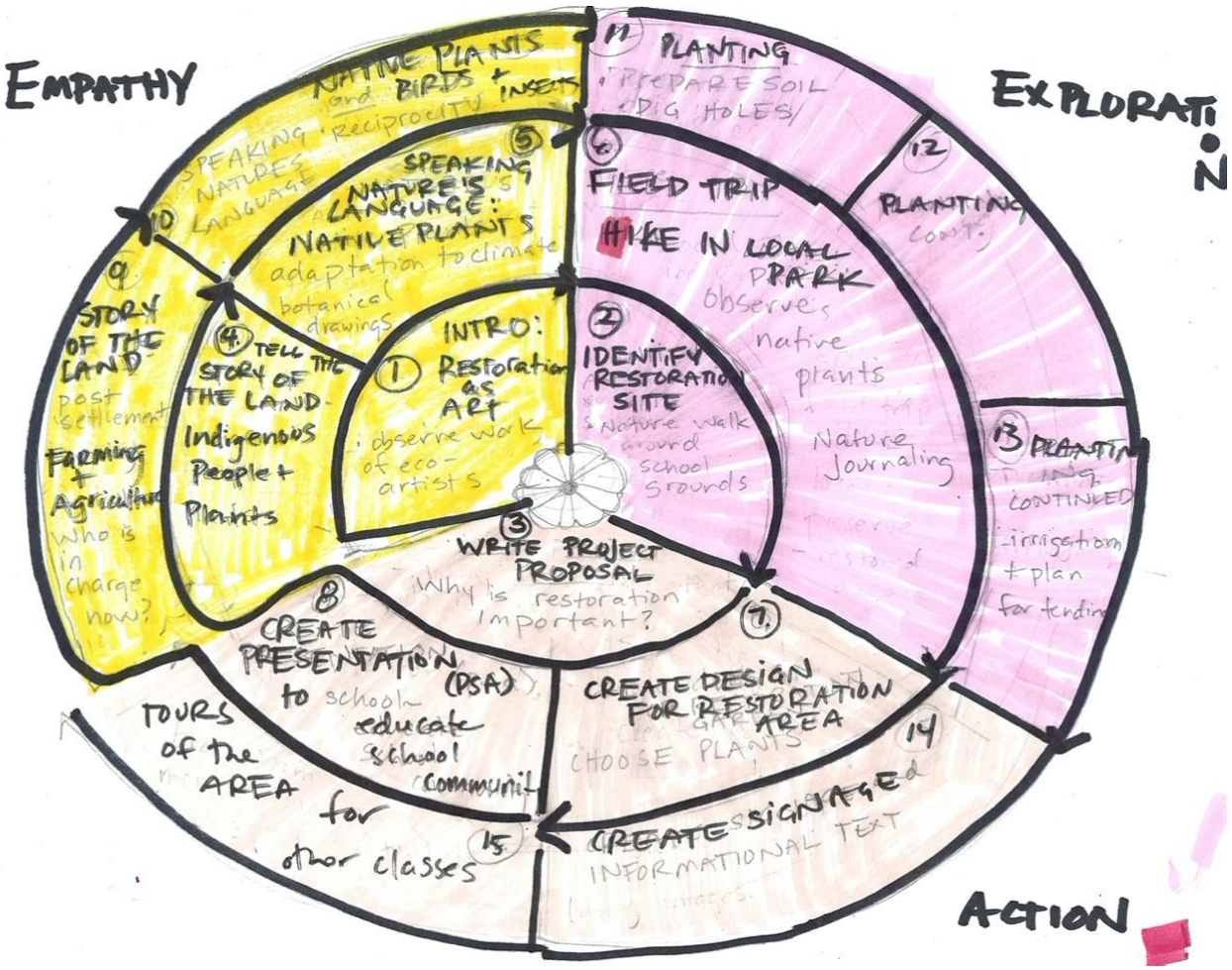
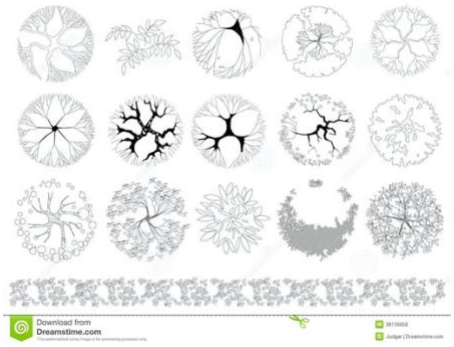
UNIT: Learning in the Landscape: Native Plant Restoration on School Grounds
16 40 min. sessions
Sample Audience: Grade 4, McNear Elementary School, Petaluma, CA
Scope and Sequence

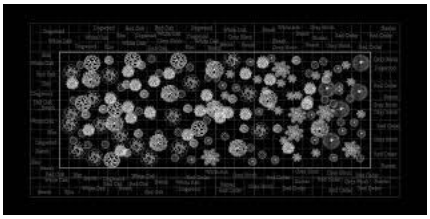


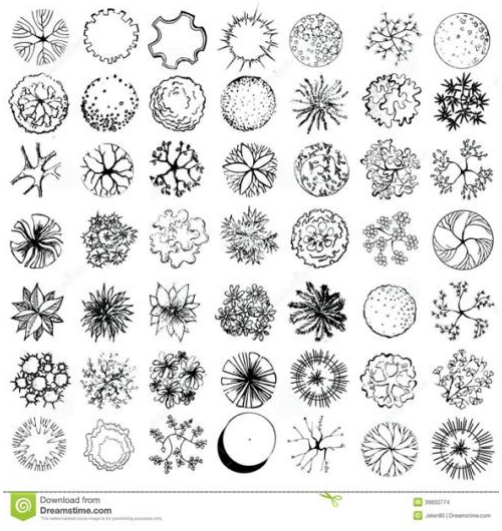


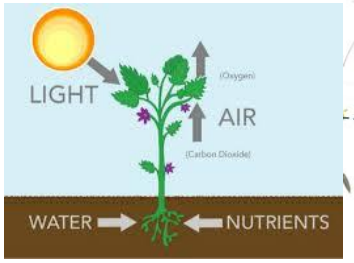
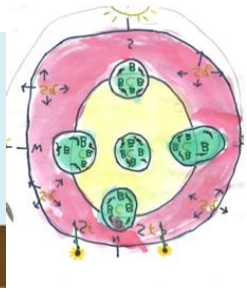
LESSON 1 (40 min)	Introduction to Unit: Native Plant Restoration as Art What is eco-art?
Goals and Objectives (Students will…)	1.observe, interpret and analyze an artwork 2.use design elements (line, shape, texture, pattern, color) to create a drawing inspired by the work of Alan Sonfist
Standard(s)	4.VA.Re.8 Interpret art by referring to contextual information and analyzing relevant subject matter, characteristics of form, and use of media
Content – visual thinking strategies (VTS)	What's going on in this artwork What makes you say that? What else do you see?
Activity- (setting)	In Classroom, Observe the work of artist, Alan Sonfist Slideshow and discussion, What is restoration? What are native plants Is restoration art? Why is it important? Should we make one at our school? Drawing activity in nature journal: Use art elements to create a drawing based on the Sonfist's work use landscape design symbols for grass, shrub, tree Teacher demonstration
Materials	drawing materials , nature journals internet connection projector
Resources	http://www.alansonfist.com/drawings_time_landscape   Alan Sonfist, Circles of Time Lost Falcon

Lesson 1 Resources, continued



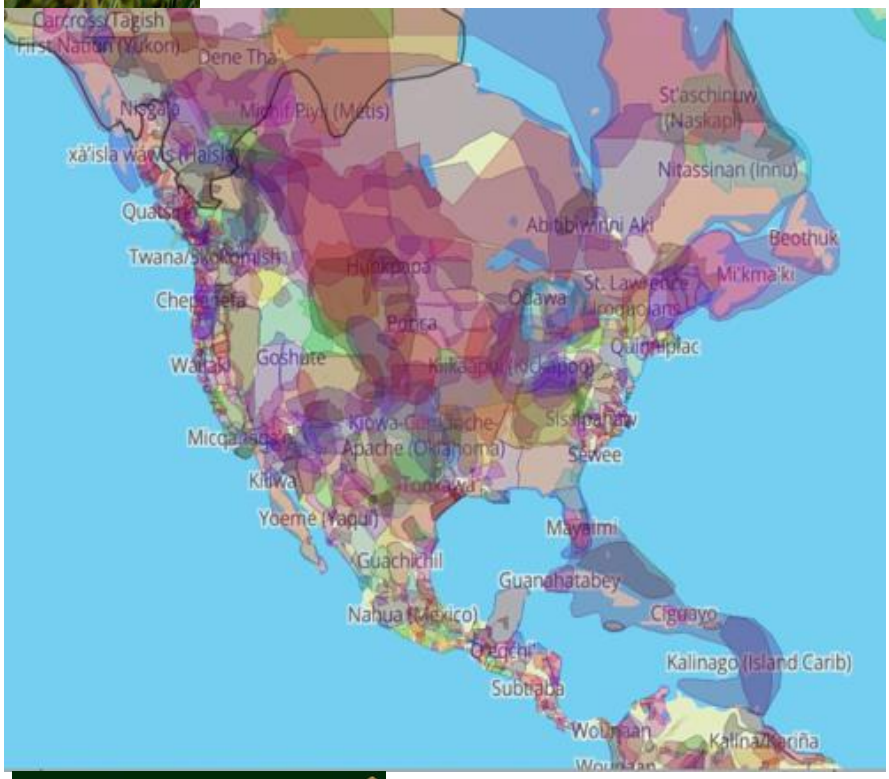


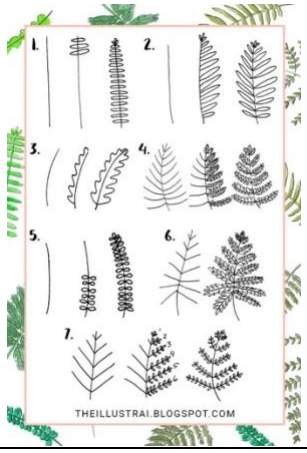


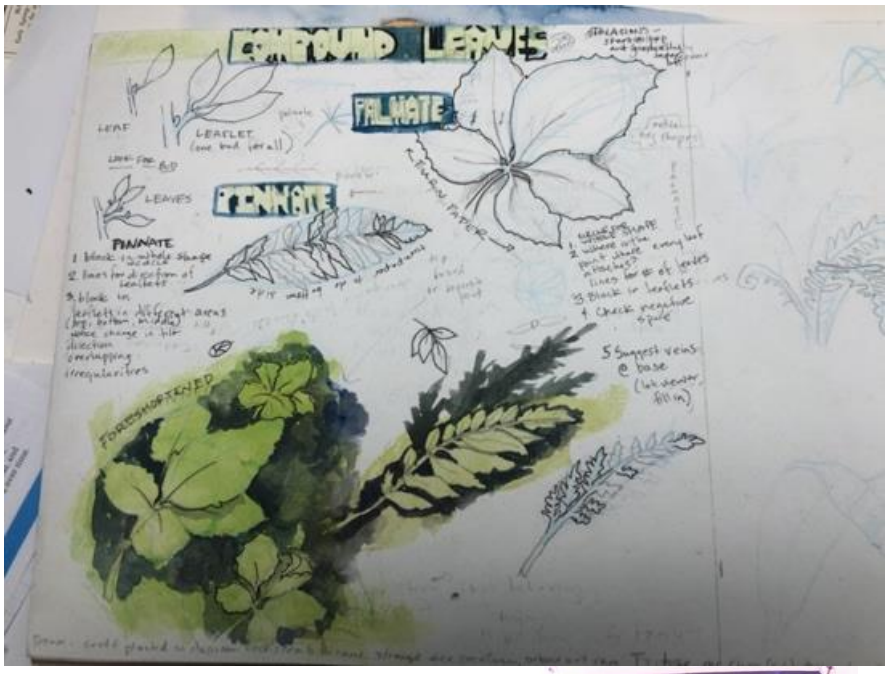
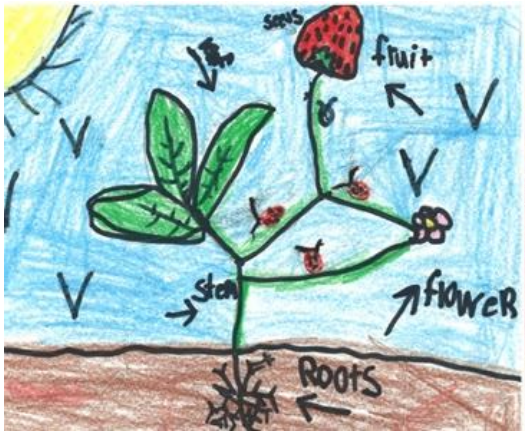
LESSON 2 (40 min)	EXPLORATION Choose site for restoration area
Goals and Objectives (Students will…)	1. Remember that plants need soil, air, sun and water and protection 2. Explore the school grounds. Choose a spot for the restoration site. 3. Measure and draw a quick sketch of your site, show water source, cardinal directions, direction of the sun.
Standard(s)	NGSS 3-5-ETS1-1. **Define a simple design problem** Asking Questions and Defining Problems • Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost.
	4.VA:Cr1.1 Brainstorm individual and collaborative approaches to a creative art or design problem.
Grouping	
Activity- Classroom and outdoor school grounds	1. Class discussion – What do plants need to survive? How do you plan a garden? Garden as system. Observe examples of landscape planning. Birds eye view. 2. With this in mind, students in groups walk outdoors and choose location and size for the restoration area. This should be a collaborative process as students discuss within their group where the plants will get the optimal sun, water, soil and protection, 3. measure and record on graph paper – draw simple a bird eye view "map" of your design and identify water source, sun exposure, directions and measurements
Materials	Clipboards, graph paper, compass, tape measure
Resources	 

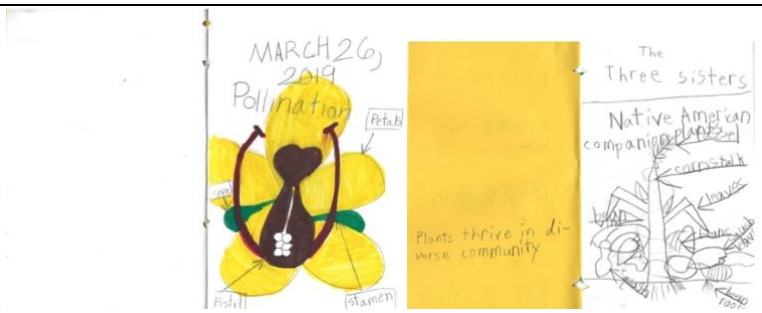
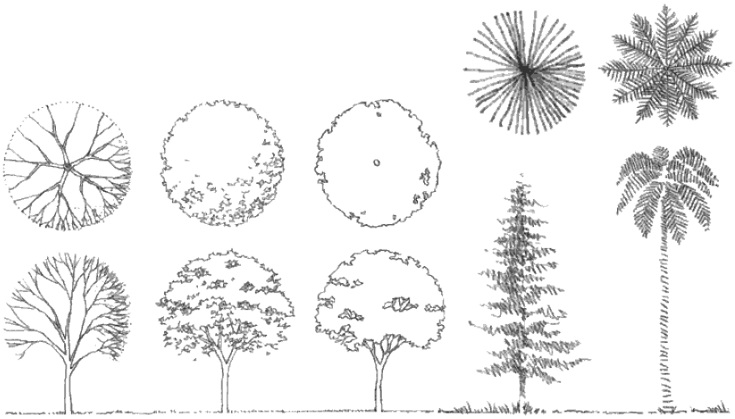
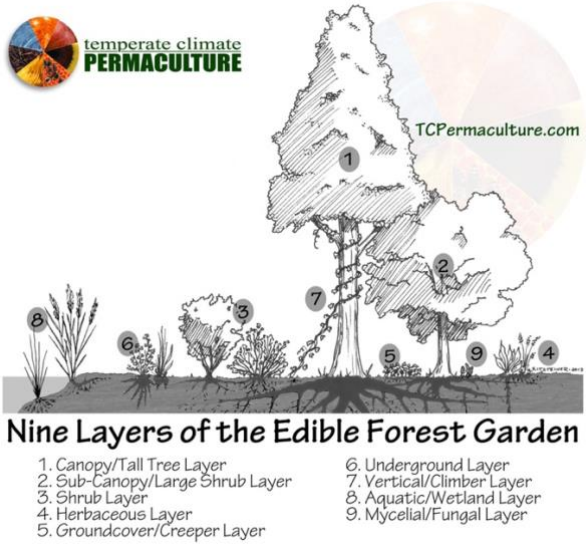
LESSON 3 (40 min)	ACTION Create project proposal – Why should we create a native plant restoration area at our school?
Goals and Objectives (Students will…)	1.Write a persuasive letter to request permission for native plant restoration area. This can be directed toward school principal, pta, school board, facilities department. 2. Support opinion with details
Standard(s)	CC Text types and purposes 1a. Introduce a topic or text clearly, state an opinion, and create an organizational structure in which related ideas are grouped to support the writer's purpose. • Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (3-5-ETS1-1)
Content	
Grouping	
Activity- In classroom	Review discussion from lesson 1 1. What is ecological restoration? 2. Why is it important to create an ecological restoration on our school grounds? Class reviews proposed designs from each group created during the last lesson. Students discuss and debate which designs will be most feasible and successful. Students work individually to write a letter asking for permission and explaining answers to above questions. Use ipads to research information to back up opinions. Finish as homework
Materials	Ipads, paper, pencils, designs from last lesson
Resources	http://www.alansonfist.com/landscapes_time_landscape_description.html https://www.ecoliteracy.org/article/straw-students-and-teachers-restoring-watershed https://www.cnps.org/gardening

LESSON 4. (40 min)	EMPATHY: Telling the story of the land: Whose land am I on? The Coast Miwok
Goals and Objectives (Students will…)	Identify the indigenous people of Sonoma County Describe and diagram the interdependent relationship between people and plants in pre Columbian miwok civilization
Standard(s)	4.2 Students describe the social, political, cultural, and economic life and interactions among people of California from the pre-Columbian societies to the Spanish mission and Mexican rancho periods. 1. Discuss the major nations of California Indians, including their geographic distribution, economic activities, legends, and religious beliefs; and describe how they depended on, adapted to, and modified the physical environment by cultivation of land and use of sea resource https://www.cde.ca.gov/ci/hs/cf/documents/hssappendixc.pdf
Content	
Grouping	
Activity-	The story goes that once upon a time, all plants and animals were people. One of them was Coyote, who created the world from the top of Sonoma Mountain. His village elders became the redwoods – crimson colored to remind everyone that we are all of the same blood. One only had to look west to the coast redwoods to remember. Discuss stewardship techniques the natives used to maintain the plants that sustained them. Read parts of the Last Woman in Petaluma Fire Harvesting Pruning Other possibilities Local Miwok Elder – plant talk Note taking In nature journal – draw a concept map or graphic organizer to diagram the reciprocal relationship between the Coast Miwok and plant life noting particular plants
Materials	Internet, drawing journals,

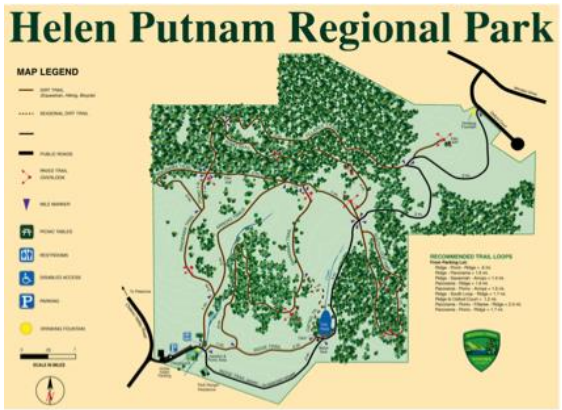
Resources	   https://www.kcet.org/shows/tending-the-wild/the-last-woman-from-petaluma https://native-land.ca/ https://www.yosemite.ca.us/library/myths_of_the_southern_sierra_miwok/ https://www.yosemite.ca.us/library/miwok_material_culture/medicines.html https://friendsofcortemaderacreek.org/cn/miwokplants.pdf

LESSON 5 (40 min)	EMPATHY- Speaking the language of plants
Goals and Objectives (Students will…)	Identify structural and functional elements of plants
Standard(s)	DCI LS1.A: Structure and Function ♣ Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1) Crosscutting concept Systems and System Models ♣ A system can be described in terms of its components and their interactions. (4- LS1-1),(4-LS1-2)
Content	
Grouping	Students work individually
Activity- In classroom	In journals create a guide to identifying plants Compound, pinnate, palmate leaves alternate, opposite, etc,,  

	  
Materials	Pencils, erasers nature journals drawing guide (teacher created)

Resources	  

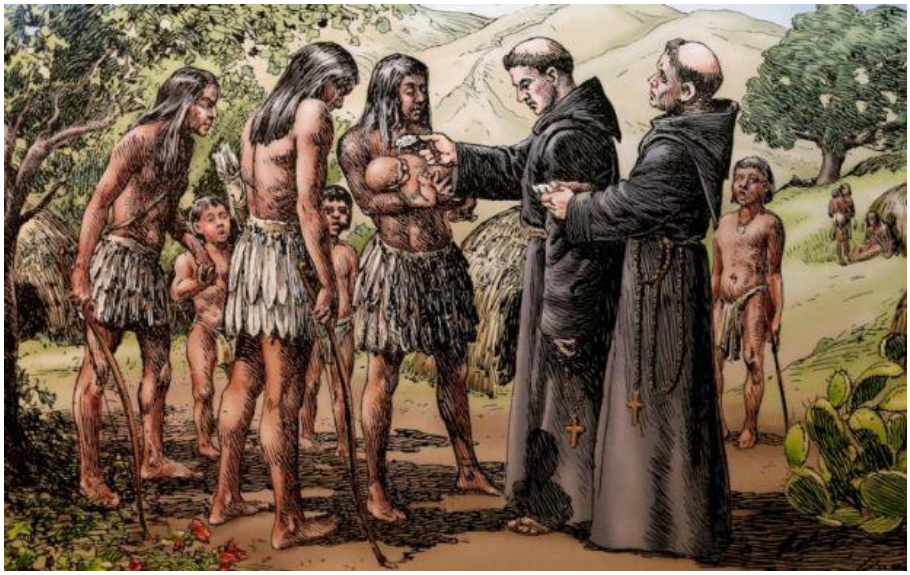
LESSON 6 All day	EXPLORATION; Field trip to local park to observe native plants
Goals and Objectives (Students will…)	Hike in local park Identify and draw native plants manzanita, wild strawberry, nut sedge Coyote bush, yarrow, live oak Interpret maps to identify creeks and channels to determine water needs of plants Observe interaction between plants and wildlife
Standard(s)	NGSS DCI LS1.A: Structure and Function ♣ Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1) Crosscutting concept Systems and System Models ♣ A system can be described in terms of its components and their interactions. (4- LS1-1),(4-LS1-2) ESS2.A: Earth Materials and Systems ♣ Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1) 4-ESS2-2 2. Analyze and interpret data from maps to describe patterns of Earth's features. [Clarification Statement: Maps can include topographic maps of Earth's land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.]
Content	
Grouping	Students will be grouped with adults or park docents
Activity-	Nature journaling Create a list of plants for students to identify and draw Manzanita Yarrow Coyote Bush Live oak
Materials	Pencils, watercolors clipboards, nature journals printed map of park

Resources	    Map of park

LESSON 7and 8 (2 40 min sessions)	ACTION: Choose Plants and finalize design of restoration area in slide show to present to school (email to other classes)
Goals and Objectives (Students will…)	Create a slide show presentation of restoration area design Including budget, list of plants and prices, list of other materials needed, final design agreed upon by class Include photos from nature journals and any other artifacts of process, letters etc…
Standard(s)	**ETS1.A: Defining and Delimiting Engineering Problems** • Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (3-5-ETS1-1) **ETS1.B: Developing Possible Solutions** • Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2) • At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2) • Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3) **ETS1.C: Optimizing the Design Solution** • Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3)
	4.VA:Cr2.3 Document, describe, and represent regional constructed environments
Grouping	.
Activity- In the classroom Groups may go outside to check measurements of restoration area	In groups Revisit plans from lesson 2 Revisit drawings from lesson 1 Revisit plant information from fieldtrip, research more native plants on I pads Use calflora website to create plant list. Identify plant community as Oak Woodland Discuss budget and create list of materials with prices Synthesize to create a final design including tree, shrub, grass, perennial flower each group presents design to class to determine best design – various elements can be combined to create final design

LESSON 9 40 min	EMPATHIZE: Tell the story of the Land Transition to Farming and agriculture
Goals and Objectives (Students will…)	Observe artworks depicting colonization Use Visual Thinking Strategies (VTS) to discuss artworks
Standard(s)	History Social Science Content Standards 4.2 Students describe the social, political, cultural, and economic life and interactions among people of California from the pre-Columbian societies to the Spanish mission and Mexican rancho periods. 3. Describe the Spanish exploration and colonization of California, including the relationships among soldiers, missionaries, and Indians (e.g., Juan Crespi, Junipero Serra, Gaspar de Portola).
	4.VA:Re8
	Interpret art by referring to contextual information and analyzing relevant subject matter, characteristics of form, and use of media.
Activity-	Observe and discuss the artworks below. What's going on in this picture? What do you see that makes you say that? What more can we find? Use artwork to stimulate inquiry and dialogue. Students guide the conversation. Watch Video of Indian Valley Organic Farm
Materials	
Resources	

The First Tribute of Christopher Columbus painted by the Spanish painter, Jose Garnelo 1892



Junipero Serra and Franciscan Monks with Native Americans

Vandalized statue of Junipero Serra

	  https://www.kcet.org/shows/tending-nature/episodes/cultivating-native-foodways-with-the-cultural-conservancy Indian Valley organic Farm and Garden, Novato Cultural Conservancy

LESSON 10 All day	Empathy – Tending the Wild Puttting the culture back in Agriculture Field Trip to Indian Valley organic Farm and Garden, Novato
Goals and Objectives (Students will…)	Observe interaction between plants and wild life Observe indigenous restoration practices and designs
Standard(s)	Social Science content standards 1. Discuss the major nations of California Indians, including their geographic distribution, economic activities, legends, and religious beliefs; and describe how they depended on, adapted to, and modified the physical environment by cultivation of land and use of sea resources. LS2.A: Interdependent Relationships in Ecosystems ♣ The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as "decomposers." Decomposition eventually restores (recycles) some materials back to the soil.. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. (5-LS2-1) LS2.B:
Content	
Grouping	
Activity-	
Materials	
Resources	

LESSON 10-13 (3 -4 40 min sessions)	EXPLORATION – Planting!!
Goals and Objectives (Students will…)	Prepare and plant native species in restoration area.
Standard(s)	Social Science content standards 1. Discuss the major nations of California Indians, including their geographic distribution, economic activities, legends, and religious beliefs; and describe how they depended on, adapted to, and modified the physical environment by cultivation of land and use of sea resources. LS2.A: Interdependent Relationships in Ecosystems ♣ The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as "decomposers." Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. (5-LS2-1) LS2.B: Cycles of Matter and Energy Transfer in Ecosystems ♣ Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment. (5-LS2-
Content	
Grouping	Students will work in groups, rotating through activities throughout the sessons.

Activity-	  Over the course of 3-5 sessions, student will create the habitat area. Prepare and amend soil with compost Dig holes Install gopher cages Put plants in. Water/install irrigation Build trellising and structures for netting
Materials	Gardening tools, and supplies
Resources	

LESSON 14/15 (40 min)	Create informational signage for plant restoration area.
Goals and Objectives (Students will…)	
Standard(s)	
Content	
Grouping	
Activity-	Paint signs identifying plants and explaining the benefits of native plant restoration
Materials	
Resources	

LESSON 16 (40 min)	Conduct tour of restoration area for students, parents and community members
Goals and Objectives (Students will…)	
Standard(s)	
Content	
Grouping	
Activity-	
Materials	
Resources	

LESSON (40 min)	
Goals and Objectives (Students will…)	
Standard(s)	
Content	
Grouping	
Activity-	
Materials	
Resources	