PLACE-CONSCIOUS EDUCATION FOR SUSTAINABLE DEVELOPMENT:
SUPPORTING DIFFUSION, TRANSFER, AND CREATION OF SUSTAINABLE TECHNOLOGIES

A CREATIVE PROJECT
SUBMITTED TO THE GRADUATE SCHOOL
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
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MASTER OF ARTS IN NATURAL RESOURCES AND
ENVIRONMENTAL MANAGEMENT

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Learning is an odyssey, a spiraling journey through which life’s mysteries are discovered. The places we experience and people we meet along the way help define and refine the gifts we have to contribute. I am infinitely grateful for the lessons and support I have received from those who have influenced who I am today.

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Chapter 1
Introduction

As the global community seeks solutions to counter the impacts of industrialization, resource depletion, wealth inequality and climate change, countries around the world are committing to sustainable development initiatives. The growing concern and acceptance of anthropogenic effects on the planet were acknowledged by the Conference of the Parties, Twenty-first session (COP21) in the closing months of 2015. The resulting adoption of the Paris Agreement under the United Nations Framework on Climate Change on April 22, 2016, demonstrated nearly 200 countries’ commitment to strengthening global resiliency and sustainable development efforts. The Agreement centers on worldwide, unified efforts to hold or reduce the global average temperature to below 2° C above pre-industrial levels (UNFCCC, 2015).

Prior to the adoption of the Paris Agreement, in September 2015, The 2030 Agenda for Sustainable Development was adopted. “Agenda 2030” envisions a world in which extreme poverty and hunger are eradicated, production and consumption patterns are sustainable, decent work and economic growth is accessible in all countries, and new technologies are climate-sensitive and increase biodiversity and resiliency (United Nations, 2015). These objectives are backed in the Paris Agreement, in which the signing “Parties” recognized “the fundamental priority of safeguarding food security and ending hunger, and the particular vulnerabilities of food production systems to the adverse impacts of climate change,” (UNFCCC, 2015). The Parties also affirmed “the importance of education, training, public awareness, public participation, public awareness to information and cooperation at all levels,” (UNFCCC, 2015). Developed country Parties are encouraged to take the lead to shift patterns of consumption and production. Noted, as top priority in both the Paris Agreement and Agenda 2030, is the obligatory respect and consideration of human rights for all people and the protection of fragile ecosystems before action is taken. These two documents demonstrate humanity’s recognition of the urgent need to bring environmental, social and economic dimensions into balance.
Achieving the integrated goals and objectives of climate action and sustainable development requires continued research and practice. Much of the literature recognizes a gap between international objectives for sustainable development and pragmatic approaches for implementing the goals at local levels. Effective, equitable strategies for transforming educational systems to support the diffusion and creation of sustainable technologies are needed. David Orr (1992), one of the world’s leading environmental educators, stated:

The demands of building good communities within a sustainable society within a just world order will require more than the specialized, one-dimensional mind and more than instrumental cleverness...The way in which people are educated makes all the difference. All previous peoples who had sustainable cultures wove education and research together within the vessel of community. Our culture has taken education and research out of community and broken that vessel (p. 241).

Orr’s insight challenges us to create equitable, sustainable societies starting from the ground up, within the context of our communities.

**Project Objective**

The aim of this project is to offer a practical, multidimensional approach for implementing sustainability education and research within communities to support the global vision set forth in Agenda 2030. To ground the project within Orr’s “vessel of community,” the theoretical framework of place-conscious education will be used to develop an introductory curriculum for a sustainable technology. The example technology chosen is the Garden Tower™ 2, created by Garden Tower Project. This emerging agricultural tool is available on the international market, and was chosen due to its sustainable design, function, and potential for combating food insecurity while educating for resiliency. Also considered were the sustainability mission of the business and its location, which in sharing the same hometown as the researcher make the product and company easily accessible. Literature regarding technology diffusion and transfer, education for sustainable development (ESD), and place-conscious education theory and practices will be thoroughly reviewed to find best practices relevant to technology and curriculum diffusion.
**Focus: The Garden Tower 2.** The Garden Tower™ 2 is a 50-plant vertical garden and composter that allows people to grow food in small 4'x4' areas – on patios, balconies, concrete and in areas with poor or contaminated soil conditions. The Garden Tower™ 2 (GT2) is a containerized ecosystem operating as a 4-foot tall portable farm. As such, it serves as both an agricultural and pedagogical tool. Preschools, K-12 schools, universities, community and senior care centers, public housing communities, and hospitals are currently using the GT2 to produce organic food, at the same time, simultaneously introducing fundamental lifecycle concepts and sustainability principles. The company has sold over 15,000 units since 2012, distributing the product worldwide.

Garden Tower Project’s mission is to support households and communities in growing healthy, nutrient dense food. They believe in “doing everything [they] can as a sustainable and responsible business to help those most in need. [They] believe the Garden Tower 2 has the potential to transform home gardening, urban gardening, and world hunger programs,“ (Garden Tower Project, 2016). Garden Tower Project (GTP) aims to do this through innovation – designing, manufacturing, and distributing net-positive agricultural tools – and by providing sustainability education. The GTP team states,

> We seek to educate individuals and communities on the benefits of ‘distributed agriculture’ as a path to increasing resilience during times of price shocks or disruptions to the food supply. Our plan is to teach the importance of concepts such as sustainability and diversity while demonstrating this through integration of our projects in communities (GTP, 2016).

Garden Tower Project seeks ventures and partnerships with local businesses, non-profits, universities, governmental & non-governmental agencies, corporations, and public and private sector agencies. On a global scale, GTP is working with the International Living Future Institute in Seattle, Washington to achieve Living Product Certification for the GT2. This will certify the GT2 as a net-positive product – meaning the ecological “footprint” is smaller than its “handprint” (International Living Future Institute, 2015). All aspects of the material supply chain and manufacturing processes of the GT2 are being analyzed through life cycle assessment. GTP and collaborative partners are performing initial studies to determine the GT2’s handprint, measuring the amount of produce capable of being grown, water savings, and economic return.
Sustainability education and food security for all people are top priorities for Garden Tower Project. The company recognizes the value and need to provide education for the successful diffusion and adoption of the GT2. A complementary introductory curriculum, demonstrating the product’s sustainability features while connecting learners to key sustainability concepts, may increase wider adoption of the product and improve food security among those who need it most.

**Thesis Organization**

Supporting the aim of this project, literature regarding technology transfer, education for sustainable development, and the critical pedagogy of place-conscious education is reviewed in Chapter 2. The scope narrows in Chapter 3 with the theoretical framework of the developing curriculum. The framework is constructed, recognizing the author’s bias, using David Gruenewald’s proposed five dimensions of place and pedagogical traditions of place-based education (2003a & 2003b). The results of the review are presented in Chapter 4 in the format of a creative project. Suggested strategies for developing place-conscious education for sustainable development curricula and an overview of the Garden Tower 2 Introductory Curriculum are shared. Supportive materials, example program development guides and lesson plans are available in the Appendix. Potential project outcomes and a critical reflection are located in Chapter 5.
Chapter 2
Literature Review

This chapter explores literature regarding technology diffusion and transfer, education for sustainable development, and place-conscious education. Review of previous research in these content areas supports the development of place-conscious education for sustainable development with the complementary objective of diffusing sustainable technologies. Specific attention is paid to agricultural and green technologies to provide relative background for the proposed diffusion of the Garden Tower 2. Focused attention is also paid to the history of education for sustainable development (ESD) to gain understanding of previous methodologies and to identify areas for further research.

Supporting the objective of curriculum development, an overview of the critical theory of place-conscious education is also reviewed. A basic background of critical theory and pedagogy is reviewed first to uncover the epistemological and ontological underpinnings of place-conscious education. David Gruenewald (now Greenwood), Canada Research Chair of Environmental Education at Lakehead University in Ontario, is one of the most prolific writers of place-conscious education literature. His work provided much of the inspiration for this project.

Technology Diffusion and Transfer

Necessity is driving innovation and new technologies are flooding the global marketplace to support sustainable, resilient lifestyles. Consumers are awakening to the devastating realities of fossil fuel dependent economies and want to create positive environmental impacts. Purchasing decisions are driving ecologically and socially responsible business practices (BBMG, GlobeScan, & SustainAbility, 2012; Ethical Consumer Research Association, 2012; Sakar, 2013). Private and public corporations are producing solutions for resilient lifestyles. Products range from “sustainable” apparel and “eco-friendly” cleaning products, to fair-trade coffee and recycled building materials, to solar-powered and “clean” renewable energy technologies.
Ecologically and socially responsible business practices and consumerism are considered a move in the right direction, yet, the countries and communities most vulnerable and ill equipped to meet the challenges of climate change face the greatest barriers for creating and acquiring these new technologies\(^1\) and products (UNFCCC, 2015). Attention is needed beyond market-based solutions in which sustainable “lifestyles” can be bought. Developed countries are expected to assist in the diffusion of sustainable technologies (UNFCCC, 2015).

Historically, technology transfer\(^2\) moves from developed to developing countries, from university or federal research and development labs to private businesses. This represents the classical, centralized model of diffusion\(^3\) characterized by top-down, one-way, “science-knows-best” approach. National government administrators and research experts positioned as decision-makers control centralized methods of diffusion. The United States Agricultural Extension Service is one of the best-known, most successful examples of centralized diffusion systems (Rogers, 2003).

The goal of any new technological innovation is that it will be transferred and adopted by consumers (Vutsova, 2013). The rate of diffusion and acceptance is linked to the relevancy and need for the invention, as well as, the ideologies present in the receiving society (Diamond, 1999). A risk of centralized methods of diffusion is the potential for top decision-makers to discount the relevant knowledge of the people and places ultimately affected by the technology.

The consequences of broad diffusion of technological innovations from one place to the next without careful consideration of ecological and socio-economic factors have resulted in failures such as the agricultural ‘Green Revolution’ of the 1960s and 1970s. Following efficiency and production goals of the Industrial Revolution, the Green Revolution increased global food production exponentially. Industrial agriculture technologies, irrigation systems, high-yielding wheat and rice varieties, synthetic fertilizers, pesticides, and herbicides were transferred to developing countries throughout Asia and Africa.

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\(^1\) Author of *Diffusion of Innovations* (2003), Everett Rogers, defines technology as “a design for instrumental action that reduces

\(^2\) Technology transfer refers to the process of applying knowledge content about a technology (Rogers, 2013). In order for transfer to exist, the process of diffusion must occur.

\(^3\) According to Rogers (2013), “Diffusion is the process in which an innovation is communicated through channels over time among the members of a social system,” (p. 5).
The initial results were optimistic particularly in India, which became self-sufficient in the production of food grains.

By the end of the 1970s, evidence began to show degrading environmental impacts and strained socioeconomic relationships as larger and larger amounts of chemical inputs were required, leading to soil and water toxicity, and the economic gap between participating and non-participating farmers widened (Elliot, 2013). Residual impacts of Green Revolution ideologies and practices are unfortunately still being witnessed. In 2011, the Centre for Human Rights and Global Justice reported, “Since 1995, a quarter of a million Indian farmers have committed suicide. In 2009 alone, 17,638 farmers took their own lives – equivalent to one death every 30 minutes,” (In Elliot, 2013. p. 212). The cause of this devastating cultural impact has been linked to the emotional stress Indian farmers of Genetically Modified cotton feel from being trapped into repaying their debts after the Indian government reduced subsidies.

Due to the multiple social, environmental, and economic perspectives and conflicting interests of participating stakeholders in any given social system, challenges can readily arise in the diffusion and transfer of a new technology (Martins & Mata, 2010). The “human rights crisis” and the negative environmental results of the Green Revolution (Elliot, 2013) demonstrate the potentially demoralizing and unsustainable reality of practicing technology transfer as a one-way approach. Diffusion as a two-way communication and social change process should not be overlooked or undermined by blind attempts to save developing communities and countries with economic growth prescriptions that ultimately only benefit the technology creator.

Decentralized methods of diffusion provide contrast to centralized one-way communication approaches. Characteristics of decentralized systems are demonstrated by control and decision-making among local members of a diffusion system. The diffusion is spontaneous and unplanned, arising when problem-solving locally perceived needs (Rogers, 2003, p. 396). In decentralized diffusion systems, non-experts are the users of a technological innovation.

The contemporary view of technology transfer recognizes it as a two-way communicative approach that affects both the creator and consumer (Vutsova, 2013). This shifts the top-down paradigm
of transfer to one in which multiple realities are acknowledged and part of an adaptive process (Douthwaite et al., 2003). Technological innovation, in this light, is a social construction shaped by societal norms and values. It drives innovators and manufacturers to evolve with the needs and trends perceived as advantageous by consumers (Rogers, 2003).

Successful adoption of a new technology occurs through a transformative process in which individuals and communities find relevancy and control over the new information or technology. Accordingly, diffusion strategies created with communities, not for, support liberation from dependence and establish pathways toward authentic sustainable development. In this we can see the transformational importance of dialogue and collaborative decision-making.

**Education for Sustainable Development**

The concept of sustainability was born out of the environmental movement of the 1960s and 1970s. Influenced by turn of the 19th century transcendentalists Emerson, Thoreau and Muir and built upon by 20th century writers and educators Rachel Carson, Aldo Leopold, Wes Jackson and Wendell Berry, the environmental movement brought into popular and official dialogue four primary themes:

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<tr>
<th>1) Awareness of the profound spiritual links between human beings and the natural world</th>
<th>2) Deeper understanding of the biological connection of all parts of nature, including human beings</th>
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<td>3) Principal concern about humanity’s impact on the environment</td>
<td>4) Strong commitment to making ethics part of environmental activism</td>
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(Edwards, 2005. p.14)

By the 1980s, conversations regarding human relationships with the Earth began shifting to include global strategies for living within the carrying capacity of the planet. *Our Common Future*, published in 1987 by the World Commission on Environment and Development (WCED), is noted for providing the first conceptual framework and call-to-action for global sustainability. It addressed governments, businesses, teachers, and all people of the world. The report called for greater consciousness of the integrated nature of the Three Es: ecology/environment, economy/employment and
equity/equality (Edwards, 2005) and appealed to citizens, NGOs, educational institutions and the scientific community to take collective action.

*Our Common Future* called for sustainable development “to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs,” (WCED, 1987). The agenda distinguished the term “development” to be beyond “what poor nations should do to become richer” and defines it as something “we all do to improve our lot within that abode” (1987). The human family, sharing this abode the Earth with a vast number of non-human families, is not separate from the environment. The environmental challenges our planet faces are linked directly to unsustainable, industrial development human practices. The results have been inequitable distribution of resources and power, ecological degradation, on-going poverty, malnutrition and hunger are the results. In its final analysis, the World Commission on Environment and Development recognized the process of sustainable development to be challenging, complex and requiring political will to further “the common understanding and common spirit of responsibility so clearly needed in a divided world,” (1987).

Charting a course for a sustainable future, “Agenda 21” was established in 1992 during the Earth Summit in Rio de Janeiro (UNCED, 1992). Agenda 21 recognized the importance of raising community awareness about sustainability issues. It called on national governments to implement strategies, plans, policies and processes within local contexts to support global partnerships for sustainable development.

Agenda 21 combined the fields of environmental science and education with economic and social development. Evidence of the United States’ commitment to Agenda 21 and support for community-based education is noted in the following statement from The President’s Council on Sustainable Development, 1996:

The capacity of democratic institutions to solve problems and create a better future depends on the knowledge and involvement of citizens in a community decision-making process that encourages systemic thought and broad-based action... Broad-based action is needed because local government alone cannot accomplish long-term solutions to community problems. Nor can individuals, businesses, community groups, or state and federal agencies do so by working in isolation, (UWCEERC, 1998. p.1).
In 1998, The University of Wisconsin Cooperative Extension Environmental Resources Center (UWCEERC) echoed Agenda 21 directives in the publication, An EPA/USDA Partnership to Support Community-Based Education. The study brought forth practices for environmental professionals to increase community involvement in decision-making processes regarding local environmental issues. Partnerships between state and federal agencies, citizens, organizations and businesses, as shown in Figure 1, were recommended in the report as a means to strengthen community education and environmental management efforts.

Figure 1. Community Environmental Management

The community team is an essential component to collaboration. Any of the groups listed below may play a role in local environmental management. Which people or groups are involved depends on the situation. An education partnership with communities can be flexible.

(UWCEERC, 1998). Author adapted to represent two-way directional flow of decision-making

The EPA/USDA study found educational initiatives to be most successful at all levels when led by the common interests and leaders within communities instead of directed at the community from outside agencies (UWCEERC, 1998). This ideology connects formal institutions with informal settings and
promotes inclusive educational structures, encouraging interaction among community members regardless of stage in life or level of cognitive development. Most importantly, it advocated community responsibility of conserving and managing common resources by building capacity of the citizens through education.

In 1948, the United Nations declared education to be a fundamental human right. The role of education is transformational, a catalyst that shifts paradigms and behaviors, helping people build capacity to make informed decisions and take responsibility for change, (Horton & Freire, 1990). Extending the rights and roles of education worldwide, with the goal of stimulating authentic behavioral change in human-nature relationships and preparing communities to adapt to the impacts of climate change by diffusing green technologies are two critical components of sustainable development (UNCED, 1992; UNDESD, 2002).

During the United Nations’ Decade of Education for Sustainable Development (2005-2014), environmental education began merging with development concepts based on social constructivism and change theories. Education for sustainable development (ESD) is multidisciplinary, with aims of integrating humanities and sciences through holistic studies of geography, ecology, demography, human rights, health, nutrition, agriculture, industry, cultural traditions, etc. UNESCO’s definition of SD and ESD is as follows:

Sustainable development is a vision of development that encompasses populations, animal and plant species, ecosystems, natural resources and that integrates concerns such as the fight against poverty, gender equality, human rights, education for all, health, human security, and intercultural dialog. ESD aims to help people to develop the attitudes, skills, and knowledge to make informed decisions for the benefit of themselves and others, now and in the future, and to act upon these decisions (UNESCO, 2012).

Critics of ESD find it to be problematic due to its broad, vague agenda that pushes top-down, globalized frameworks and policies onto educators. Some view ESD as a neo-liberal agenda that prescribes a certain kind of global citizenship through corporate curriculums funded by powerful world bodies such as the World Bank, The World Trade Organization, and UNESCO, (Jickling & Wals, 2008, 2013; Le Grange, L., 2013). Many environmental educators disapprove ESD’s move away from the

The debate whether economic development frameworks will ever be compatible with maintaining environmental integrity has been on-going for decades and may be irreconcilable within the context of the dominant scientific worldview of western society, (Cars & West, 2015, Holdsworth et al., 2013). The scientific western worldview “has a strong empiricist quality, which assumes that any knowledge obtained through the scientific method is objective, rational and true, and that this method is the only rational avenue to acquire knowledge,” (Holdsworth et al, 2013 cite Capra, 1988). This worldview supports efficiency, effectiveness and productivity in educational practice as a means to prepare learners for the same objectives underlying industrial economic development. Refuting or throwing out scientific processes is not suggested in ESD literature, but the movement does advocate for a reorientation of how and what learners study, (UNESCO, 2005).

ESD literature suggests the use of multiple pedagogies in curriculum development and practice (Armstrong, 2011; Holdsworth et al., 2013; Cars and West, 2015). Holdsworth et al. state, “How sustainability is understood and practiced by the educator will influence the curriculum content that is relevant to disciplinary knowledge and practice,” (2013). Educators can draw on local social structures and issues (environment, human rights, health, industry, agriculture, etc.) for curriculum content. Epistemologies (educational theories and practices) that integrate a priori (subjective, theory-based) and a posteriori (objective, experimental) ways of knowing are encouraged for helping learners develop quantitative and qualitative research skills.

ESD is a holistic, transformational education aiming to transform society through learner-centered programs designed to empower people of all ages to “engage and assume active roles, both locally and globally, to face and to resolve global challenges and ultimately to become proactive contributors to creating a more just, peaceful, tolerant, inclusive, secure and sustainable world,” (UNESCO, 2014). As such, ESD educators need to be critically aware of their own assumptions and
biases about how knowledge, skills, and values are produced, as well as, their own views about sustainable development. From this critically aware position, educators can guide learners to follow their own interests and participate in the process of transforming ecological and cultural conditions in their community through project-based research. Together, educators and the learners can become conscious of desired learning outcomes and collectively determine areas for study. In this way, ESD aligns theoretically with critical pedagogy (Cars and West, 2015).


Recognizing the need to provide specific strategies for ESD instruction, the Global Action Programme on ESD was established in 2013 as a follow-up to the UN Decade of ESD (2005-2014). The Global Action Programme’s (GAP) *Roadmap for ESD* is intended “to enable strategic focus and foster stakeholder commitment” for furthering the ESD agenda (UNESCO, 2014. p. 3). The most recent strategy to engage stakeholders in ESD instruction was the adoption of *The 2030 Agenda of Sustainable Development* and the *17 Sustainable Development Goals* that build upon the Millennium Development Goals (United Nations, 2015).

The *2030 Agenda for Sustainable Development* (Agenda 2030) and *17 Sustainable Development Goals* (SDGs) were adopted in September 2015 at the United Nations Sustainable Development Summit. The United Nations Division for Sustainable Development (UN-DESA) states, “The 2030 Agenda is a new plan of action for people, planet and prosperity, with 17 SDGs and 169 associated targets at its core,” (United Nations, UN-DESA, 2016). Goal #4: Quality Education is directly related to ESD, though reciprocal links connect education with all SDGs (Vladimirova and Blanc, 2015). Table 2 below and Appendix C provide an overview of the 17 Sustainable Development Goals.
Critics again may find these newest agendas from GAP and UN-DESA to be top-down rhetoric veiling global economic agendas. Supporters, on the other hand, appreciate the flexibility to interpret the
overarching goals and make them relevant to the specific country, region, state, city, town, or community where ESD programs are implemented. According to Cars and West (2015):

ESD is defined differently depending on its socio-cultural, organizational, political, and historical contexts. The definition of and understanding of ESD differs not only between countries but also within a country. This is a reflection of relevant education that should be contextualized to diverse learning needs, which are rooted to the historical pedagogical variations, national and organizational agendas, and cultural differences. However, the interconnectivity of the world means that solving some of the global issues require collaborative work in partnership, at various levels in societies and that our experiences and knowledge expand across countries. It is here that harmonized coupling of global, international, national and local becomes important (p. 16).

What Cars and West are speaking to here is the unique importance of place on the smallest scale and its relation to the rest of the world.

ESD is recognized as a multidisciplinary transformational pedagogy advocating community-based programs. The integration of place-conscious methods of critical inquiry and instruction may provide a viable response to counter ESD critiques of it being a neo-liberal agenda with empirical tendencies. Place-conscious education is reviewed below, but first, its underlying philosophical approaches of critical theory and critical pedagogy are provided for contextual understanding.

**Critical Theory and Pedagogy**

Critical theory is based on the assumption that “reality” is ever-changing, relevant to the subjective interpretations of individuals and the collective agreements existing in the surrounding culture. Noted theorists influencing the tradition are Karl Marx, Immanuel Kant, and Max Horkheimer. More recently, Jürgen Habermas, Hans-Georg Gadamer and Henry Giroux have built on this social theory used to challenge the assumptions accepted as truth in social, political, economic, and cultural structures. Critical theory methodologies merge subjective and objective ways of knowing for fuller understanding of the natural sciences and humanities (Cohen and Crabtree, 2006).

Critical pedagogy is the teaching method of critical theory in practice. Educator, Ira Shor defines critical pedagogy in *Empowering Education* (1992) as:

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4 Critical theory is also applied in literary traditions, specifically in the form of hermeneutics, to interpret texts and symbols.
Habits of thought, reading, writing, and speaking which go beneath surface meaning, first impressions, dominant myths, official pronouncements, traditional clichés, received wisdom, and mere opinions, to understand the deep meaning, root causes, social context, ideology, and personal consequences of any action, event, object, process, organization, experience, text, subject matter, policy, mass media, or discourse, (p. 129).

Paulo Freire⁵, perhaps the most significant critical educator of the 20th century, saw education as a vocation in which the learner becomes free from oppressive structures – propaganda, management, and manipulation – that dominate and control the mind. As co-investigators, teachers and learners using critical pedagogical methods engage in a process of transformation and liberation through on-going dialogue and reflection about their assumed roles and perceptions of the world. The world, in Freire’s view, continually produces thematic content that can be “problematized” for co-investigation instead of “re-presented” in the form of a lecture, (1973, p. 109). The application of this methodology places the learner as the Subject in a cultural situation, in a particular place and time, with the potential to become conscious of his or her capability to continually emerge and transform the world.

Critics of critical pedagogy may fear the revolutionary nature of the methods that encourage questioning of dominant and bureaucratic structures, perceiving the methods inherently antagonistic and contradictory. Certainly, the theoretical framework places more value on independent, empowered critical thinkers than on dependent servants of the status quo. Falling within the progressive education movement, critical pedagogy has a strong emphasis on democracy and as such, critics of the method are most welcome to add to the emerging structure.

Multiple disciplines use critical theory and pedagogy, literary studies, art history, geography, political ecology, and others. Education for sustainable development is recognized as a critical pedagogy. Considering the multidimensional goals of sustainable development and recognizing the need for localized two-way communication in technology transfer, the critical theory of place-conscious education will be reviewed as a viable framework for implementing ESD. What follows is a review of the history and theoretical constructs of place-conscious education.

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⁵ Paulo Freire (1921-1997) was a Brazilian Professor of the History of Philosophy of Education. His revolutionary book, *The Pedagogy of the Oppressed*, is considered a foundational text of critical pedagogy.
Place-Conscious Education

Place-conscious education provides a conceptual framework for critically evaluating cultural and ecological relationships of place. It is a philosophy and political orientation in the field of environmental education with the broad goals of decolonization and reinhabitation. In “A Critical Theory of Place-Conscious Education,” David Greenwood challenges environmental educators to deepen their practice in the field by utilizing these two philosophical and theoretical constructs “for personal, cultural, and ecological consciousness, renewal, and creativity,” (2013, p. 96).

The epistemological and ontological task of decolonization and reinhabitation envisions means for unifying cultural and ecological perspectives in order to transform models of oppression and domination that marginalize both human and non-human communities. Utilization of the decolonization/reinhabitation framework as a pedagogical tool for place-conscious learning will be explored later. The history of place-based pedagogies will be reviewed first.

Pedagogy of Place. Human-place interactions have been the focus of pedagogical instruction for thousands of years. Rooted in indigenous educational practices of orienting oneself in space and time in relation to the four directions, earth, sky, and the “Centre of the self” (Cajete, 1994), place-based education has been and continues to be first and foremost experiential. The writings and practices of philosophers and progressive educators, John Dewey, Friedrich Fröbel, Maria Montessori and Aldo Leopold, carried the importance of integrating concrete learning experiences within a living, interactive, community context.

Places are not simply a geographical location or an abstract concept, but are full of real, natural and human-made objects. Places are where individual and community actions occur in relation to the natural world, (Berry, 1992; Relph, 1976). Leopold pioneered the idea that landscapes have multiple meanings, including ethical, esthetic, economic, and ecological dimensions (Kudryavtsev, Stedman and

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6 Readers’ note: Place-conscious education is the broader philosophical foundation of place-based educational practices. The two terms are often used interchangeably.
Krasny, 2011). His interest in the social relationships between people and people, and people in relationship to the land, moved us to monitor phenological events and critically question human impact. In essence, places are the centers of human existence defined by intention, decision-making, and action. Whether made by conscious or unconscious, authentic or inauthentic action, places are the external manifestation of the human experience.

“Places are fundamentally pedagogical because they are contexts for human perception and for participation with the phenomenal, ecological, and cultural world,” (Gruenewald, 2003a, p. 645). Place-based education is intrinsically linked to active participation within the local community, making it a foundational method for socio-cultural investigation, problem solving, internships, entrepreneurial opportunities and involvement in community decision-making, (Gruenewald, 2003b; Smith, 2007). It is an approach to regain sense of place and adjust to the consequences of climate change, economic globalization, and resource exhaustion, (Smith and Sobel, 2010).

**Sense of Place.** Researchers across disciplines agree that sense of place is made up of the beliefs, feelings and behaviors an individual or group has in relation to a place (Jorgensen & Stedman, 2001; Powers, 2004; Semken & Freeman, 2008, Kudryavtsev, Stedman and Krasny, 2011). How people “value, use, and work to protect places,” (Ardoin, 2012) reveals sense of place. Meanings are “contextually bound” and can include a range of aesthetic, ceremonial, economic, familial, historical, political, spiritual, and scientific meanings, (Semken & Freeman, 2008). How and to what depth these meanings are measured and interpreted has been left to the context of the discipline, (Jorgensen & Stedman, 2001; Gruenewald, 2003b; Shamai & Ilatov, 2004; Semken & Freeman, 2008; Ardoin, 2012).

Historically, sense of place has been explored in attitude research, focused primarily on the cognitive and affective aspects of human relationships with the environment, (Jorgensen & Stedman, 2001; Semken & Freeman, 2008). As interest in sense of place has increased, research has evolved from a two-dimensional to a multidimensional approach, (Jorgensen & Stedman, 2001; Gruenewald, 2003a & 2003b; Shamai & Ilatov, 2004; Semken & Freeman, 2008; Ardoin, 2006 & 2012). Place attachment and
place meaning are viewed as “the two principal components of sense of place,” warranting the inclusion of these dimensions in all sense of place studies (Seamon & Sowers, 2008 citing Relph, 1976; Shamai & Ilatov, 2004). A third dimension, place dependence, was included in Jorgensen & Stedman’s study of “Lakeshore Owners Attitudes Toward Their Property” (2001).

Moving beyond cognitive and affective experiences of human attachment, meaning, and dependence, David Gruenewald called for a more multidisciplinary approach to studying socio-ecological relationships in “Foundations of Place” (2003a). Using insights from phenomenology, critical geography, bioregionalism and other place-conscious traditions of study, Gruenewald presented five dimensions of place for analysis: ecological, perceptual, sociological, ideological, and political. Nicole Ardoin strengthens this move to extend sense of place theories in her 2006-2009 study of measuring place attachment, meaning, and dependence within four dimensions of place: biophysical, sociocultural, political-economic, and psychological. Ardoin’s study showed a multidisciplinary approach to be essential when studying place due to its holistic structure (Ardoin, 2006 & 2012).
Chapter 3
Theoretical Framework

This chapter provides the basis for the Garden Tower 2 Introductory Curriculum. Transparency of my personal perspectives and disposition are provided honoring social constructivist perspectives and participatory action research strategies that recognize the significance and value of the researcher’s inseparable bias. The remainder of the chapter is an in-depth exploration of David Gruenewald’s five dimensions of place and pedagogical traditions of place-based education. The five dimensions and the traditions provide the context for curriculum development as well as strategies for implementation. Each of the place dimensions and traditions of practice sections provide suggested curricular activities.

Author’s Bias

I am approaching this project as a critical researcher interested in ecological and social justice issues. As a critical researcher, I value my own critiques of oppressive cultural structures and welcome the criticisms of others as fuel for change. I recognize my position of privilege enables me to question power structures and affords me the responsibility to voice my opinion in order to transform them.

I am intrigued by the juxtaposition of sustainability concepts in relation to development, as it is traditionally understood in the context of economic growth. Equally intriguing are the dualist, oppositional expressions regarding globalism and localism movements. In a world in which a person has the potential to “be here now” fully engaged in local ecology, culture and economy, while at the same time able to connect electronically with persons having similar experiences on the other side of the planet, I do not see separation. I see opportunities to connect and celebrate our similarities and unique differences, and the ability to collectively critique structures that are no longer useful for generations now and into the future. Beliefs of separation are embedded in the relationships of power that continue to perpetuate epistemological dualism. Fear of losing power is blocking the transformation toward more just and equitable societies in which humans and non-humans live in balance.
I lean toward accepting global ideologies and initiatives expressing commitment to eco- and social justice, no matter how rhetorical. Within structure is freedom and universal frameworks, when based on equality and peace, help provide room for individual expression. To build truly sustainable communities, place-based educational systems are needed that engage learners in the physical world, with opportunities to move from concrete to abstract action, from bioregional production to policy-making.

5 Dimensions of Place

Gruenewald’s five dimensions of place (2003a) have structural and functional components present in any particular place at any specified time. Much like an ecosystem, each dimension is not isolated but overlaps and responds to the other components. Study of place is holistic and multidimensional with boundless possibilities for curriculum development. More than five undoubtedly exist, but for the purpose of this project the following dimensions suggested by Gruenewald will be reviewed and later provide context for the GTP Introductory Curriculum lessons plans: perceptual, ecological, social, ideological, and political.

Perceptual. Human perceptions of the world are formed through direct, interactive experiences. The realm of the perceptual is pre-conceptual. It is what we experience before thinking. Prior to a thought, in this dimension, we subjectively make meaning based on the qualities we attribute to what is experienced through our sensory body.

Sight, sound, smell, touch, taste are the most commonly named senses. Eco-psychologist and Founder of Project Nature Connect, Michael Cohen, describes as many as 54 natural senses categorized into feeling, chemical, radiation and mental senses. Oftentimes we become more aware of our extrasensory perceptions in natural settings, such as sense of color, sense of season, sense of community, sense of design, sense of territory, and many, many more. On cellular and molecular levels our senses help us maintain homeostasis and balance with the world around us (Project Nature Connect, 2016).
However, much of this is taken for granted in our rational, scientific world based on Cartesian dualism and Galileo’s mechanical, objective reality.

Places have something to say; rarely do we listen or participate in the world using our perceptual knowledge (Berry, 1999; Cohen, Gruenewald, 2003a). In the words of Thomas Berry, “We can no longer hear the voice of the rivers, the mountains, or the sea. The trees and meadows are no longer intimate modes of spirit presence. The world about us has become an ‘it’ rather than a ‘thou,’” (1999, p. 17).

Educational strategies to renew human attentiveness and interaction with the more-than-human world are needed now more than ever. When we acknowledge and perceive the messages present in the places around us, we gain information inviting us to engage in a fuller conversation.

The emergence of phenomenology brought forth the value of a perceiver’s subjective lived experience. In Spell of the Sensuous (1996), David Abram builds upon the work of Edmund Husserl and Maurice Merleau-Ponty. Abram describes the “self” as a unified, interdependent body-mind:

> It is indeed a radical move. Most of us are accustomed to consider the self, our innermost essence, as something incorporeal. Yet, consider: Without this body, without this tongue or these ears, you could neither speak nor hear another’s voice. Nor could you have anything to speak about, or even to reflect on, or to think, since without any contact, any encounter, without any glimmer of sensory experience, there could be nothing to question or to know. The living body is thus the very possibility of contact, not just with others, but with oneself – the very possibility of reflection, of thought, of knowledge. (p. 45)

Abram and his predecessors do not reject the importance of objectivity and reason in scientific study, but express phenomenology to be the foundation of all scientific inquiry.

Taking time for learners to experience the body-mind “self” and his or her sense of place (personal attachment, meaning, and dependence), is not commonly practiced institutional educational settings. Educators feel pressured to meet core requirements on a standardized timeline to prepare students for a global economy leaves little space for phenomenological exploration and inquiry.

Gruenewald, like Orr (1992), claims Western philosophical traditions have created schools, governments, and corporations that “manipulate, neglect, and destroy” place for economic gain (2003a, p. 642).

Ignoring and suppressing humanity’s innate perceptual abilities perpetuates “nature-deficit disorders” (Louv, 2005). Fear or dislike of nature, or wilderness, is often a programmed ideology that
blocks authentic, precognitive experiences in nature. These common feelings stem from a value system that developed during primitive times when structuring and creating order on the land was necessary for human survival. Pushing nature back to create paradise, Adam and Eve’s Garden of Eden, is a Judeo-Christian ideology still prevalent today (Nash, 2001). This objective has been marked by conquest, domestication, and dominion over the earth. By these standards, humanity has succeeded. However, in winning the “battle” against nature, our sterile, manufactured industrial environments have resulted in the world’s resources and our senses depleted.

A paradigm shift toward ecological systems way of perceiving may return humanity to a more reciprocal relationship with the world – one in which humans intuitively read and listen to the land and respond as a system interacting within a matrix of other systems. Consider the following thought experiment from Donella Meadows (2008, p. 34):

If A causes B, is it possible that B also causes A?

In other words, we live in a dynamic world. It is filled with feedback loops existing in overlapping systems, most of which we are unconscious.

In his book, The Botany of Desire (2001), Michael Pollen provides excellent examples of reciprocal relationships that often go unnoticed. Drawing attention to co-evolutionary relationships, Pollen equates the role of humans to that of bees in the selection of desirable plant characteristics. Size, symmetry and color are considerable factors for bees and humans when selecting and harvesting from plants. One step further, he proposes that plants themselves play a role in the domestication process by playing to the desires of animals, including human animals. Pollen writes:

In a coevolutionary bargain like the one struck by the bee and the apple tree, the two parties act on each other to advance their individual interests but wind up trading favors: food for the bee, transportation for the apple genes. Consciousness needn’t enter into it on either side, and the traditional distinction between subject and object is meaningless (2001, Location 50).
The importance of Pollen’s example is the pre-conceptual, instinctual truth claims⁷ and meaning horizons⁸ constructed in the interactions between humans and non-humans. From a purely perceptual perspective, we may begin to sense the natural world’s vested interest in the actions of the human species. Opening ourselves to perceiving the desires of non-humans may help shift normative conditions toward more balanced and empathic symbiotic relationships.

People who work hand-in-hand with the natural world understand this reciprocity. For instance, a craftsperson perceives and is attracted to the desired curve of a willow branch for building a rocking chair or an arbor, in the way a bird perceives a mass of human hair useful for building a nest. Value is recognized when in direct contact with the resources assisting one’s survival. Meaning and attachment to the resource drives action to conserve and protect it (Cato, 2013. Chapter 6).

As a curricular strategy, improving perceptual awareness asks learners to immerse themselves in the world and stretch beyond the use of the five senses. Participants are encouraged to consider personal meaning and attachment to a place of study, as well as, consider what the place may mean to non-human subjects. When appropriate, further inquiry and analysis can be made into how meaning and attachment are implicitly expressed. Perceptual awareness activities can serve as a relevant strategy to support local crafts and sustainable production from the land, thereby encourage sustainable economic growth.

Ecological. The ecological dimension of place consists of the rich biodiversity of life forms, plants, animals, and microbes, participating as an interconnected community. These communities have open boundaries where they meet with other ecosystems. The health of ecological systems is directly related to the cultural practices of humans interacting as parts of these systems. Greenwood states, “Place-study is vital for understanding how human and other species adapt to ecological and cultural changes on a planet in flux,” (2013, p. 94).

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⑦ Phil Carspecken’s definition of truth claim is being stretched and applied to the non-human world. He defines truth claim as “the consent given by a group of people, potentially universal in membership, that validates a claim,” (1996, p. 21).
⑧ Intersubjective assumptions about how others - first, second, or third person - experience an act (Carspecken, 1996. p. 103).
Current educational practices promoting academic standardization and preparation for employment in global markets perpetuate social constructs that geographically marginalize people and ecological systems. In his classic book, *The Unsettling of America* (1977), Wendell Berry argues that the failing of ecological systems is due to the specialization of responsibilities in human societies. Perceived as beneficial, we have doctors, chemists, farmers, teachers, etc. trained to be experts in their field. The problem, Berry claims, is that in knowing how to do only one thing we have divorced ourselves from the integrated problems of the whole (p. 21). Chemists create flame-retardant compounds for clothing and furniture to protect us from fire, that later bioaccumulate in our ecosystems and food supply causing adverse health effects (DiGangi et al., 2010). Oncologist treat cancer patients while their children sit at home on furniture treated with brominated and chlorinated flame-retardants. Industrial agriculture has increased global food production significantly during last century, and yet the absolute number of undernourished people has increased. (FAO, 2015; Nellemann, et al., 2009). The increase in crop production is attributed to fertilization and irrigation practices, effectively requiring further cropland expansion at the expense of biodiversity (FAO, 2015; Nellemann, et al., 2009).

As a true critical thinker, Berry problematizes the role of education and in it relationship to ecological health. We need ecologically sensitive educational systems that encourage systems thinking and biodiversity in order to create healthy, sustainable relationships with the earth. Berry (1977) speaking of health:

> When all the parts of the body are working together, are under each other’s influence, we say that it is whole; it is healthy. The same is true of the world, of which we our bodies are parts. The parts are healthy insofar as they are joined harmoniously to the whole (p. 110).

Permaculture provides an educational model demonstrating a holistic, systems approach to learning and living harmoniously with ecological systems. “Permaculture,” a term coined by Bill Mollison and David Holmgren in the 1970’s, “is an effective response to the limitations on use of energy and natural resources,” (Holmgren, 2002, p. xvii). Permaculturalists utilize systems thinking and design
principles to create landscapes that mimic fundamental patterns in nature and build self-reliance\(^9\) by ethically producing the food, fiber and energy needed for consumption (Mollison, 1991; Holmgren, 2002; Bane, 2013). Sustainable agriculture and the built environment (houses and buildings) are combined to create sustainable, permanent cultures (Holmgren, 2002). Figure 2 presents twelve permaculture principles and the cyclical movement of interacting ethically with natural systems.

Permaculture aims to design production and consumption patterns at household and community levels within the context of a bioregional economy. A bioregion is defined by natural characteristics, such as landforms, watershed, plants and animals, type of soil and weather patterns. A bioregional understanding of place includes knowledge of where products come from, how they are made, and where they end up within a local context. Consuming on a bioregional scale requires humans to rethink economic relationships in a profound way. Bioregional ideologies recognize the impacts of production, consumption and waste on human and natural systems. Bioregional thinking promotes limiting economic choices to what is available within the region when possible (Berry, 1992; Cato, 2013).

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**Figure 2. The Wheel of Permaculture Action**

[Credit Concept – Peter Bane] (Bane, 2013. p. 28)

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\(^9\) “Self-reliance”, as opposed to self-sufficiency, “is about taking responsibility for one’s own household needs as part of a resilient local economy,” (Bane, 2013. P. 3).
Shifting Western economies, based on global trade that have dominated the world over the last few centuries, to economies that produce and consume solely on a bioregional scale seems like a far-fetched utopian ideal. “For many people,” states green economist, Molly Scott Cato, “their identity is built on energy-intensive patterns of consumption,” (2013. p. 125). Transitioning to ecologically sensitive patterns of production and consumption requires increased awareness of our identity-attachments and addictions to the latest, greatest material objects (ie. iPhones), as well as, the environmental costs embedded in the production process. New standards of identification are needed in which consumers support and take pride in regionally produced, sustainable products.

Supporting the shift toward ethically responsible products, new tools and measures are emerging to support transparency and accountability in product supply chains and manufacturing. Green innovators, designers, chemists and manufacturers are looking beyond “business as usual” supply chains and moving past sustainability’s old notion of being “less bad.” In their provocative book, *Cradle-to-Cradle*, architect William McDonough and chemist Michael Braungart find the sustainability objective of being “less bad” to be a depressing approach:

As long as human beings are regarded as “bad,” zero is a good goal. But to be less bad is to accept things as they are, to believe that poorly designed, dishonorable, destructive systems are the best humans can do. This is the ultimate failure of the “be less bad” approach: a failure of the imagination (2002, p. 67).

With tools such as Open LCA\(^{10}\), designers and manufacturers can calculate the environmental and social impacts a product has throughout its “life cycle.” LCA reports give specialists a comprehensive, quantitative look at the isolated raw materials being considered in the creation of a product. Footprints (negative impact) and handprints (positive impact) paired with consumer demand for ethically responsible products can drive the imagination of innovators to new standards of sustainability.

Companies such as the Cradle-to-Cradle (C2C) Products Institute and the International Living Future Institute (ILFI) offer rigorous certification processes and labels to inform consumers of a product’s

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\(^{10}\) Open LCA (life cycle assessment) is a free, open source computer software program used for comprehensive sustainability reports available at
net environmental and social impact. Material health, water and energy consumption, habitat impact and social fairness are assessed (C2C; ILFI, 2015). These programs are helping to better integrate human consumer behavior in the ecological dimension of place by driving the consumer markets toward a regenerative future. It is a future imagined to be one in which all consumer products are “net-positive” – “made up of materials informed by biomimicry\(^{11}\) and biophilia\(^{12}\) … and give back more than they take over their total life cycles, improving human health, the world’s ecosystems and the climate,” (ILFI, 2015).

The creation of healthy ecological dimensions of place, in which humans are “joined harmoniously with the whole” (Berry, 1977, p. 110), requires the kind of imagination, ingenuity, re-identification and hard work suggested by bioregionalists and green innovators. It involves critical attention to the question: Who owns the resources of our local places and how can we produce and consume equitably, ethically, and responsibly within the limits? It commands the inclusion of other species in economic decision-making processes. Healthy ecological dimensions can be produced through educational systems that reorientate human identities to places and advocate for local bioregions.

Pedagogically, anyplace can serve as the *axis mundi* ("center of the world") for launching ecological inquiries. School, community center, city, town, village, home, garden, farm, factory, market, river, creek, wastewater treatment plant, etc., no matter how rural or urban, will do. Multiple disciplines fit within the context of the ecological dimension, including but not limited to: agriculture, biology, botany, ecology, environmental science, horticulture, hydrology, phenology, soil science, resource management, and zoology. Phenology\(^{13}\) is also a growing discipline relevant to the study of place while contributing to global knowledge. Naturally, as axis mundi of their own experiences, learners can critically engage in quantitative and qualitative research of their ecological surroundings relevant to their own interests. Educators are cautioned to remember, as pointed out by Berry (1977), specializing in one

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\(^{11}\) Mimicking biological systems

\(^{12}\) Edward O. Wilson’s (1984) hypothesis that there is an instinctive bond between human beings and other living systems

\(^{13}\) A branch of science dealing with the relations between climate and periodic biological phenomena (as bird migration or plant flowering) (Merriam-Webster, 2016)
content area isolates learners from understanding the interconnections of ecological systems. Promoting harmonious, healthy systems requires holistic, integration of subject matter within the context of place.

**Social.** Places are manifestations of human identities, (Gruenewald, 2003a; 2008; Relph, 1976). As products of culture, places can be recognized as the result of human domination and exploitation, or conversely, preservation or restoration. When we acknowledge the benefits of a wilderness area and choose to protect it or we enact clean air and water policies, socially constructed meanings for the places we inhabit are displayed. More commonly displayed in today’s world, however, are beliefs stemming from humanity’s longtime identification of holding authority and dominion over the Earth. This is demonstrated by the ruin of post-industrial towns and cities and the continuing expansion of the industrial global market.

Socially constructed places and structures are often taken for granted (Dale & Onyx, 2005; Gruenewald, 2003a & 2003b); Places are predominantly constructed with little to no significance to local cultural beliefs or preferences. Shopping malls, restaurants, and gated communities around the world have been built by homogenizing corporate ideals and agendas based on economic growth. Local input from community members is rarely welcomed in the planning and design phases of development. Standardized educational practices aimed at building a uniform globalized workforce legitimize these practices (Gruenewald, 2003a). We have become disempowered and compliantly unaware that “people are place makers and that places are a primary artifact of human culture,” (Gruenewald, 2003a. p. 627).

Educators play an important role in cultural evolution. Shifting socially constructed paradigms begins with reaching the minds of the people. Along with learners, educators can facilitate dialogue about the community’s volition. Volition – how we choose to act – encompasses our values, the norms of our culture, and our identities. Communities can become conscious of their current social structures through conversation and monitoring personal and collective actions. They can alter the structures to the extent the existing themes will allow (Carspecken, 1996).
“Sociocultural theory assumes that learning cannot be dissociated from interpersonal interactions located in cultural frameworks,” (Chinn, 2007 cites Lave & Wenger, 1991; Cole, 1996; Gee et al., 1996). As a social phenomenon, learning must not be viewed as exclusive to schools, colleges, and universities, but as happening around us at all times in our homes and communities. Community-based education combines public participation, social marketing, environmental education and right-to-know strategies to respond to the economic, political and social problems within local communities, (Andrews, Stevens & Wise, 2002). Adroin (2006) also supports a broader inclusion of participants outside formal educational institutions:

While young people and students are a critical audience, place-based education must be broader than K-12 education. Adults, as well as children, can have deep, transformational relationships with place, while also having an inordinate impact on our world’s resources (p. 120).

Change theory for place-based education (Figure 3) posits outcomes that lead to increased place attachment, bioregional awareness, appreciation for the natural world, civic engagement and greater social capital among its participants, (Powers, 2004; Adroin, 2006; Semken and Freeman, 2008).

**Figure 3.** Working Model: Change Theory for Place-Based Education

![Figure 3: Working Model: Change Theory for Place-Based Education](Powers, 2004)
Social capital is built on trust and collaborative contribution. Building social capital requires democratic social structures in which all members feel welcome to participate in the transforming society.

In learning communities, adults and children are all equal participants in formal and informal settings. Closely related, Freire’s “popular education” principles propose, “that education is not neutral, that it must start with the experiences and perceptions of the learners,” (Barndt, 2011. p.11). Special sensitivity and attention should be given to whom progressive educator Maria Montessori named “the forgotten citizen.” Montessori recognized the universal oppression of children all over the world within all social strata. Her revolutionary pedagogical methods addressed the tensions between adults and children that have existed “undisturbed for thousands of years” (Standing, 1957. p. 253). Montessori challenged ideologies that perceive children as unproductive members of society lacking function with no economic or social value.

“The fundamental problem in education,” says Montessori, “is not an educational problem at all: it is a social one,” (Standing, 1957. p. 251). Social revolutions to end oppression and the exclusion of members of society – children, slaves, peasants, laborers, women, indigenous people, etc. – involve close examination of the nature of oppression. Overcoming oppressive social structures can occur by force in which the oppressed overthrow oppressors in acts of violence and war. Montessori and Freire supported peaceful revolutions through education (Freire, 1998 & 2000; Montessori, 1932). Whether working with children or adults, educators must work with learners to raise awareness and eradicate socially constructed ethics perpetuating racial, sexual or class discrimination.

Place-conscious education follows peaceful frameworks for examining oppressive social structures through the pedagogical practice of decolonization and reinhabitation. Greenwood (2013) states the term decolonization “problematises colonization both as a historical practice and as the ideological and political progenitor of today’s socially and ecologically catastrophic globalization and development trends,” (p. 96). In the words of artist and educator Amy Shimshon-Santo:

14 The potential collective benefits members of communities have to share (Dale & Onyx, 2005)
Decolonization is to come into that awareness of how your ancestors brought you here, and to engage in an affirming way with who you are, where you came from, and what your potential for creativity and change might be. Cultural and educational institutions should be reflective of who we are as a people. What we consider beautiful, what we consider meaningful, what we consider intelligent and knowledgeable, should be reflective of all of us, (Bardnt, 2011, p. 10).

For sustainable social change to occur, learners must be met where they are, developmentally, cognitively and economically, with respect paid to past accomplishments and goals for the future. Supporting the curricular aim of decolonization, place-conscious facilitators create spaces for groups to safely gather and participate in sharing perspectives regarding the impacts of the social structures built around them. Community dialogue and cultural arts provide viable mediums for expressing the act of decolonization (Barndt, 2011; Freire, 2001). Reinhabitation tasks citizens to become actively involved with shaping the places that affect their local resources and quality of life. Doing so requires critical questioning of the ideologies embedded in the places we inhabit.

**Ideological.** The ideological dimension of place is alive, “pulsing with the beliefs, thoughts, and actions that shape who we are as people,” (Gruenewald, 2003a. p. 628). Ideologies of place are apparent in stories, past and present, that are told, accepted and perpetuated. They are present in the way geographical space is owned and programmed. They appear in the way power manifests and marginalizes others. Place-conscious education follows the tradition of critical geography, facilitating inquiry into how relationships of domination are created and maintained through geographical spatial arrangements and land use.

Privatization and control of land by the wealthy few has historically displaced and marginalized cultural groups. Land and natural resources, on which humans are inseparably dependent, are at the core of ecological economies. According to green economists, the current human-nature economic relationship lacks reciprocity and proper redistribution. “It is a market relationship dominated by the human species underpinned by principles of private ownership,” states Cato (2013, p. 9).

Private property laws are based on beliefs that class systems are “natural” and necessary for capitalist markets to exist. Market economies rely on the socially constructed ideology of scarcity, which
artificially creates the desire for goods. Artificial demand for material goods directly competes and
threatens the availability of the resources needed to support a community’s economic growth. The
anthropocentric ideology and practice of putting a price tag on nature, diminishes the value and worth of
all species living in the place of extraction. It creates disparity of wealth between nations and groups of
people and is maintained by unequal distribution of resources. Economic systems based on private
ownership and artificial demands are unsustainable for non-human and human communities alike
(Polanyi, 1944/2001; Schumacher, 1973; Cato, 2013).

People, like natural resources, are also viewed as commodities in the dominant industrial global
Eisler views this dominator model as one that emphasizes the conquest of people and nature. In modern
history, the continuing effects of imperialism and colonization are seen and heard in the living stories of
Native and African Americans and indigenous communities around the world. Roberts (2007) sums up
the struggle many local communities face in the exploitive global economic system:

Driven in part by a society that has left them without viable options, the “dispossessed” often
have been forced to use the resources they do have access to in an extremely unsustainable way. Examples are peasant farmers forced to clear forests and “mine” their soils, and periurban slum
dwellers building on deforested hillsides or floodplains, which collapse or are inundated with
heavy rains or rising seas. So whether the “culprits” are emitters near or far away, poor nations
and especially their poorest people increasingly are suffering environmental injustices in a
globalized economy. The fact that they are least responsible for the pollutants, and benefiting
least from the consumption which is driving this increasing inequity, further exacerbates the
injustice.

Challenging the structures of such injustice is the work of place-conscious education.

Investigation of the socio-ecological and cultural consequences of oppressive economic systems can be
used to shift the prevailing paradigm of conquest and private ownership to one more just and reciprocal
with ecological systems. Freedom to question where power lies and the ideologies keeping groups
marginalized, however, may seem an insurmountable hurdle for those with little economic or political
power. Carspecken (2016) states, “When ideologies are internalized, which is the normal case, those who
experience doubts about the system of beliefs will judge themselves in these same terms: sinners, or
political traitors, or mentally impaired.” To challenge forms of institutional forms of power (economic,
political, or ideological), “To no longer be prey to its force,” states Freire, “one must emerge from it and turn upon it. This can only be done by means of praxis: reflection and action upon the world in order to transform it,” (2000, p. 51).

Organizations and people in “privileged” positions interested in transforming institutional power structures need to understand “that there is much history, culture, and habit to be challenged before people can begin an authentic process of making the most of their abilities,” (Preskill & Brookfield, 2009, p. 29). Leaders, as learners, can help to create opportunities in which assumptions, biases, and barriers hindering growth can be discovered and transformed. “If leaders are able to encourage climates or structures that allow expression of new ideas and unfamiliar perspectives, opportunities abound,” (Preskill & Brookfield, 2009, p. 25).

Place-conscious education aims to lift not only the voice of marginalized people, but to also bring forth the messages being told by the non-human world. In addition to critically analyzing and opposing ideologies and relationships that oppress people, decolonization and reinhabitation of ecological systems must occur as well. As discussed in the previous section regarding the perceptual dimension, fear-based ideologies about nature and wilderness are long-standing. These ideologies have justified and perpetuated humanity’s domination over land communities. How are we to hear the non-human world? What practices can we employ to listen and hear the ancient wisdom offered by life forms that have inhabited the planet for millennia, prior to human evolution and destruction? If “space is the medium through which culture is reproduced” (Gruenewald, 2003a, p. 629), the natural history of the places we inhabit must also be part of dialogue when working to create sustainable communities.

The ideologies of place are reproduced by the actions taken by the members of a society. Governments, businesses and popular culture have the ability to mobilize and create change for multigenerational, multicultural and multinational equitable distribution of wealth – key for sustainable development. New economic development ideologies are surfacing, challenging large corporate economic models and political systems that have succeeded by exploiting people and the environment (Eisler, 2007; Alperovitz, 2013; Cato, 2013; Kelly & McKinley, 2015). Cato (2013) argues that humanity needs to
focus on provisioning material needed only for subsistence instead of producing ‘disembodied and
disembedded’ market goods (p. 45). Eisler (2007) calls for partnership economies in which caring and
caregiving jobs (i.e. childcare, teaching, nursing, elderly care, social justice, environmental labor) are
factored into the total wealth of communities. The Democracy Collaborative (Kelly & McKinley, 2015)
presents a community-based, systems approach to economic development:

Community wealth building is a systems approach to economic development that creates an
inclusive, sustainable economy built on locally rooted and broadly held ownership. This
framework for development calls for developing place-based assets of many kinds, working
collaboratively, tapping large sources of demand, and fostering economic institutions and
ecosystems of support for enterprises rooted in community. The aim is to create a new system
that enables inclusive enterprises and communities to thrive and helps families increase economic
security, (p. 18).

Creating new social and economic systems such as these requires investigation into the political structures
of place that are enacted through laws and constitutions that formalize our values and beliefs.

Respectfully, one of the best known inquires regarding wealth distribution is Garrett Hardin’s
“The Tragedy of the Commons” (1968). Hardin contests “liberal” movements and policies that support
communal land ownership and wealth distribution. He calls out the United Nations’ Universal
Declaration of Human Rights (1967) that promotes the belief that everyone born has an equal right to the
commons. He denies the validity of such a claim, believing it is rhetoric hiding the true Darwinian nature
of humanity’s rational drive to maximize personal gain. Yet, even Hardin recognizes the realm of
possibility and justification for sharing common resources if education plays a role in “counteracting the
natural tendency to do the “wrong thing”:

But we can never do nothing. That which we have done for thousands of years is also action. It
also produces evils. Once we are aware that the status quo is action, we can then compare its
discoverable advantages and disadvantages with the predicted advantages and disadvantages of
the proposed reform, discounting as best we can for our lack of experience. On the basis of such
a comparison, we can make a rational decision which will not involve the unworkable assumption
that only perfect systems are tolerable (p. 429).

The act of decolonization and reinhabitation assumes and honors humanity’s imperfect systems. If, as
Hardin contests, individuals will always act for personal benefit, acting for the sake of the global
commons is beyond reason. Looking to Wendell Berry (1992), we cannot help but act locally. Thinking
globally, in Berry’s opinion, leads to large-scale destruction. Thinking locally, carrying capacity and the politics of place are at a comprehensible human scale.

Balancing the spectrum between globalism and localism, curricular strategies for the ideological dimension of place must focus on analyzing the control elites have over geographic space and the impacts of capitalism and globalization at all levels (Gruenewald, 2003a). According to Greenwood (2013):

Reinhabitation roughly corresponds to the aims of a wide range of ecological educators who seek to maintain, reclaim, and create ways of living that are more in tune with the ecological limits of a place, and less dependent on a globalized consumer culture that values profits and conveniences more than people and places (p. 96).

Educational opportunities exist for increasing place attachment through local provisioning and production based on ecological limits (Cato, 2013). In this context, participants are in direct relationship with economic and land-ownership ideologies. This presents the opportunity to gain the knowledge needed to participate in changing circumstances through civic engagement.

**Political.** Pedagogically, place-based education creates opportunities for participants to responsibly engage in democratic, sociopolitical processes of place making. Examining the political geography of place within the context of cultural relationships can reveal significant insights on how people, places and cultures emerge. Studying the social constructs found within places can inform educators and learners of the politics that have led to relationships of power and domination. Engaging learners in active research of these relationships through place-conscious education can then lead to transformation and development of more just societies and communities.

Tied closely with the ideological dimension, the political dimension of place can be analyzed using the language of critical geographers to describe human spatial relationships with place. Gruenewald (2003a, p. 631) provides the terms: “ethnic space, marginality, territoriality, movement, disruption, displacement, exile, annexation, division, segregation, absorption, diaspora, and panopticonism” as social spatial forms that shape cultures. Learners can critically examine these terms as a means to bring attention to the effects these relationships have in their own communities. With
knowledge of oppressive ideologies enacted through spatial arrangements, citizens can take political action to bring about change.

Creating and maintaining an environment that encourages inquiry and participatory action research requires discipline to apply the principles of democratic leadership. “In its commitment to hearing every voice, honoring every person’s experience, making the most of everyone’s strengths, and turning the strengths of the many into a powerful force for positive change, democracy knows no peer,” (Preskill & Brookfield, 2009. p. 162). Democratic principles support place-based and popular education frameworks demonstrating critical inquiry, dialogue, distributed problem-solving, sharing of common resources, and transformation of oppressive ideologies.

Yet, democratic principles are not always readily apparent or practiced. Seeing inconsistencies in the faces of leadership – misrepresentation of the multicultural diversity of the nation and world in which we live – Bordas (2012) states, “The discrepancy between the vision of democracy and the reality of racial and cultural segregation has caused a continuing tension in U.S. society,” (p. 4). In effect, negative viewpoints stemming from generations of discrimination have subliminally and systemically caused racial, ethnic, and gender groups to reject themselves and their group.

Bordas promotes a new social covenant – *Sankofa* “learning from the past” – that encourages us to know the history of conquest and acquisition and to take into account how “unfettered individualism, the Protestant work ethic, and capitalism may be impairing our quality of life,” (p. 37). She calls for multicultural leadership practices (Table 3) to advance the vitality, values, and voices of the world’s rich mosaic of people and cultures. These leadership practices can be used to help others overcome internalized negative messages and stereotypes about themselves and build confidence in their ability to be contributing members of society.

In *Salsa, Soul and Spirit*, Bordas (2013) draws on the diverse wisdom and knowledge of the historically marginalized Black, Latino, and American Indian communities. She reminds us that American democracy is “fashioned on the principle of inclusive governance originally used by the Iroquois Indians,” (p. 4). Following the seventh-generation rule of the Iroquois, intergenerational circles
of leadership are needed to make long-term, ecological and socially responsible commitments and lead the way to a sustainable future. Bordas councils, “The circle, which has no top or bottom, symbolizes equality. All can see and hear each other. Everyone is related and equal to everyone else,” (p. 139).

**Table 3. Multicultural Leadership Model**

<table>
<thead>
<tr>
<th>Sankofa</th>
<th>Integrate knowledge from the past into plans for the future</th>
</tr>
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<tbody>
<tr>
<td><em>I to We</em></td>
<td>Move from individualism to collectivism</td>
</tr>
<tr>
<td><em>Mi Casa Es Su Casa</em></td>
<td>Be generous and encourage only taking fair share</td>
</tr>
<tr>
<td><em>Leader Among Equals</em></td>
<td>Treat everyone with respect</td>
</tr>
<tr>
<td><em>Guardians of Public Values</em></td>
<td>Advocate for social responsibility</td>
</tr>
<tr>
<td><em>Community Stewardship</em></td>
<td>Work for the common good</td>
</tr>
<tr>
<td><em>Seventh Generation Rule</em></td>
<td>Protect &amp; design for a sustainable future</td>
</tr>
<tr>
<td><em>All My Relatives</em></td>
<td>Recognize &amp; honor humanity as one family, village, tribe</td>
</tr>
<tr>
<td><em>Gracias</em></td>
<td>Inspire gratitude, hope, and forgiveness</td>
</tr>
</tbody>
</table>

(Bordas, 2013)

Multicultural leadership advocates for decision-making based on values and moral sensibilities – helping others in our community by taking only our fair share and distributing wealth equitably. Accordingly, it promotes civic humanism, restoring the ideal that people should be active participants in local public affairs. These principles also reflect the political and economic ideologies presented in bioregionalism\(^{15}\) (Holmgren, 2002; Feldman & Wilt, 1999; McGinnis, 1999; Sale, 1983; Thomashaw, 1999).

McGinnis (1999) argues, “A viable culture must find its roots somewhere, in *some place,*” (p. 69). Humanity’s physical, psychological, and spiritual sense of place has been hijacked by the global economy organized and maintained by distant “representatives” who create homogenized bureaucratic policies. Appropriated by global socio-political and economic capitalist agendas, we are caught in a paradox between global and local citizenry. For example, McGinnis (1999):

\(^{15}\) Bioregional political boundaries define the boundaries of governance within natural features, such as watersheds and biomes. In the words of Kirkpatrick Sale (1983), “Political principles on a bioregional scale are also grounded in the dictates presented by nature, in which what is forever valued are not the imperatives of giantism, centralization, hierarchy, and monolithicity but rather, in the starkest contraposition, those of scale, decentralization, division, and diversity.”
In *Sustainable America*, President Clinton’s Commission on Sustainable Development describes the need for more decentralized, community-based environmental management…We attempt to include nature, but at the same time we are bound by the language, power and order of global economy…One world is governed in accordance with techno-bureaucratic and capitalistic values while the other world sways and evolves in accordance with the tug and pull of place, (p. 69).

Having biologically evolved as “boundary creatures,” McGinnis recommends resolving the conflicts between human and natural history, and bureaucratic political-economic systems and ecosystems by reorganizing social structures and the self for bioregional living. At human scale, within a place-based, decentralized network of governance, participation in political initiatives and decision-making regarding local resources becomes more appropriate and accessible (Cato, 2013; McGinnis, 1999; Ostrom, 2009; Schumacher, 1973).

Alternatively, Thomashaw (1999) recognizes the socially constructed agreements we have made as global civilians and encourages sensibility to multiple scales of governance. The chain of ecological and cultural disruptions initiated by commercial, industrial and agricultural developments, resource extraction, tourism and war have forced populations of people and non-human species to adapt to new conditions or migrate. The diaspora\(^\text{16}\) of the marginalized has created a global transient culture continuously transforming and fragmenting places with uprooted psyches and new inhabitants (Thomashaw, 1999). This trend will only increase as climate change displaces more and more people and species. Bioregionalists are cautioned from balkanization\(^\text{17}\), parochialism\(^\text{18}\), and stagnation (Cato, 2013), and are challenged to remain open to shifting identities and perceptions prevalent in a “world-in-flux,” (Thomashaw, 1999).

Thomashaw (1999) calls for the development of a “local/global dialect” that honors the complexities of scale and the interactions that occur between them. He states, “Global economy requires that bioregionalists explore both the immediate landscape (place) and those larger systems that exist

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\(^{16}\) Forced dispersion of a group due to a natural disaster or political disruption

\(^{17}\) Balkanization - rejection of outsiders (i.e. Nazi regime; to divide into smaller, hostile states)

\(^{18}\) Parochialism - temptation to have a strict idealism for rural living or commitment to a specific region; ignoring others values; “ours is better than yours” attitude
beyond the horizon (space). The local landscape can no longer be understood without reference to the larger patterns of ecosystems, economies and bureaucracies,” (p. 126). Agreeing with McGinnis (1999), Thomashaw recognizes the importance of grounding personal identity within the ecological and social dimensions of place. He adds to bioregional sensitivity the need to honor the spatial and temporal continuums of the “mind regions” that connect us to the global community.

The political dimension of place, overlapping with all other dimensions, ranges from personal to global perspectives. Curricular activities in this dimension explore the range of perspectives through democratic dialogue and aim to transform oppressive structures through the practice of decolonization and reinhabitation. Opposition and dissent are expected and central to the process of democratic dialogue and civic engagement. It is the task of place-based educators, organizers, and facilitators to create activities that encourage all generations and diverse cultures to participate in critical conversations regarding the place of study. Civic engagement builds social capital, out of which sustainable communities are established (Powers, 2004).

**Place-Conscious Education Traditions of Practice**

The central aim of place-conscious education is to connect learning communities with the living biotic community they are part of and become critically conscious and accountable to the human-nature relationships that are shaping the place of study, (Gruenewald, 2003a; 2003b). Critical questions for place-conscious learning openly uncover natural and cultural histories of a place and how they are interwoven (Greenwood, 2013). These questions move learners to become critically aware of the institutions and individuals holding positions of power and encourages them to participate in the transformative processes needed for poverty, resource management and climate change issues to be authentically addressed and remedied.

In practice, the five dimensions of place provide entry points for critical investigation of place. Gruenewald (2003a) names the following educational traditions useful for guiding inquiry: *natural history, cultural journalism,* and *action research*. These traditions will be explored separately in this
review, however, when used together they provide opportunities for holistic experiences and transformative learning. Relevant practices will be integrated into the developing GT2 Introductory Curriculum.

**Natural History.** The study of natural history connects learners to the geological and biological web-of-life. Studying natural history explorers learn, as did Leopold (1949), “Time, to an atom locked in a rock, does not pass.” Stories of the Earth, even the universe, are told in the places we inhabit. When we, as schoolchildren, university students, adults or seniors, have the opportunity to observe nature, epochal truths are revealed and can be perceived. Exploring patterns and habits of plants, animals, geology, water and energy in nature can spark one’s interest and attachment to place, as well as, expand conscious awareness of one’s own existence as part of the greater whole. Speaking of bridging human consciousness and nature, psychologist Carl Jung:

…To make a man aware of his conscious side is not the only way to civilize him, and in any case, is not the ideal way. A far more satisfactory approach would be to consider man as a whole instead of considering his various parts. What is needed is to call a halt to the fatal dissociation that exists between man’s higher and lower being; instead, we must unite conscious man with primitive man,” (Jung & Sabini, 2008. p. 146).

Teachers, non-formal educators, environmental interpreters, parents and anyone in position to guide others, can create opportunities for learners to engage in the practice of connecting the conscious and primitive parts of humanity of which Jung speaks. All places, urban or rural, are seated in the ecological dimension presenting ever-ready opportunities for curricular activities. “Subjectivity and objectivity can be balanced and bring great value if kept in constant dialogue,” (Freire, 2000. p. 51)

Numerous resources are available for creating “dialogic” activities in nature. Activities can range from purely perceptual experiences to in-depth research integrating both quantitative and qualitative methods. The study of natural history bridges perceptual and ecological dimensions – form and matter – and activates systems thinking. Example activities include:
Table 4. Natural History Activities

| Nature hikes; Finding patterns in nature; Wilderness survival skills; Plant and animal identification, classification, and drawing; Gather wild edibles; Nature-inspired folk art; Journal in nature; Data collection – weather, climate, migration patterns |

Lessons from the field of environmental interpretation can provide insight for those working to connect others with nature. Environmental interpreters serve a vital role in protecting and preserving natural and cultural history throughout the world. Interpretive programs engage people in the physical world, offering an alternative to the dominant technological culture that has created disconnect from our places of significance. Learning and understanding the meanings embedded in our natural and human history offers people the opportunity to connect to a greater whole. “The more attuned we are to the beauties of the world, the more we come to life and take joy in it,” (Yi-Fu Tuan cited in Beck & Cable, 2002. p.143).

An interpreter’s role is to encourage others to “attune” to the beauties of the world by adventuring into the physical world with their senses open. As an adventure guide, the interpreter shares details and information to satisfy curious minds and, at the same time, entices learners to see what they may have otherwise overlooked. With joy and appreciation in their own hearts, interpreters encourage others to “rise to a new plane of understanding, responsible action, and integrity,” (Beck & Cable, 2002. p. 144). Relating to the whole of the world and perceiving humanity’s place in it, promotes preservation of our collective heritage.

Cultural Journalism. In place-conscious education, the tradition of cultural journalism brings forth learners’ experience and critical inquires of place through dialogue, written word, and artistic expression. Humans create narratives, arguably as a biological adaptation, in order to define, understand, and establish meaning in the world, (Kohl, 2008). Sharing individual and collective narratives helps to define, reconcile and transform communities and cultures. James Conlon (1994) states, “Our stories carry
our history, our meaning, our purpose, our roots…in telling stories we remember the past and act our way into a new kind of future.”

Dialogue is an instrumental tool for increasing conceptual awareness. It occurs formally in organized activities or informally through everyday storytelling. The sharing of stories told by individuals about their lived experience in the places they inhabit is humanity’s most ancient form of cultural journalism. David Abram brings forth this nearly forgotten practice of preserving human-nature relationships in *Spell of the Sensuous* (1996):

The telling of stories, like singing and praying, would seem to be an almost ceremonial act, an ancient and necessary mode of speech that tends the earthly rootedness of human language. For narrated events, as Basso reminds us, always happen *somewhere*. And for an oral culture, that location is never merely incidental to those occurrences. The events belong, as it were, to the place, and to tell the story of those events is to let the place itself speak through the telling (p. 163).

The stories of place, coming through the voice of the people, occur as praxis. Praxis is the simultaneous event of action and reflection. Freire states, “There is no true word that is not at the same time a praxis. Thus to speak a true word is to transform the world,” (1977, p. 87). When we are consciously connected perceptually and ecologically to place, and we tell its true story, we transform the world. In this, we see the reciprocal nature of people as places and places as people. Telling the true story requires us to be accountable to places – critically reflecting on the ideologies embedded in our social and political structures and responsibly participating in the dialogue necessary to transform them.

One of the best models of cultural journalism was the VIVA! Project, a transnational exchange of stories told by way of eight community arts projects (Barndt, 2011). NGOs and universities in Panama, Nicaragua, Mexico, the United States, and Canada participated in aims of decolonizing and reinhabiting local communities. Indigenous peoples, communities of color, and their allies worked together to recover cultural histories through

<table>
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<th>Table 5. Decolonization Process</th>
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<td>• Acknowledge the history of colonialism</td>
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<tr>
<td>• Work to undo the effects of colonialism</td>
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<tr>
<td>• Strive to unlearn habits, attitudes, and behaviors that perpetuate colonialism</td>
</tr>
<tr>
<td>• Challenge and transform institutional manifestations of colonialism</td>
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theatre and murals, transform post-colonial urban areas into public meeting places, and strengthen voices and culture by creating a local television station and a pop culture market.

The VIVA! Project challenged the globalization of civil society and pervasive stories in dominant media that maintain inequality. VIVA! Project coordinator Deborah Barndt from Canada stated, “No matter where we are located, we have to confront the fact we are all immersed in colonial contexts that are not just of the past, but perpetuated in new forms such as corporate globalism,” (2011, p.3).

Place-conscious education provides a framework for exploring forms of modern day colonialism and transforming them. Participants can reflect on dominant forces by asking:

<table>
<thead>
<tr>
<th>Question</th>
<th>Adapted from (Gruenewald, 2003a; Barndt, 2011; Greenwood, 2013)</th>
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<tbody>
<tr>
<td>What happened here in the past? Who owns this space now?</td>
<td></td>
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<tr>
<td>What political or corporate influences have determined the use of this place?</td>
<td></td>
</tr>
<tr>
<td>What message is being conveyed through (architecture, writing, artwork, media coverage, etc.)?</td>
<td></td>
</tr>
<tr>
<td>Who is benefiting from the use of this place? Who is marginalized?</td>
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Outlets for connecting with other community members to share perspectives, engage in dialogue, and report or exhibit findings include: local arts venues, libraries, schools, public forums, newspapers, magazines, radio and television networks, and social media. “A story helps us discover for ourselves, as well as others, what we value…wherever liberating action is happening, stories are being told,” (Conlon, 1994).

**Participatory Action Research.** The place-conscious education traditions of natural history and cultural journalism engage learners with the perceptual, ecological, and social dimensions of place. Holistically, the ideological and political dimensions are interwoven with the previous three mentioned. It is through this third reviewed tradition, participatory action research, that the perceptions, beliefs and experiences of learners actively become part of the place-making process (Gruenewald, 2003a).

Participatory action research (PAR), also known as, action research or project-based research, is used in a variety of disciplines including environmental resource management, public health, anthropology, and education. In essence, PAR is a cyclical educational process used to bring about social
change. It is demonstrated in a spiraling power/knowledge/action cycle (Figure 4). An integral part of popular education, PAR provides practical methods for community members to build research skills, lead their own investigations and change their circumstances.

When people come together in numbers, with unified intention, power is built. The intention may be to change institutional policies, environmental quality or neighborhood issues. Good data collection will produce the knowledge needed to take effective action. Stoecker (2013) states, “When community members are involved in producing and using knowledge themselves, rather than having others do it for them, they develop skills to become self-sufficient knowledge producers, which in itself begins to change power relations,” (2013, p. 38). Key to PAR is that it is learner/community driven, critically reflective, and relevant to the betterment of self, others and place. Adults and children alike can make use of the methods.

Social activist and reformer, Jane Addams (1907) stated, “Action indeed is the sole medium of expression for ethics,” (p. 273). She believed that democratic societies are morally obligated to provide opportunities for individual members to reach their full potential through civic participation and social expression. Addams’ social ethic and democratic theory stressed the importance of open communication, critical self-reflection, and collaborative efforts among community members (Preskill & Brookfield, 2009; Shields, 2006).

Educators, interpreters, facilitators, and organizers working as collaborating partners in participatory action research must personally hold themselves accountable to the highest ethical standard in order to best model the process. They must become aware of their intentions for taking a leadership position and assess their own cultural beliefs, biases, and behaviors. Cornel West (1990, p. 105) speaks of the PAR process and the importance of staying critically awake, demystified, stating, “It is partisan,
partial, engaged, and crisis-centered, yet always keeps open a skeptical eye to avoid dogmatic traps, premature closures, formulaic formulations, or rigid conclusions.” Organizationally, facilitators can work to dismantle hierarchical structures that marginalize others. They can help build inclusive environments where participants can develop the self-confidence, discipline and perseverance needed to engage in critical practices without sacrificing their own individual interests and expressions (West, 1990).

Critical research of the places we inhabit allows us to see humans and non-humans living on the margins and the social constructions that have created separation. Greenwood (2013) offers the following questions to provoke research, analysis, and critically conscious place making:

<table>
<thead>
<tr>
<th>What should happen here?</th>
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<tbody>
<tr>
<td>What needs to be remembered? What needs to be recovered or restored?</td>
</tr>
<tr>
<td>What needs to be conserved or maintained?</td>
</tr>
<tr>
<td>What needs to be changed or transformed? What needs to be created?</td>
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Chapter 4
Findings and Curricular Design

As stated, the aim of this project is to offer a practical, multidimensional approach for implementing sustainability education and research within communities to support the global vision set forth in The 2030 Agenda Sustainable Development and the Sustainable Development Goals (United Nations, 2015). The Agenda 2030 objectives specifically relevant to this creative project are poverty and hunger eradication, sustainable production and consumption patterns, decent and accessible work and economic growth in all countries, and new climate-sensitive technologies that increase biodiversity and resiliency. To achieve the goal of this project, the theoretical framework of place-conscious education was reviewed as a means to support the development of an introductory curriculum to complement the diffusion and transfer of a sustainable technology. The pros and cons of technology diffusion and transfer and education for sustainable development methodologies were also reviewed. This chapter presents key findings of the literature review and an overview of the resulting Garden Tower 2 Introductory Curriculum.

Key Findings

Key points emerged in the review of technology diffusion and transfer literature relevant to the project objective. These considerations are listed in Table 6.

Table 6. Considerations for Technology Diffusion and Transfer

<table>
<thead>
<tr>
<th>Consideration</th>
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<tr>
<td>• Stakeholders and partnerships for the development of sustainable communities range in scale from international, national, regional, state and local.</td>
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<tr>
<td>• Distributed and cooperative forms of diffusion involve two-way communication strategies.</td>
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<tr>
<td>• Multiple dimensions of place must be considered before diffusing information or technological innovations to communities.</td>
</tr>
<tr>
<td>• If resources necessary for technology transfer and democratic decision-making are not available at local levels, adoption of innovative technologies and thinking will fail.</td>
</tr>
<tr>
<td>• Socially constructed models of education and innovation need to be integrated, relevant and controlled by local communities.</td>
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</tbody>
</table>
Education for sustainable development, place-conscious education, and popular education are all critical pedagogies professing decolonization and reinhabitation strategies for the creation of healthy, resilient communities. The change theory for place-based education (Figure 3) and popular education’s community-based power/knowledge/action cycle (Figure 4) are closely aligned with ESD goals. All three present philosophical perspectives that challenge corporate educational systems that push standardization and specialization to maintain global economic structures. The diffusion of ESD is challenged by UNESCO’s global position and top-down strategies. Conversely, place-conscious and popular education counter global perspectives by engaging community members at local levels. All three transformative pedagogies have yet to become mainstream.

Moving forward, the Garden Tower 2 Introductory Curriculum will be presented. An attempt has been made to demonstrate how sustainable hardware (GT2) and software (sustainability concepts) can be paired for diffusion. The example curriculum also aims to demonstrate further possibilities for developing similar curricula to bridge on-the-ground, localized needs with the universal ideologies of Agenda 2030. Minzey (1972) provides a good measure for the creation of healthy, resilient communities:

When a community is capable of the initiative and sustained action necessary for attacking and solving its own problems, and when it is moving in the direction of the fulfillment of individual and community needs and community potential, then it can be said to be self-actualized (p. 33).

Garden Tower 2 Introductory Curriculum

The GT2 Intro Curriculum is designed to be widely transferable and applicable regardless of climate or culture. Presentations are hands-on, experiential and appealing to multiple learning styles. Concepts and practices woven throughout the curriculum include systems thinking, green innovation and entrepreneurship, empathy, conservation and regeneration, critical analysis and data collection. Lessons are geared for children 6-15 years of age, though the concepts and activities can be extended for younger and older participants.

Prior to purchasing one or multiple Garden Tower 2s and before implementing a GTP educational program, several factors should be taken into consideration. The Garden Tower Project Flow Chart:
Education Program Overview (Appendix A) presents phases to guide administrators. Key to the process to setting up a local Garden Tower Project is inclusive, collaborative decision-making in which community members play an integral part as leaders. The Place-Conscious Inquiry Form (Appendix B) provides a starting point to increase sense of place and to support place-based, project-based research.

The goals of place-conscious education (Table 7) and Agenda 2030’s Sustainable Development Goals (Table 2 and Appendix C) provide the theoretical framework of the GT2 Introductory Curriculum.

Table 7. Goals of Place-Based Education

| 1) Increase opportunities for human perception and experience |
| 2) Examine interrelationship between culture and place |
| 3) Understand how ideologies are embedded in spatial forms leading to relationships of power |
| 4) “Appreciate the diversity of life on the margins” |
| 5) Attend to the well-being of non-human beings and ecosystems |
| 6) Participate in the process of place making for better living |

(Gruenewald, 2003a. p. 646)

The five dimensions of place, perceptual, ecological, social, ideological, and political provide context for facilitators when presenting the lessons. Lessons in the Garden Tower 2 Introductory Curriculum follow this multidimensional approach and correlate with the 17 Sustainable Development Goals (United Nations, 2015).

A Garden Tower 2 Introductory Curriculum Outline (Appendix D) of ten lessons with applicable dimensions of place and corresponding Sustainable Development Goals (SDGs) were created. These are suggested lessons to be further developed by Garden Tower Project in the future. Two lessons are provided in detail as example formats for implementation: “Food Systems” (Appendix E) and “Product Design: Make It! Innovative, Beautiful & Responsible” (Appendix F). These lessons contain specific sections: Pre-lesson reflection, background information, objectives, dimensions of place, SDGs, developmental age range, lesson time, space needed, preparation, materials, presentation, conclusion, follow-up activities, resources, and post-lesson reflection. The pre-lesson and post-lesson reflections are...
to assist facilitators in critical pedagogical practices and thereby, encourage the same practices among program participants.

**Key Concepts.** The Garden Tower 2, like David Orr’s “vessel of community,” is itself a vessel for growing both food and community through education and research. Figuratively, the Garden Tower 2 can also be seen as a gateway through which people living in any environment can connect with the concepts of sustainability. The first step through the Garden Tower gate is digging your hands in the dirt to produce healthy, organic food to feed self, family or community. In the process of growing food in GT2, first time gardeners, schoolteachers and children, commercial growers, people of all ages are led down a multidisciplinary path to participate in acts that build capacity for sustainable living and local economies (Table 8).

**Table 8.** Garden Tower Gate to Sustainability Concepts and Actions

<table>
<thead>
<tr>
<th>Concept</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Empathy</strong></td>
<td>Watering and feeding plants and worms</td>
</tr>
<tr>
<td><strong>Problem-solving</strong></td>
<td>Companion planting and pest control</td>
</tr>
<tr>
<td><strong>Innovation</strong></td>
<td>Building trellises, irrigation systems, growing indoors</td>
</tr>
<tr>
<td><strong>Conservation</strong></td>
<td>Less water, fewer petrol-produced veggies purchased, decreased food miles</td>
</tr>
<tr>
<td><strong>Cycling Nutrients</strong></td>
<td>Waste Equals Food</td>
</tr>
<tr>
<td><strong>Entrepreneurship</strong></td>
<td>Worm casting or farm market business</td>
</tr>
<tr>
<td><strong>Critical Reflection</strong></td>
<td>Data collection, analysis, and planning</td>
</tr>
</tbody>
</table>

Educators, interpreters, and community program coordinators seeking an interactive approach to teaching environmental science, agriculture, health and nutrition and sustainability will find the GT2 and the companion Garden Tower 2 Introductory Curriculum an engaging, tangible method for reaching participants. Underlying the direct actions of growing food in a Garden Tower 2, the place-based pedagogical framework of the curriculum supports exploration of natural history through scientific inquiry and encourages place-conscious attachment.

Decolonization and reinhabitation of the places we inhabit involves consciously integrating the study of the location’s natural history, raising the voice of the local people through cultural journalism,
and creating social change through action research. The curriculum is designed for learners to participate in “citizen science” and cultural journalism in which knowledge is gained through data collection and findings are reported to community members. Issues involving food security, funding for program support, and land-use policies are examples of project-based opportunities for participatory action research.

It is assumed the Garden Tower 2 Introductory Curriculum will be made available online to educators and facilitators through the business website. Parts of the lesson plans have embedded hyperlinks to other websites for further information. This feature is beneficial, but is not necessary for implementing the lessons plans.
Chapter 5
Conclusion

Potential Outcomes

The need for sustainability education is internationally recognized (UNESCO, 2012; 2013; 2014; 2015; United Nations, 2015; UNFCCC, 2015). Multiple stakeholders at all levels of society are taking part in increasing sustainability awareness, policies, practices, and innovation. The diffusion of the Garden Tower 2, combined with the complementary Garden Tower 2 Introductory Curriculum, is a model for supporting food security, the transfer of ESD, and continued creation of sustainable technologies at local levels.

Should the Garden Tower Project choose to develop the GT2 Introductory Curriculum further and offer it freely online, the business may experience growth in sales, particularly in educational markets. An entire Garden Tower educational platform could be developed online wherein users of the curriculum offer feedback and adaptations to lessons. Additional lessons for different developmental age groups and/or variations and extensions in content could be contributed through a Creative Commons licensing arrangement. Extending the idea further, an entire Garden Tower database could be created in which phenological and “handprinting” information are collected from GT2 users around the world and recorded online as part of the curriculum.

Potential outcomes of the diffusion of GT2s and the Introductory Curriculum would be increased food security for individuals, communities and nations living in developing and developed areas of the world. Resiliency skills and attachment to place may increase. Offshoots of the program may occur if participants are inspired to create their own sustainable innovations and use them to educate others on how to live responsibly and equitably as part of a natural system. Vocational-skills programs sensitive to all dimensions of place may also develop. This model may support the growth of sustainable bioregional economies in developed and developing communities. Further evaluative research may follow to examine the impact of the Garden Tower 2 pilot curriculum on learning communities.
Critical Reflection

Humanity’s separation from nature, the polarization between top-down hierarchies and local, place-based social structures, and the degradation and marginalization of humans and non-humans due to globalized economies and education have brought forth an urgent need for unifying strategies. Innovative technologies, such as the Garden Tower 2, are pushing the global economy toward sustainable goals. However, the individuals, communities, and countries needing these technologies the most will continue to exist or parish on the margins if access to these sustainable technologies and the capacity to build resiliency is not provided. Under the dominating capitalist economic model, partnerships between philanthropic organizations and socially responsible businesses, such as the Garden Tower Project, will need to increase in order for developing communities to acquire education and tools for sustainability. This solution, even in my very limited understanding of economics, seems like a short-term, unsustainable answer, as it will perpetuate inequitable class structures. Further research is needed regarding the effective diffusion and transfer strategies of sustainable technologies combined with place-conscious education for sustainable development.

We are all born into the ecological dimension with the capacity to create. Humans can begin to understand sustainability concepts as a curricular activity in the places they inhabit only after the basic needs of food, shelter, and security have been met. If we are born into social systems in which resources are honored and equitably distributed (to the degree that everyone’s basic needs were met) and educational systems are framed to foster humanity’s innate creativity, I believe our capacity to develop a sustainable world will authentically appear. For this to emerge, top-level governments and policymakers must create a stronger base from which the voice of local places, through the people, are truly heard and help lead the way. The separation that exists between top and bottom social structures, humanity and nature, can be leveled in the heart of place-consciousness education for sustainable development to support generations now and into the future.


Garden Tower Project. (2016). Communication literature provided through email by Tom Tlusty, Director of Communications and Outreach to Amy Rhodes, February 2016.


Appendix A

Phase 1: Planning
- Explore local interest, knowledge & resource base
- Identify local leaders
- Form distance-learning collaborations
- Local leaders manage project research
- Dialogue & Determine feasibility
- Acquire funding for resources & implementation
- Garden Tower(s) shipped

Phase 2: Set-Up
- Garden Tower on-site
- GT Educator Training & Support
- Potting soil or soil components delivered to project site
- GT2 Intro Curriculum review
- Place-conscious inquiry
- GT Educator identifies participants & establishes program logistics

Phase 3: Implementation
- Launch local Garden Tower Project
- Join Growing Circles
- International community membership
- Footprint/Handprint data points collected
- Data points reported
- On-going critical reflection & communication
- On-going support from Growing Circles

Phase 4: Evaluation
- Project evaluation
- Report findings
- Recommendations
- Plan next project
Appendix B
Place-Conscious Inquiry Form

This form provides points for research and can be used to guide program facilitators and participants in discovering sense of place.

I. Ecological
   a. Bioregion
   b. Waterways
   c. Vegetation
   d. Animals
   e. Soil
   f. Temperature
   g. Rainfall
   h. Air quality

II. Perceptual
   a. Sensorial/Experiential
      i. Space
      ii. Sounds
      iii. Textures
      iv. Patterns

III. Social
   a. People – Heritage
   b. Customs
      i. Food – Security? Access?
      ii. Housing
      iii. Water / Sanitation
      iv. Type of Currency
      v. Art, Music, Stories
      vi. Religion
   c. Modes of transportation
   d. Educational infrastructure
   e. Jobs / Training
   f. Social programs / organizations

IV. Ideologies*
   a. Story of human-nature relationship
      i. What has happened here?
      ii. What is happening here now?
      iii. What would you like to see here in the future?
   b. Story of human – human relationships
      i. What has happened here?
      ii. What is happening here now?
      iii. What would you like to see here in the future?
   c. Marginalization
      i. Who?
      ii. How?

V. Political – Economic
   a. Class structure
   b. Decision-makers in power
   c. Relevant policies
   d. Markets

Appendix C
Sustainable Development Goals

Goal 1. End poverty in all its forms everywhere

Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture

Goal 3. Ensure healthy lives and promote well-being for all at all ages

Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

Goal 5. Achieve gender equality and empower all women and girls

Goal 6. Ensure availability and sustainable management of water and sanitation for all

Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all

Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Goal 10. Reduce inequality within and among countries

Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable

Goal 12. Ensure sustainable consumption and production patterns

Goal 13. Take urgent action to combat climate change and its impacts*

Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development

Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to Justice for all and build effective, accountable and inclusive institutions at all levels

Goal 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

* Acknowledging that the United Nations Framework Convention on Climate Change is the primary international, intergovernmental forum for negotiating the global response to climate change.

## Appendix D
### Garden Tower 2
Introductory Curriculum Outline

<table>
<thead>
<tr>
<th>Lesson</th>
<th>Dimensions of Place</th>
<th>Sustainable Development Goals</th>
<th>Key Concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Food Systems</strong></td>
<td>E, S, I</td>
<td>2.4, 4.4, 4.7, 8.4, 12.3, 12.a</td>
<td>systems thinking, fossil fuel dependency, distributed agriculture</td>
</tr>
<tr>
<td><strong>Product Design:</strong></td>
<td>E, S, I</td>
<td>4.4, 4.7, 8.3, 9.4, 9.5, 9.b, 12.4, 12.5, 12.6, 12.8, 12.a</td>
<td>innovation, inventors, life cycle assessment, green chemistry</td>
</tr>
<tr>
<td><strong>Make It! Innovative, Beautiful &amp; Responsible</strong></td>
<td>E, S, I</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Garden Tower Placement</strong></td>
<td>P, E, I</td>
<td>4.4, 4.7, 11.3, 11.7</td>
<td>sun calculations, patterns in nature, microclimates, accessibility, mapping</td>
</tr>
<tr>
<td><strong>Garden Design:</strong></td>
<td>P, E, S</td>
<td>4.4, 4.7, 12.8, 15.9</td>
<td>team-building &amp; communication, design concepts, classification, diversity, companion planting</td>
</tr>
<tr>
<td><strong>Plant Research</strong></td>
<td>P, E</td>
<td>4.4, 4.7, 12.2, 12.8, 15.9</td>
<td>mineral cycle, soil typologies, nutrient cycles, pH balance</td>
</tr>
<tr>
<td><strong>Healthy Soil:</strong></td>
<td>P, E</td>
<td>4.4, 4.7, 12.8, 15.9</td>
<td></td>
</tr>
<tr>
<td><strong>Healthy Bodies</strong></td>
<td>P, E, S</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Observation / Data Collection</strong></td>
<td>P, E, I</td>
<td>4.4, 4.7, 9.c, 12.a.</td>
<td>observation skills, citizen science, measurement tools, project reports</td>
</tr>
<tr>
<td><strong>Planting/Care</strong></td>
<td>P, E</td>
<td>4.4, 4.7, 12.8, 15.9</td>
<td>empathy, botany, optimal conditions, trial &amp; error, pest management, problem-solving</td>
</tr>
<tr>
<td><strong>Compost/Worms</strong></td>
<td>E, S, I</td>
<td>4.4, 4.7, 12.2, 12.3, 12.5, 12.8</td>
<td>waste = food, cycling nutrients, symbiotic relationship, zoology</td>
</tr>
<tr>
<td><strong>Value-Adding/ Harvest Celebration</strong></td>
<td>S, I, PO</td>
<td>4.4, 4.7, 8.2, 8.b, 12.a</td>
<td>local food production, market skills, entrepreneurship, cultural diversity &amp; preservation</td>
</tr>
<tr>
<td><strong>Critical Reflection/ Feedback Loops/ Planning</strong></td>
<td>E, I, PO</td>
<td>4.4, 4.7, 8.3, 11.3, 11.7, 12.8, 12.a</td>
<td>systems thinking, critical reflection, project reporting, planning for new growth</td>
</tr>
</tbody>
</table>

**Dimensions of Place**
Perceptual = P  Ecological = E  Social = S  Ideological = I  Political = PO
Appendix E
Garden Tower 2 Introductory Curriculum: Lesson 1

FOOD SYSTEMS

Pre-Lesson Reflection

Do you have previous experience growing food?
  • If yes, reflect on the experience. Was it enjoyable? Difficult?
  • If no, what has limited or deterred you from growing food?

What benefits and challenges do you foresee in growing food with students?

What resources (individuals, organizations, business) are available to support a gardening program?

Background

Food systems include all aspects of growing, harvesting, processing, packaging, distributing, consuming and eventually disposing food. Knowing where food comes from and considering the inputs required to produce food, such as fuel, fertilizer, energy for manufacturing, and materials for packaging, can help consumers make informed decisions about their food choices.

The world’s human population is expected to reach 9.7 billion people by the year 2050¹ with 70% of the population living in urban areas². Much of our food supply is produced in large fields miles from town or even in other countries. Removed from the process of agriculture, we aren’t aware of our dependency and consumption on the fossil fuels needed to transport produce from the fields to factories where it is processed, then driven to storage warehouses (often hundreds of miles away), and then finally transported to the multiple markets or grocery stores in cities. The industrial food system also has concentrated control over nutrients and relies on chemical fertilizers, pesticides, and herbicides made from non-renewable energy sources including fossil fuels. Distributing our ability to grow food, recycle nutrients, and build soil right where we are encourages resiliency and food security.

The Garden Tower is highly suitable for growing food in urban areas, in places where soil has been contaminated or is unstable due to flooding. It can be used as an educational model to demonstrate and actively immerse learners in a complete food system on-site at your school, community garden, church or home. Proven to produce food from 50 plants in a small 4’ ft. x 4’ area outside and indoors, multiple Garden Towers can be utilized to support the growth of a local sustainable food system. Job skills training for people of all ages can be developed as multiple generations come together to grow healthy food for schools and the broader community.
Objectives

- Introduce food systems
- Present Garden Tower 2
- Spark interest to participate in growing, tending, and harvesting food

Dimensions of Place in Focus

- Ecological, Social, Ideological

Sustainable Development Goals

- 2.4, 4.4, 4.7, 8.4, 12.3, 12.a

Developmental Age Range

- 1st – 4th grade

Lesson Time

- 45 – 60 minutes

Space Needed

- Large yard, playground or gymnasium

Preparation

- Watch “What’s in the Box” (youtu.be/dzYYiyZbiyc)
- Make Food System labels & images
- Set the “stage” for Food System Play
  - The Farm
  - The Processing Plant
  - 3 locations for each Consumer’s “home”
    - Use a table or blanket with plate, fork, spoon, napkin laid out
    - Consumer 1’s home near Compost Pile
    - Consumer 2 & 3 each have Trash Bags with Landfill between them
  - 3 locations for Store Owners
Materials

- Garden Tower 2 (stacked outside the box covered by a blanket)
- Whole carrots, cucumbers, and/or cherry tomatoes (1 or all 3 varieties)
- Containers of previously cut vegetables enough to share with all students
- Napkins or plates
- Food System labels & images
- Props for Food System Players
  - 3 Veggies – Picture or plastic vegetable
  - 1 Farmer – Garden gloves, hat, and a basket, crate or bag
  - 1 Processor – Hair net & plastic gloves; Plastic wrap
  - 1 Driver – steering wheel made from cardboard
  - 3 Store Owners – Aprons or “business” clothes (tie, dress, big shoes, etc.);
    Pretend $$
  - 3 Consumers – Each having a fork, spoon, plate at a table or blanket; Pretend $$
    - Consumer 1 – canvas bag or basket
    - Consumer 2 – paper sack
    - Consumer 3 – plastic bag
  - 2 Large Trash bags
  - 1 Landfill – Trash (boxes, plastic bottles, cans, clothes, bicycle tire, electronics, boxes, shoes, small appliances, etc.)
  - 1 Compost pile – Biodegradables (leaves, cardboard, grass clippings, fruits, vegetables)

Presentation

I. I have exciting things I want to share with you today.

   Pull vegetables (i.e. carrots, tomatoes, cucumbers) out of a bag or basket.

   Where do you suppose I found these?

   Possible answers: grocery store, refrigerator, garden

   Move backwards in time telling students how you came to acquire the vegetables.

   I just brought these from the refrigerator, before that, I purchased them from a store. We’re going to talk about where these vegetables came from even before the store, but first…

   Who would like to have a taste?”

II. Snack

   Distribute napkins & cut vegetables.

   Talk about the qualities of the vegetables (Sweetness, crunchiness, favorite, etc.)

   Throw away napkins.
III. Discussion
Where do you think the vegetables were before the store? How did they get to the store?

Demonstrate the food system journey.
Post following labels and images in a circle on a board or on a table or ground in front of you:

1) production 2) processing 3) distribution 4) consumption 5) disposal

Images of each step of the food system can be found and used freely by searching through the “Find CC Material” box on creativecommons.org. If possible, use images of one of the vegetables the students are eating. Alternatively, you can use the following as a template.

IV. Act It Out

Food System Productions Presents...Food Miles!
Who would like to be an actor?

Pass out props to participants.

This is meant to be improvisational, left to the kids’ creativity and freedom to ad lib. The program facilitator helps designate places on the “stage” and narrates to keep the play moving. The goal is to highlight the long distances food travels in the industrial food chain.
Act I: Production
- Farmer – Harvests Veggies then loads Veggies in the truck
- Veggies – Begins in a “field” then follows Farmer to the truck
- Driver – Stands with steering wheel waiting for Farmer to load Veggies behind Driver

Act II: Processing
- Driver – Drives and delivers Veggies to the Processor at processing plant then waits
- Processor – Receives Veggies from Driver then washes, wraps & puts Veggies back on truck
- Veggies – Handed from Driver to Processor then washed, wrapped & put back on truck

Act III: Distribution
- Driver – Drives & drops off Veggies at 3 different locations
  - 3 Grocery Store Owners Consumers – Fork and spoon
  - Trash Bin – trash bin or bag
  - Landfill –
  - Compost pile –

V. The Big Reveal

What if we could have a whole entire food system right here?
Would you believe that we could have an entire food system to grow, process, distribute, consume, and dispose of food right here at ______ (school, home, church, community center)?

Pull blanket off the top of Garden Tower box.
We can!! Let me show you.

Lay out the components of the Garden Tower 2.

Conclusion

The next time we meet we will learn how and why the Garden Tower was made.

Provide instructions if follow up activities are required (see below).
Follow Up / Extensions / Enrichment Activities

1. Sort waste items from the “Food Miles” play into Landfill and Compost piles
2. Layout the Food System Wheel and copy the cycle in a Garden Journal
3. Create/Draw a Food System Wheel in Garden Journal different than examples
4. Collect labels from canned vegetables. Make sure labels have both the country of origin as well as the location of the distributor listed. Calculate miles the product traveled from the country of origin to their home or school.
   - Example – A can of tomatoes (U.S. example):
     - Start in Fresno, California (90% tomatoes consumed in U.S. are grown in CA).
     - Calculate miles to a Campbell Soup Co. processing plant in Milwaukee, Wisconsin. Add in miles from Milwaukee to the capital city of your state (distribution center).
     - Add in miles from capital city to a local grocery store in your town.
     - Add in the miles to travel from your school or house to the grocery store and back.
     - Finally, add in the miles from your house to the local waste management facility.
   - Draw the tomato’s journey on a United States map.

5. Consider the “miles” for growing, processing, distributing, consuming, and disposing tomatoes at school. Compare / Contrast a Food System at school compared to the larger industrial Food System. Make columns and write about it in Garden Journal.

Resources

Food System – USDA Local Food Supply Chain


Imported foods

Appendix F
Garden Tower 2 Introductory Curriculum: Lesson 2

PRODUCT DESIGN: MAKE IT! INNOVATIVE, BEAUTIFUL & RESPONSIBLE

Pre-Lesson Reflection
What inspires and motivates you?

Who is your #1 fan? How does this person encourage you to follow your interests?

What do you see as one of the biggest problems in the world? How the world would be different if this problem were solved?

Background
Inventor of the Garden Tower, Colin Cudmore, created the patio garden and composting system after hearing a lecture by urban agriculture guru, Will Allen. Will Allen inspired Colin to join the Good Food Revolution and help solve the problems of food insecurity.

Along with the Garden Tower Project team, Colin sought a solution for anyone, anywhere to grow a meaningful amount of food regardless of limitation; whether it is poor or toxic soil, harsh climatic conditions, and/or lack of water, time or space. The GT2 is adaptable for use in all climates, captures nearly all water used, and requires no electricity. It has virtually no need for weeding which saves busy gardeners time. The vertical design with a small footprint of only 4-square feet affords users the option to grow food in locations that have never before been capable of nourishing plants, like flat rooftops, concrete slabs and ordinary decks.

Patterned off of natural close-loop systems, the compact and revolutionary design of the Garden Tower 2 captures water and critical nutrients while converting fresh food waste into organic fertilizer. In detail, nutrients are made available through microbial processes associated with vermicomposting (worm-assisted composting). These processes create a perfectly pH balanced leachate, “worm tea,” as well as, worm “castings” or manure that can immediately be added back into the system to keep the soil conditioned and the plants healthy (See images below).

As a material product, the life cycle of the Garden Tower 2 has been considered to ensure it contributes to a sustainable world. The Garden Tower Project is working with the International Living Future Institute (www.living-future.org) to certify the GT2 as a “Living Product.” A Living Product should be designed to reflect the natural world, produced from healthy materials, and manufactured by renewable energy power sources within natural water cycles. To be certified as a Living Product, a product must be regenerative, giving more than it takes from the environment and people over the course of its life cycle. In this way, Living Products offer more “handprints” than “footprints.” Transparency about the materials used to make products is important for educating consumers. They can then make knowledgeable decisions and chose responsibly (See Declare label below).
Features of the Garden Tower 2

Patented Compost Tube – The Garden Tower 2 is the only container gardening implement that utilizes an original composting column within a container garden.

It rotates! - 360 degree rotation is made possible by a robust integrated bearing track which optimizes sun exposure and better plant access in tight spaces.

100% recyclable, food-contact grade plastic – No plasticizers, no BPA, no PVC, no phthalates. Only food-grade dye, antioxidant for long-term UV protection, and high quality USA made HDPE plastics are used in manufacturing.

Wide, heavily reinforced, anchorable feet: The Garden Tower 2 can be securely attached to a rooftop, patio, or deck. The feet are heavy and tough, each containing nearly a pound of plastic.

Stout and UV Resistant: The Garden Tower 2 features the maximum amount of food-grade UV protection available in container garden industry for an expected 10+ year lifespan even in harsh climates.

Benefits for Garden Tower 2 Users

Accessibility - Anyone who desires to grow food, even individuals who lack mobility, can garden comfortably. The GT2 features of 360-degree rotation and vertical plant growth allow users access to plants from a wheelchair or seated position.

More Nutrients, Faster Growth, Plants have constant access to nutrient-dense water. Water is steeped in a hearty brew of “compost tea” and “worm tea” via the vermicompost tube and returned to the soil repeatedly.

Water Savings – Nearly all water used is captured through the bottom drawer and can be recycled by pouring it back on top. The exterior body of GT2 covers the majority of the soil, which helps prevent evaporation due to wind and sun.

Nutrient Recycling – The internal compost tube and capacity to capture and recycle nutrients make the GT2 a self-fertilizing system. Fertilizer does not need to be purchased; it can be made. In fact, when using the composting feature, more nutrients are produced than needed to maintain healthy plants in the GT2. Extra worm castings and leachate harvested can be used to fertilize other houseplants or ornamentals. In this way, the GT2 is a regenerative container garden system.

Extended Growing Season – Plants grow faster in the Garden Tower 2 because they are protected in a special microclimate. The exothermic reaction that occurs in the compost tube allows for a longer growing season over other container gardens.

Affordability – The high-quality design, abundant yields and expected lifespan of 10 years or more make the Garden Tower 2 a valuable investment.

Compact, Portable and Beautiful – Each GT2 grow ring can be nestled inside another for a total height of 2-feet. This minimizes packaging when shipping and provides easy storage or transport for customers.
organic
WASTE
=
organic
FOOD

GARDEN TOWER 2

© 2016 Garden Tower Project
The Garden Tower 2
Garden Tower Project

Final Assembly: Noblesville, Indiana, USA
Life Expectancy: 10 Years
End of Life Options: Recyclable (100%)

Ingredients:
Tower: High-Density Polyethylene; Additive
Carrier: Polyethylene; Additive: Calcium
Carbonate, Titanium Dioxide, Proprietary* (0.80%)

* LBC Temp Exception R0-E4 Proprietary Ingredients

Living Building Challenge Criteria:
GTP-0001
VOC Content: N/A
VOC Emissions: CDPH Compliant
Declared Status
- LBC Red List Free
- LBC Compliant
- Declared

© 2016 Garden Tower Project
Product Design: Make it Innovative, Beautiful & Responsible

Production: Hand-built Gen 1 Garden Tower

Mold: Grow Ring

Injection Mold: Ring Press

Grow Rings

Garden Tower 2 Features

Garden Tower 2
Objectives

- Build the Garden Tower 2
- Introduce material composition of Garden Tower 2
- Introduce industrial design and manufacturing
- Introduce concept of the life cycle of consumer products
- Encourage “green” innovation and inventors

Dimensions of Place in Focus

- Ecological, Social, Ideological

Sustainable Development Goals

- 4.4, 4.7, 8.3, 9.4, 9.5, 9.b, 12.4, 12.5, 12.6, 12.8, 12.a

Developmental Age Range

- 3rd – 8th grade

Lesson Time

- 45 – 60 minutes

Space Needed

- Outdoor or indoor classroom area large enough for a group circle

Preparation

- Watch How to Assemble Your Garden Tower.

Materials

- Garden Tower 2
- Images of manufacturing (above)
- Plastic pellets - Image or small package (found at craft stores)

Optional:

- Image of formation of petroleum
- Images of oil extraction – See pumpjack diagram, image and video; Off-shore rig: Hydraulic Fracking
  GT2 supply chain image coming soon
Presentation

*Gather participants in a circle with Garden Tower 2 parts laid out in front of you. The base of the Tower can be placed in the center of the circle or next to you.*

1) **Review Lesson 1: Food Systems.**  
   What was learned? What more does the group want to know?

2) **Today we are going to discuss how and why the Garden Tower is made.**  
   Before that…Let’s assemble the Tower.

3) **Build & Name each feature while participants add each part**
   - Base – Drawer, Legs, Screen
   - Show Rotation
   - Compost Tube Sections (with holes)
   - Grow Rings
   - Top Compost Tube Section (no holes)
   - Compost Tube Lid

4) **Pass the Compost Tube Lid and Screen around the circle for inspection.**

   *What is the Garden Tower made out of?*

   *What is plastic made from? (Oil/Petroleum)*

   *Where does the oil come from?*

   *How do you think the GT2 was made?*

5) **Garden Towers are made from high-density polyethylene (HDPE) plastic through a process called injection molding. They are manufactured in a facility near Indianapolis, Indiana in the United States of America.**

6) **Briefly discuss plastic supply chain and show GT2 life cycle chart.**
   - Oil extraction
   - Refinery
   - Processing oil into pellets (show example of plastic pellets)
   - Manufacturer buys the pellets & adds colorant
   - Heats the pellets to around 240 degrees melting them into a liquid
   - The liquid is injected into molds into shapes - grow rings, drawer, etc.
   - After use the GT2 can be recycled (life expectancy 5-10 years)

7) **How is the life cycle of the Garden Tower similar to the Food System?**
   - Production, processing, distribution, consumption, waste (recycling)
8) **Now we know how the Garden Tower was made, but why do you think it was created?**
   - Inventors like to solve problems and improve the way humans work and interact with the world.

9) **Inventor Colin Cudmore came up with the design of the Garden Tower as a way to solve problems in the food system.**
   - **Lack of access to land** –
     - Problem: Over half of the world’s population lives in cities where there is very little land or space to grow their own food.
     - Solution: This invention offers a way for people to grow 50 – 100 plants in the GT pockets in a very small area such as a patio, a balcony or anywhere on concrete.
   - **Food deserts** –
     - Problem: Areas in which healthy, nutritious food is not available within 1 mile (urban) or 10 miles (rural).
     - Solution: People living in food deserts could use the GT or create something similar to grow fruits and vegetables.
   - **Water shortages and drought** –
     - Problem: Increasing due to climate change
     - Solution: Drawer at the bottom of the GT captures water so it is not wasted as runoff water and can be recycled back into the Tower.
   - **Degradation and depletion of nutrients in soil** –
     - Problem: Large-scale agriculture & chemical fertilizers
     - Solution: The compost tube in the middle supplies plants with natural fertilizer and healthy nutrients, which supports the growth of healthy food for healthy human bodies.

10) **Problems in our world can create motivation for innovation. Colin created a solution for growing food in small spaces never considered capable of growing food. He and the Garden Tower team are continuing working to provide more solutions to make gardening easy for all people. Garden Towers may soon be made from renewable plastic – made from plant material instead of non-renewable plastic made from oil…Cool!**

11) **People just like you create inventions.**

    Do you know of other inventors?
    What did they create?
    Have their inventions made the world better or worse?
    What problems do you see in the way humans interact with the world?
    Why is it a problem?
    What will you invent to make human relationships with the world better?
PRODUCT DESIGN: MAKE IT! INNOVATIVE, BEAUTIFUL & RESPONSIBLE

Conclusion

If time allows, participants can draw, write, or build an invention using salvaged materials.

The next time we meet we will develop our sense of place skills, using the sun and maps to orientate us, and we will determine the best place to put our Garden Tower.

Follow Up / Extensions / Enrichment Activities

1. Compare Manufacturing System to Food System.
2. Make a diagram of GT2 supply chain
3. Brainstorm ways to replace fossil fuels with renewable energy in the Food System.
4. Explore biomimicry. Create an invention based on biomimicry.
5. Investigate the life cycle of a product.
6. Explore careers in green chemistry. Can we move from “less” toxic to regenerative?

Post-Lesson Reflection

What were the students most interested in during this lesson? Write down memorable comments.

What might need more attention or clarification about Product Design in a future lesson?

Is there anything you would do differently when presenting this again?