FACILITIES AS TEACHING TOOLS: A TRANSFORMATIVE PARTICIPATORY PROFESSIONAL DEVELOPMENT EXPERIENCE

by

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Facilitates as Teaching Tools: A Transformative Participatory Professional Development Experience

Thesis directed by Assistant Professor Bryan Wee.

ABSTRACT

Resource consumption continues to increase as the population grows. In order to secure a sustainable future, society must educate the next generation to become "sustainability natives." Schools play a pivotal role in educating a sustainability-literate society. However, a disconnect exists between the hidden curriculum of the built environment and the enacted curriculum. This study employs a transformative participatory professional development model to instruct teachers on how to use their school grounds as teaching tools for the purpose of helping students make explicit choices in energy consumption, materials use, and sustainable living.

Incorporating a phenomenological perspective, this study considers the lived experience of two sustainability coordinators. Grounded theory provides an interpretational context for the participants' interactions with each other and the professional development process. Through a year long professional development experience – commencing with an intense, participatory two-day workshop –the participants discussed challenges they faced with integrating facilities into school curriculum and institutionalizing a culture of sustainability.

Two major needs were identified in this study. For successful sustainability initiatives, a hybrid model that melds top-down and bottom-up approaches offers the requisite mix of administrative support, ground level buy-in, and excitement vis-à-vis sustainability. Second, related to this hybrid approach, K-12 sustainability coordinators ideally need

administrative capabilities with access to decision making, while remaining connected to students in a meaningful way, either directly in the classroom, as a mentor, or through work with student groups and projects.

The form and content of this abstract are approved. I recommend its publication.
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DEDICATION

To my wife, Jill, and my children, Asher and Jonah, both of whom joined us midway through this journey. At the risk of sounding completely immodest, I did this for you and the future of children everywhere. May it lead to something greater than I could produce on my own.

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CHAPTER I

INTRODUCTION

Significance of Study

In their seminal report entitled, *Limits to Growth*, Meadows, Meadows, Randers, and Behrens (1974) warned against the patterns of consumption developing at the time and issued a set of conclusions about the state of the world. The first such proclamation stated that:

> If the present growth trends in world population, industrialization, pollution, food production, and resource depletion continue unchanged, the limits to growth on this planet will be reached sometime within the next one hundred years. The most probable result will be a rather sudden and uncontrollable decline in both population and industrial capacity (p. 1).

Turner (2008) revisited these ideas and demonstrated that little had changed in the preceding decades and that the original assertion in *Limits to Growth* was holding true. With this rampant consumption of resources and the severity of environmental impacts that accompany it, there exists a pressing need to educate future generations so as to avert a scenario in which resource extinction becomes inevitable.

Schools and other educational settings (e.g. afterschool programs, community centers, and daycare facilities) have an impressionable, captive audience learning implicitly and explicitly. "Absent from the debates ... about our educational system has been critical discourse on the responsibility of schools to the communities that support them and to the planet's life-support systems" (Keifer and Kemple, 1999, p. 28). Schools must step up and take an active role in educating students for a sustainable future.

Green Schools and Green Buildings

S. Richard Fedrizzi (2007), President of the U.S. Green Building Council (USGBC), points out:

> In the U.S. alone, more than 55 million students and more than 5 million faculty, staff, and administrators spend hours every day in buildings with poor ventilation, inadequate lighting, inferior acoustics, and antiquated heating systems. For school superintendents or school board members, improving standards and raising test scores often takes priority over upgrading or maintaining facilities. But it's no long an either/or question: high-performance green schools . . . are good for people, good for the bottom line, and good for the environment. . . . *Green schools are also wonderful educational tools in and of themselves, serving as living laboratories to engage kids in the sciences, building arts, and environmental stewardship*" (p. 6, italics added).

A report from the Metropolitan Washington Council of Governments states, less than one half of one percent of all LEED certified square footage (86,000 out of 22.9 million) in the National Capitol Region (which encompasses Washington D.C. and its outlying areas) represented LEED for Schools projects (Hand, 2011). In 2013, Washington DC led the nation in per capita square footage designated with LEED certification, surpassing every state in the union by 1417% - 32.45 square feet per person, versus 2.29 square feet per person for Illinois, the highest ranked state (USGBC, 2014). Despite this boom in certified green building, schools lag well behind commercial and residential projects.

McGranahan and Satterthwaite (2003) discuss the specific challenges of sustainability in an urban milieu. They point out that the increasing populations in cities put ecologically sustainable patterns of development at a premium. In North America, more than 75% of the population lives in urban centers (McGranahan & Satterthwaite, 2003). This is where the built environment plays a crucial role. The urban experience, with its resource intensive existence, provides a visceral example of how one's surroundings lend themselves to lessons about how humanity consumes energy, materials,

and water, among other types of capital. In Younger, Morrow-Almeida, Vindigni, and Dannenberg (2008) the built environment is defined as being "comprised of manmade components of people's surroundings, from small-scale settings (e.g., offices, houses, hospitals, shopping malls, and *schools* [emphasis added]) to large-scale settings (e.g., neighborhoods, communities, and cities), as well as roads, sidewalks, green spaces, and connecting transit systems" (p. 517). Ironically, as quickly as societies are urbanizing, there is still the stereotype that sustainability and related education efforts are more suited for 'natural' settings. With a majority of the world's population in these urban locales, urban centers are integral to an education that aims to develop environmentally literate individuals and communities.

In the famous words of the Lorax, "UNLESS" (Geisel, 1999, p. 56) all users are educated and their behaviors are addressed, resource consumption may continue on the path described by Meadows et al. (1974) and "nothing is going to get better. It's not" (Geisel, 1999, p. 58).

Research Questions

The need to address Limits to Growth, which is a complex interaction of environmental, social, and economic issues, provides a framework with which to view education in the early part of the 21st century. Green schools in neighborhoods of all socioeconomic strata can bridge the gap between the "haves" and the "have-nots" by providing healthy, environmentally benign spaces for students to learn about environmental responsibility. Additionally, social components can be addressed through the physical structure as a focal point for the community and as an example of how buildings can help to reduce humanity's impact on the local (and global) ecosystem. A

green school, as certified by USGBC, may consist of multipurpose spaces for both educational and neighborhood gatherings, serving as a focal point of the community at large. Lastly, school districts can realize fiscal savings through reduced energy and water consumption typically found in green school buildings.

Given Fedrizzi's (2007) statement that schools are wonderful educational tools and USGBC's (2008) vision of schools as interactive teaching tools, there is a need to develop professional development models to train educators to use the structures in their classrooms. The following questions stem from this professional development model and its implementation:

1. What impact does this innovative PD model focused on place-based education and sustainability have on school personnel's ability to integrate school facilities (in particular the built environment) with their school culture?
2. How do sustainability coordinators, as participatory researchers, shape professional development and envision teaching with a focus on the school's facilities in a frame of place-based education?
3. How do participants' sense of ownership evolve over time through their participation in this process? What evidence is there of their ownership/leadership within the workshop? How does this ownership manifest itself?

Sustainability and Environmental Education

Environmental Education (EE) is seen as a potential solution to the issues brought up in *Limits to Growth*. Tillbury (1995) defines environmental education as a strategy that aims to engage students in world problems, placing EE in the realm of holistic approaches to education. Glenn (2000) adds the concept of "environmental literacy and the skills needed for lifelong learning" (p. 5) to Tillbury's conception of EE. Glenn (2000) goes on to add, "EE refers to education efforts that increase public awareness and knowledge about environmental issues and provides the critical thinking, problem-solving and effective decision-making skills to make informed and responsible decision about the environment" (p. 5).

In a display off the interdisciplinary nature of EE, Orr (2004a) argues, "all education is environmental education" (p. 12). In order to realize this vision, students must experience settings that foster a sense of responsibility to respond to the challenged posed by Limits to Growth. With these challenges in mind, Nolet (2009) calls for "preparing sustainability-literate teachers" (p. 409). Nolet (2009) asserts

> that a person is sustainability literate if he or she knows things associated with sustainability, if he or she is disposed to think or problem solve in ways associated with sustainability, and if he or she behaves in ways consistent with sustainability" (p. 428).

Environmental education and educating for sustainability do not represent synonymous concepts. McKeown and Hopkins (2003) point out that while the environment is central to EE, "society, economics, and development are not mentioned" (p.118). Educating for sustainability encompasses more than environmental concerns. They define educating for sustainable development (ESD) – used synonymously with educating for sustainability in this research – as being "commonly thought to involve and

address three realms: environment, society, and economy" (p. 119). Stevenson (2007) points out that

> the language and discourse of environmental education has been displaced in many policy circles by that of education for sustainable development (ESD), education for sustainability (EfS) or sustainability education . . . as the dominant international policy discourse and rhetoric" (p. 266)

Conflating environmental education (EE) with sustainability education, or EfS fails to recognize the systems approach of the latter. The Cloud Institute for Sustainability Education defines EfS as

> a transformative learning process that equips students, teachers, and school systems with the new knowledge and ways of thinking we need to achieve economic prosperity and responsible citizenship while restoring the health of the living systems upon which our lives depend (n.d., para. 1).

While there is a connection between the EE and EfS, the latter incorporates economic and equity issues in addition to the environmental concerns raised by EE. Furthermore, the addition of systems thinking, which Meadows and Wright (2008) refer to as a "critical tool in addressing the many environmental, political, social, and economic challenges we face around the world" (p. xi), because it allows the user to consider issues from a wealth of interconnected points, imbues EfS and ESD with another level of analysis not currently ascribed to by mainstream EE.

Defining Green Schools

In order to determine whether a school is in fact "green", USGBC developed the LEED program, which stands for Leadership in Energy and Environmental Design. LEED "provides building owners and operators with a framework for identifying and implementing practical and measurable green building design, construction, operations and maintenance solutions" (USGBC, 2011b, para. 1-2).

In particular, LEED standards exist for a number of project types, two of which are “Existing Buildings: Operations and Maintenance” and “Schools” (USGBC 2011c). The former applies to extant structures, including schools, while the latter refers to new school construction. USGBC (2008) defines a green school as "a school building or facility that creates a healthy environment that is conducive to learning while saving energy, resources and money" (para. 1). In 2006, the *Review and Assessment of the Health and Productivity Benefits of Green Schools: An Interim Report,* MASSTECH (the Massachusetts Technology Collaborative) listed the three attributes of green schools. They were less expensive to operate than conventional schools, “Designed to enhance the learning and working environment, and [they conserve] important resources such as energy and water” (Committee to Review and Assess the Health and Productivity Benefits of Green Schools, 2006, p. 8).

Green schools may sometimes be referred to as high performing schools. This moniker has a specific connotation though. Ford (2007) notes, “High performance design refers to the on-site design solutions that contribute directly to enhanced learning” (p. 12). The Collaborative for High Performance Schools (CHPS) provides 13 characteristics for a “high performance school” including: “Healthy,” “Comfortable Energy Efficient,” “Material Efficient,” “Easy to Maintain and Operate,” “Commissioned,” “Environmentally Responsive Site”, “A Building That Teaches”, “Safe and Secure,” “Community Resource,” “Stimulating Architecture,” and “Adaptable to Changing Needs” (CHPS, 2010).

Whether using the appellation of green school or high performing school, these facilities naturally serve as a component of teaching and learning. USGBC (2008)

advocates for this position: "Imagine the learning potential when the school building itself becomes an interactive teaching tool, educating the next generation of sustainable leaders through hands-on learning" ("Hands-on Learning").

Buildings that Teach

The very buildings that house our schools implicitly teach students and teachers alike. Orr (2002) argues, "buildings and landscape reflect a hidden curriculum that powerfully influences the learning process" (p127-8). This hidden curriculum can be used to inform faculty and students as to the impact humans have on their immediate and global environs. The Intergovernmental Panel on Climate Change (IPCC, 2007) reports "global atmospheric concentrations of carbon dioxide, methane and nitrous oxide have increased markedly as a result of human activities since 1750 and now far exceed pre-industrial values" (p. 2). Higher concentrations of carbon dioxide, methane, and nitrous oxide, collective referred to as greenhouse gases, have been linked to potentially detrimental changes in the climate. "Changes in the atmospheric abundance of greenhouse gases and aerosols, in solar radiation and in land surface properties alter the energy balance of the climate system" (IPCC, 2007, p. 2). Amongst the greatest contributors to these emissions are buildings, which form a significant part of the school facilities.

With these negative environmental impacts in mind, schools are needed that not only minimize ecological footprints - defined as "the total area of productive land and water required continuously to produce all the resources consumed and to assimilate all the wastes produced, by a defined population, wherever on Earth that land is located" (Rees and Wackernagel, 1996, p.228-9) – but that also promote teaching and learning vis-

à-vis environmental issues in order to produce ecologically literate students that can address the concerns in Limits to Growth. In an ideal, synergistic relationship, school buildings will stand in place of textbooks, providing a real-world example of how to conserve resources and live more sustainably. Kuhn (1996) argues "science textbooks (and too many of the older histories of science) refer only to that part of the work of past scientists that can easily be viewed as contributions to the statement and solution of the texts' paradigm problems" (p. 138). In order to combat this backward looking aspect of textbooks, students will learn from their surroundings, as data generated by the buildings – in terms of kilowatt-hours consumed – fluctuate based on usage patterns that classes study and manipulate through efforts to reduce consumption. By gathering information in real-time the buildings can create an instant assessment of how effective the conservation measures are, while providing feedback to students so that they can evaluate their own understanding of how energy consumption is affected by various behaviors. In true interdisciplinary fashion, this information can then serve as fodder for mathematics lessons as students attempt to determine rates of use, percentage of reduction, and cost savings. Furthermore, various other issues associated with textbooks – including the financial costs, resources needed to print and ship, lack of local connection to learners, and dated material – can be rectified with supplementing real-world, real-time data. According to the Center for Green Schools (n.d.), there are more than 133,000 K-12 schools throughout the country (para. 4), which provide ample structures from which to choose.

Sustainability's Relationship to "Green"

The term sustainability has also been attached to the green movement, which many in the blogosphere argue is not an entirely proper connection (Hodges, 2009; Werbach, 2009; Wilson, 2009). Sustainable and sustainability have their historical roots in the Brundtland Report's (World Commission on Environment and Development, 1987) use of the term sustainable development, which defines it as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Chap 2). The Brundtland Report will serve as the foundation for defining sustainability despite its flaws. For instance, Williams and Millington (2004) assert, "this definition of sustainable development is allied to a particular developmental worldview that is resisted and contested by many commentators" (p. 100). Even before the Brundtland Report, there had been various interpretations of sustainability (and sustainable development). Brown, Hanson, Liverman, and Meredith (1987) provide both a narrow and broad definition of sustainability:

> In the narrowest sense, global sustainability means the indefinite survival of the human species across all regions of the world. A broader sense of the meaning specifies that virtually all humans, once born, live to adulthood and must place on economic growth that their lives have quality beyond mere biological survival. Finally, the broadest sense of global sustainability includes the persistence of all components of the biosphere, even those with no apparent benefit to humanity. (p. 717)

I am using the idea of sustainability in the sense that it allows for the perpetuation of the human species *ad infinitum*. This is only possible with resource conservation and equitable standards of treatment. Consuming resources without regard for future generations will ultimately deplete nonrenewable stores, not to mention externalities associated with fossil fuel and nuclear energy. Conserving resources – namely water,

food, and energy – for future generations stands at the heart of sustainability. Additionally, Wilkinson and Pickett (2010) posit that equitable standards of treatment have a direct connection with sustainability. Societies in which a greater level of equity – less inequality – tend to exhibit lower levels of violence, improved healthcare, and access to education, all pillars of sustainability.

Williams and Millington (2004) claim, "sustainable development is a notoriously difficult, slippery and elusive concept to pin down. Indeed, Fowke and Prasad (1996) have identified 80 different, often competing and sometimes contradictory, definitions" (p. 99). Goodland (1995) provides a basic definition of environmental sustainability "as the 'maintenance of natural capital' " (p. 10). The convoluted topic of sustainability has created a situation wherein two people can have opposing definitions of the term. As Connelly (2007) points out,

> Although 'sustainable development' has been a dominant concept in planning and policy making for over 15 years, there is still no general consensus over the societal goals that would count as sustainable development as a matter of definition, or would contribute to it in practice (p. 259)

In addition, usage of "green" to describe features of a building or curriculum carries an association of its own. While environmental sustainability, as defined by Goodland (1995), represents how the term sustainable is often used (i.e. in referring to environmental sustainability and not social or economic sustainability), I will use the more general term "green" in this study to refer to environmentally friendly practices and to refer to green schools, like those ascribed to in LEED, as opposed to other contested terms; "sustainable", "sustainability", or "environmental sustainability". As Hodges (2009) points out though, there is not a commonly accepted, standard definition of what it means for something to be "green." Inevitably, practices in green schools, such as the use

of buildings as curricular tools, can address – to an extent – ecological issues in Limits to Growth.

CHAPTER II

LITERATURE REVIEW

This literature review considers the body of research around effective professional development (PD), transformative professional development (TPD), and green schools. In relation to the latter, the role of school buildings has a level of importance in this study, therefore I also focus on the integration of facilities into the curriculum and how they are currently employed – or under employed – as teaching tools. Since this study takes place in the Rocky Mountain region, and my home institution is situated in Colorado's capital city, I include a review Colorado's burgeoning green schools movement. LEED, the certification standard for green buildings, also has a place in this literature review.

Professional Development (PD)

Beyond they classroom and their own education, professional development courses and workshops provide exposure to new concepts, evolving educational theory, and pedagogically sound teaching. Networks of teachers who learn and practice together can help create communities that strive to improve instruction and student learning.

Guskey (2000) defines professional development as "those processes and activities designed to enhance the professional knowledge, skills, and attitudes of educators so that they might, in turn, improve the learning of students" (p. 16). As part of this, Guskey (2000) lists three "defining characteristics" of PD: it is an intentional, ongoing, and systemic process.

Lessons from research on how people learn (Bransford et al., 2000) and best practices in teaching (Zemelman, Daniels, & Hyde, 2005) extend beyond primary and secondary education. Best practices in education should not exist solely in the traditional classroom;

they need to apply to all educational settings. Zemelman, Daniels, and Hyde (2005) distill best practices from a range of academic disciplines into the following three categories: student centered, cognitive, and social. Professional development must also take these factors into account.

Historically, professional development amounted to a lecture on a topic, with little regard for how teachers learn and assimilate new knowledge, material, and findings into their own teaching. The National Joint Committee on Learning Disabilities (2000) reports,

> At one time professional development was synonymous with 'sit and get' sessions in which relatively passive participants were 'made aware' of the latest ideas regarding teaching and learning from 'experts.' Today professional development must include high-quality, ongoing training that reflects a variety of approaches, with intensive follow-up and support (p.2).

The changing landscape for professional development needs to consider a range of factors that the "sit and get" model failed to address. In an analysis of interviews with 72 teachers and 23 professional development facilitators, Rogers et al. (2007) found that teachers' themes for characterizing effective PD included classroom application, teacher as learner, and teacher networking. Klingner (2004) provides a set of criteria upon which successful professional development experiences are predicated. These include situations in which "researchers work closely with school districts," "administrative support is clearly evident," "long-term support is provided for teachers (including demonstrations and coaching)," and "teachers take ownership of the practices and responsibility for mentoring their peers" (p. 248). These factors coincide with many of the features from both the National Joint Committee on Learning Disabilities (2000), Guskey (2000), and Rogers et al. (2007).

Guyton (2000) uses the term "powerful" as a stand-in for effective when discussing professional development. "My favorite synonym is *powerful*, programs that have power- power to change teachers and to change their students" (p. x). With the proliferation of research on PD, conflicting reports emerge (Guskey & Huberman, 1995). Much of the literature Guskey and Huberman (1995) review sends contradictory messages about how to approach professional development. However, in the past fifteen years, more clarity has seemingly come to the field. Guyton (2000) suggests that the best research, theory, and practice provide a guide for developing teacher education, however, she warns that these nested concepts create varying layers of complexity.

Math and Science PD

Numerous studies have found student learning is associated with particular professional development programs in science (Heller, Wong, Daehler, Shinohara, & Miratrix, 2012; Roth et al., 2011), math (Saxe, Gearhart, & Nasir, 2001; Telese, 2012; Wallace, 2009), and both science and math (Blank et al., 2010).

Saxe et al. (2001) looked at a PD program geared toward teacher understanding coupled with students' thinking and motivation. Their small scale – 17 participants in two treatment groups, one with a sample size of nine and a second treatment with eight – allowed for higher intensity in terms of PD. Working with two groups of upper elementary teachers and observing a third that served as a control, the researchers demonstrated an incremental improvement in student performance on fractions for the test groups. Saxe et al. (2001), whose study arose out of the need for assessing professional development, detailed "greater student achievement on the conceptual items" (p. 70), though it cited caution in extrapolating results.

Wallace (2009) found moderate improvement in student achievement in mathematics and smaller effects on reading when mediated by teacher practice. Wallace (2009) analyzed data from six existing data sets, the 2000 Beginning Teacher Preparation Survey conducted in Connecticut and Tennessee, and four renditions of the National Assessment of Educational Progress. This analysis provided information from students (n = 1,550–6,408) nested within teachers (n = 168–1,029) to demonstrate the connection between PD and student achievement.

Telese (2012) raised the question as to how much PD is too much. Making sure that PD maintains its effectiveness, while providing tools, support, and ways to improve student performance remains an essential goal. Using the mathematics assessment from the National Association of Educational Progress data for eighth grade, which consisted of more than 100,000 students and their teachers, Telese (2012) found "mathematics content knowledge has a larger role in predicting student achievement than mathematics pedagogical knowledge" (p. 102). It is important to note that Telese (2012) uses standardized test scores as a measure of student achievement, a disconcerting notion in terms of reflecting actual understanding and not just the ability to correctly answer questions on an exam. Although generalizing this study to science, and sustainability in particular, presents implicit issues, the notion of preparing educators with the most in depth knowledge of their subject area represents a top priority. In a similar vein, looking at content knowledge, Heller et al. (2012) studied 48 teachers (32 in the experimental group and 16 control subjects) who taught 1,490 students to discern the impact of "an analysis-of-practice PD … on upper elementary science teachers' knowledge and practices and on their students' learning" (p. 118). Their intensive approach found that

content played an important role in PD when looking at student test responses. Their "Findings suggest investing in professional development that integrates content learning with analysis of student learning and teaching rather than advanced content or teacher metacognition alone" (p. 333).

Blank, de las Alas, and The Society for Research on Educational Effectiveness (2010) performed a meta-analysis, which found 16 studies detailing significant effect sizes when comparing teacher development and increased student achievement. Tying PD to student performance of traditional classroom teachers makes logical sense, however, for positions like a sustainability coordinator or a director of diversity, PD experiences may not directly influence student performance, especially when these areas fall outside the standardized testing regimen. For sustainability coordinators, assessing their impact on student performance serves as a reductive measure of their utility. The literature on PD for this position is virtually non-existent. Due to a confluence of factors, the newness of sustainability coordinators in K-12 education, their rarity, the lack of an organizing or accreditation association, and their variance within schools – many serve informally as they have become the *de facto* sustainability person on campus. Understanding how PD can assist sustainability coordinators find their own voice and affect change at the local level represents an important challenge not currently reflected in the literature.

Transformative PD

New arenas in the field of PD have arisen in recent years. These developments have altered the landscape of professional development, moving it into a more critical phase. In particular, Johnson and Marx (2009) propose an alternative approach to

professional development for urban science educators, one they refer to as "transformative professional development," or TPD, which is "based upon the premise that through effective, sustained, collaborative professional development, climates of schools, as well as beliefs and practices of teachers can be positively transformed" (p. 118). TPD aims to transform science instruction into a positive learning environment for under-represented groups. The role of TPD in professional development connects the participants more fully to the process, as opposed to being passive recipients of content. In a longitudinal study, Johnson and Fargo (2010) demonstrated the effectiveness of TPD vis-à-vis student performance at two urban schools, an encouraging, albeit small sample (Johnson & Fargo, 2010). Responding to each schools' specific needs, TPD enabled participants "to coconstruct [*sic*] the focus of the program. . . . [T]he focus of 'whole-school' allowed all science teachers in each school to participate, growing collective power for change within an urban school" (p. 23). When combined with education for sustainable development, which "should always be implemented in a locally relevant and culturally appropriate fashion" (McKeown & Hopkins, 2003, p. 119), TPD represents a powerful tool to affect change at the school level. PD in the burgeoning field of educating for sustainability offers an opportunity to develop the research, which currently presents itself as a yawning gap.

Participatory PD

Robottom (1987), laid the foundation for participatory PD in the field of EE, claiming it "should be enquiry-based, participatory and practice-based, critical, community-based, and collaborative" (p. 298). Recent developments in participatory PD programming yielded a set of guidelines as laid out by Literat (2012). In an attempt to

develop a participatory PD model, Literat (2012) proposes four values (a) participation, not indoctrination, (b) exploration, not prescription, (c) contextualization, not abstraction, and (d) iteration, not repetition. These guiding statements provide the basis for thinking about PD that embraces both participants and the process. Jenkins (2012) suggests moving from a 'teacher-training' model to one in which 'co-creation' and 'co-facilitated learning' represents the norm. Jenkins (2012) sees PD situated in schools and communities, programs that work on the local level, even as a participatory approach aims to alter existing PD modalities. Engaging participants in the co-construction of PD (Johnson & Fargo, 2010) creates buy-in and investment on behalf of those involved. Meaningful experiences combined with relevant content offer the ideal opportunity to create participatory PD programs focused on EfS. The sustainability coordinator position, being relatively new to K-12 education – and to education in general – would benefit from participatory PD. Literat and Itow (2012) argue that those engaged in a participatory learning build community. This is particularly important for a nascent profession within education. Little research currently exists exploring sustainability coordinators and PD, especially at the K-12 level. Given the increasing need for EfS in schools with the latest data from two IPCC (2014a, 2014b) reports – Impacts, Adaptation, and Vulnerability and Mitigation of Climate Change – PD for sustainability coordinators that includes their tacit knowledge and energy to move forward in this pivotal time is critical.

Adaptable, Customizable Professional Development

The participant driven nature of this research follows from the need for both small group and customizable professional development. A "one-size fits all" approach to professional development does not suit the varied needs of either individuals or

individual schools. McLester (2012) states PD lags behind in terms of innovative approaches, despite the advances in student learning. In particular, the large group, "one-size fits all strategy" (p. 37), largely deemed inappropriate and ineffective for classrooms maintains a stronghold in PD. While best practices in education (Zemelman et al., 2005) and research based components of professional development (Bransford et al., 2000) have both practical and foundational impacts on PD, Senge (1990) warns against the wonton copying of prescribed practices, likening the emulating of an exemplary model to copying the habits of a great person in order to achieve individual greatness.

Customized professional development with participants taking a leading role in the design and implementation of said PD offers a way forward while considering Senge's (1990) warning. With research on how people learn as a guide, this project set out to engage the participants in meaningful dialogue around the idea of Educating for Sustainability, while providing valuable resources that can further their understanding and goals as pertains to sustainability in their schools. No single template or one size fits all approach to PD for EfS makes sense as local solutions to local problems lie at the heart of sustainability. Gonzalez, Moll, and Amanti (2005) advise connecting instruction to the lives of those involved, while ensuring "the details of effective pedagogy … be linked to local histories and community contexts" (p. ix). In designing an effective, and meaningful, PD centered on local histories and community contexts, taking the participants' voices into account plays an essential component of the experience.

Green Schools

A thorough review of the literature reveals a number of gaps in the research surrounding the use of facilities, especially LEED-certified structures, in the curriculum of green schools. Part of the gap stems from the contemporary nature of the issue. As noted, organizations (USGBC, 2008), architects (Ford, 2007), and individuals (Fedrizzi, 2007), all support the use of school facilities in the curriculum. However, the physical structure rarely enters into the formalized curriculum in K-12 education and there is little research conducted to understand why this is the case. As of April 2011, the United States Green Building Council had more than 4,000 registered projects for LEED certification within higher education (USGBC, 2011a). For the past decade higher education has taken the lead on "greening the curriculum." In the preface to *Teaching Sustainability at Universities – Toward curriculum greening*, Filho (2002) noted, "higher education institutions around the world are beginning to recognise [*sic*] that they have a unique responsibility towards the goal of sustainability" (p. 9). As an example, these institutions have started using features from LEED certification to supplement the traditional curriculum, often aligning with their institutional sustainability plans (Erwin and Kearns, 2008). Many institutions of higher education have taken the lead in building facilities that minimize resource consumption. Erwin and Kerans (2008) discuss a renewable energy project installed at Colby College in Maine that has become a "living lab" for the university. Not only does the project generate energy for the campus, but also it serves as a learning tool for students. In this guise, buildings constructed over the next few years that replace the existing building stock in elementary and secondary education – or those that are retrofitted – can serve as teaching tools, not just boxes to house people

and the traditional educational accouterments. Abraham (2005) argues, "Education for a sustainable society requires that we also develop techniques to promote sustainability to the precollege student" (p. 343).

The issue of aging schools is a significant one. As of 1999, the average age of educational facilities in the United States was 40 years old, with the projected average lifespan of a school building coming in at 42 years (Westcott & Egan, 2009). As these buildings age, the need to renovate or to replace them arises. "Globally, school construction represents one of the largest sectors of new and renovation construction activity and therefore has significant environmental consequences" (Ford, 2007, p. 10). In 2010, the commercial sector consumed roughly 19 percent of energy in this country, with schools (elementary, secondary, and higher education) constituting 13% of that figure (U.S. Energy Information Agency, 2010). Furthermore, schools spend approximately $8 billion annually on utility bills (Wescott & Egan, 2009). According to Chiles (as cited in Riley, Thatcher, and Workman, 2006, p. 143), buildings and their construction directly or indirectly account for 54 percent of energy consumption "and [given] that the USA consumes nearly 30 percent of the world's energy resources, the need to minimize the negative effects of buildings on the environment is crucial, especially in the USA." Hawken, Lovins, and Lovins (1999) point out that people spend a majority of their time indoors – 90% – and they "use one-third of our total energy and two-thirds of our electricity. Their construction consumes one-fourth of all wood harvested; 3 billion tons of raw materials are used annually to construct buildings worldwide" (p. 85). Given the amount of time people spend indoors, the walls can do much more than hold up the roof, they can teach.

Buildings as Teaching Tools

Li, Locke, Nair, and Bunting (2006) argue, "school architecture can be a three-dimensional learning tool, a stage set that is designed to create awareness, communicate ideas and impart lessons" (p. 15). In particular, in the section titled "The School Building as a Learning Tool," Li (2006) comments on the distinct relationship between sustainability and buildings as teaching tools. "The school building has excellent potential to showcase real-life connectivity." (p. 16). They argue that the wealth of systems in a standard school – lighting, heating and cooling, and water treatment – offer a unique opportunity to teach students directly, replacing materials that lack relevance or context. In order to do so, Li (2006) suggest that these elements have "hands-on learning tools such as meters and gauges for observation and investigation" (p.16). If installed properly, they can supplement instruction in many of the core science courses, as well as environmental science, an advanced placement option at many schools. Beyond the systems themselves, Li (2006) also indicates that a school's facilities provide a chance to demonstrate "how buildings effect the environment, what they consume, pollution they produce in terms of waste and noise, and the overall impact of pollutants on climatic change, wildlife and vegetation" (p. 16). Much focus of buildings as instructional tools is tied to physics, chemistry, and environmental science as Li (2006) mentions. What remains unclear in the literature is how the built environment is linked to social science and humanities curricula. Li (2006) mentions two schools (IslandWood, a school in the woods of Washington State, and the Roy Lee Walker Elementary School in Texas) that currently incorporate sustainability into their curricula, however, there is no mention of what precisely either of these schools did, nor how the buildings played a role in

educating students. Presumably Li (2006) refers to the informal use of signage throughout the facilities, as this is one of the criterion for earning points toward LEED certification, however, this is unclear. As an example, touring the Evie Garrett Dennis campus, a LEED certified project, in the Denver Public School (DPS) district one notices signs throughout buildings that point to the environmental features of the structures. These signs constitute what could be considered part of the informal curriculum, but the question remains as to the manner in which the facilities make their way into the formalized, classroom based curriculum. According to the Denver Post, in some Douglas County Schools "solar panels . . . are being used as a learning experience for students. In the classroom, students study and analyze the data from the solar panels" (Illescas, 2011, para. 6). Additionally, more than 1,200 students at 58 schools conducted energy audits to reduce consumption, yielding a reported savings of $11 million dollars over four years. Training teachers to use features of the school's built environment properly, whether they are add-ons like solar panels or the buildings themselves, is an integral part of the equation. Exchanging generic, decontextualized examples in the formal curriculum with those from the school's campus represents an opportunity to scaffold science concepts onto the physical surroundings via place-based experiences.

Selby (2000) points out that schools have integrated ecological awareness into the curriculum. He argues that

> In recent years, the idea of 'greening' schools has achieved fairly common currency. School curricula incorporate environmental themes and topics. Mission statements are tinged with green (albeit a faded green in these days of 'back to basics' and economic retrenchment). Composters are commonplace. Indigenous vegetation is replacing concrete in many a schoolyard as school ground naturalization proceeds apace. Recycling is replacing the throwaway ethic (p. 88).

The notion of "greening" relates to practices that are less environmentally destructive, as suggested in the quotation above. Selby's (2000) comments do not address the extent, or presence for that matter, of these green features in the curriculum. Mentions of environmental themes and topics do not necessarily include examples of composters and indigenous vegetation as components of the formal curriculum. The LEED protocol for building falls in line with this track. Just because signage earns points for certification, does not mean that teachers integrate these real-world examples into their daily lessons, or that students are learning about these innovations in the context of science content. Pro-environment perspectives routinely fail to translate into behaviors that support environmental conservation. "[P]eople often harm the environment *despite* holding attitudes that are environmentally friendly" (Tenbrunsel, Wade-Benzoni, Messick, & Bazerman, 1997, p. 5). Signs indicating sustainable measures merely act as static representations of dynamic processes. By monitoring a building, the data generated creates a wealth of information that can enter the classroom in an engaging, hands-on lesson.

A number of studies, articles, and reports detailing the financial savings and health benefits of "green schools" exist in the literature (Kats, 2006; Langdon, 2007; Sack-Min, 2007; LaFee, 2008). For instance, Kats (2006) reports "Green schools use an average of 33% less energy than conventionally designed schools" (p. 4). Other studies consider the impact on test scores resulting from features like natural daylighting (Heschong-Mahone Group, 1999; National Research Council, 2008). This feature provides an abundance of natural light, reducing the need for artificial, energy consuming overhead lighting. These design features and subsequent energy savings could serve as

the basis for an integrated arithmetic and science unit of study. The potential for integrated learning reaches across the curriculum and throughout the facilities. However, what remains unclear in the literature is exactly how these school buildings are incorporated into the curriculum. With these environmental features, how do teachers, curriculum coordinators, and instructors use the facility to enhance their teaching?

State of the State: Colorado Green Schools

Colorado in particular has a few examples of the important role buildings can play in education. In Denver, a Montessori school instituted an after school program, "The Green Neighborhood Class," where architects and members of the community would come in and use the neighborhood to teach. In the class, students "learn about their relationship with resources and sustainability right in their own backyard" (Goldblatt, 2012, p. 14). Other instances showcase schools that have been built to LEED standards and have the opportunity to become exemplars of facilities that teach. In Denver Public Schools (DPS), a new campus designed to achieve LEED certification opened in time for the 2010 school year. Known as the Evie Garrett Dennis campus, it contains numerous buildings and "allows for a variety of learning environments. Interior spaces are intended to be adaptable for different learning approaches without significant expense" (DPS Communications Office, 2010). The campus has a number of features that helped earn LEED certification, including "Geothermal heating and cooling, solar power, extensive daylighting, water conservation, environmentally friendly materials, enhanced indoor air quality, and optimal operational and maintenance practices are among the core strategies used to meet sustainability needs" (DPS Communications Office, 2010). These systems and the structures represent a wonderful opportunity to inform the teaching that happens

within its walls. Whether the schools that inhabit the campus choose to use the systems in place remains to be seen.

While these two situations demonstrate the positive role schools can plan, there is also an opportunity to critically study school buildings in the state. For instance, a number of Colorado schools built during the first decade of the twenty-first century were deemed unsound and substandard (Groski, 2011). A series of investigative reports in the Denver Post revealed that several newly constructed schools exhibited structural faults. In the end, a total of nine schools were closed due to structural problems (Barr, 2012). Generally speaking, many public school buildings are in substandard condition (Darling-Hammond, 2004. Darling-Hammond (2004) points to the dilapidated buildings – which she calls one of "the most basic elements of schooling" (p 1936) – as a major issue in the educating of today's youth. Taking these facilities and empowering students to learn from and improve them represents a real-world scenario in which the buildings can serve as a teaching tool. Through a curriculum designed to provide students with hands-on experiences (and aligned to the latest movement in education, common core standards) in which they study their surroundings, interact with the facilities, and gain valuable experience researching the process of retrofitting and weatherization in order to make their schools more habitable and energy efficient, they enter the working world with skills that serve them well in a twenty-first century economy. These "green jobs" cannot be outsourced and can be accessed by students right out of high school. In the worst-case scenario, like those Colorado schools deemed unsound and substandard (Groski, 2011), they fail to accomplish even the task of providing a safe learning space. In order to better help students understand their own personal relationship with energy, how it is consumed,

and the conservation thereof, school buildings must play an integral role in educating children.

High-Stakes Testing, Social Justice, and Green Schools

Ford's (2007) mention of improved test scores in green schools speaks to the heightened awareness of exams that determine the success or failure of a school. So-called high-stakes tests play a prominent role in today's educational landscape. In fact, "tests have been a fixture in American education since the early decades of the twentieth century" (Ravitch, 2010, p. 151). Dutt-Doner and Maddox (1998) argue that standardized tests have become high-stakes instead of formative assessments that can improve instruction or student learning. Despite this, these assessments remain part of the educational landscape.

High stakes testing represents "a way to measure student achievement and school quality and as a mechanism to hold students and educators accountable" (Jones, Jones, & Hargrove, 2003, p. 1). In a milieu of high stakes testing, demonstrating that green schools can improve student performance cannot be overlooked. While high-stakes tests have serious "unintended consequences" (Jones et al., 2003), preparing students for this single assessment, which may be used as the sole indicator of a school's success, has taken precedence at many schools. Jones et al. (2003) detail the shift from a holistic curriculum that included service learning, hands-on experiences, and a science lab at one school to test preparation in light of testing that threatened the jobs of administrators. Vogler and Virtue (2007) found "Teachers under the pressure of high stakes tend to use teacher-centered instructional practices, such as lecture, instead of student-centered approaches, such as discussion, role play, research papers, and cooperative learning" (p. 56). As often

happens, high-stakes testing narrows the curriculum as educators sacrifice rich experiences for test preparation.

These examples seem to present a challenge for content centered on ecological concepts. However, Smith (2004) provides the example of an ecologically focused school that demonstrated a positive impact on student performance.

> EMS was the only secondary school in the state of Oregon to receive an exemplary designation by the state's Department of Education. High test scores are simply a secondary benefit of an educational process whose primary purposes involve connecting children more deeply to their community and the world and then encouraging them to play a role in bringing about more justice and less environmental destruction (p. 74).

EMS, Portland Environmental Middle School, focuses on more than ecological awareness. As part of the connection to the trinity of sustainability, social justice also has a home in the curriculum. This well-rounded approach to education connects social justice to environmental sustainability. Smith (2004) goes on to connect "the development of this kind of careful attentiveness to other people and the world . . . with the cultivation of a willingness to address issues related to environmental degradation or social injustice" (p. 81). This relationship has deep roots in the environmental justice movement. Agyeman, Bullard, and Evans (2002) argue "that the issue of environmental quality is inextricably linked to that of human equality at all scales" (p. 77). This represents another instance where green schools can support the teaching of conservation-based concepts, especially in schools with populations of students coming from neighborhoods subject to environmental degradation. Bullard (1993) posits, "The environmental crisis can simply not be solved without social injustice" (p. 23).

Barriers to Integration

Barriers to integrating environmental education, not just environmental justice or LEED-certified school buildings, into K-12 curriculum abound. Barrett (2007) provides the following barriers to integration, "Structural barriers such as too much curriculum material to cover, difficulty working across disciplines, lack of resources, time, or the ability to take students outside continue to be cited as problems" (p. 209). Barrett (2007) asserts that the dominant discourse preempts the inclusion of environmentally oriented content. Ernst (2007) argues it is "unlikely that teachers would have been exposed to EBE in their preservice [*sic*] preparation programs. It seems even less likely that they would be inclined to use such an interdisciplinary approach" (p. 17). This lack of training and silo approach to academic disciplines represent yet another set of barriers. Ernst (2007) identifies the five following barriers to actualizing environmentally based education: "(a) emphasis on state testing, (b) lack of funding, (c) lack of planning time, (d) emphasis on state standards, and (e) lack of transportation" (p. 24).

In a study of classroom teachers and their incorporation of environmental education into the curriculum, Sosu, McWilliam, and Gray (2008) pinpoint a number of obstacles as well, such as a "restrictive and compartmentalized curriculum and the absence of background knowledge to deal with controversial environmental education issues" (p. 182). Sosu et al (2008) also suggest "subjects such as environmental education, which do not have specific time slots but cut across the curriculum, tend to be ignored" (p. 182). In order to guard against this, interdisciplinary approaches are often seen as preferable to treating environmental education as a stand-alone endeavor.

Science teachers often maintain responsibility for implementing environmental education, though by its nature the discipline crosses many academic boundaries. Yet, as alluded to above, some teachers do not have the depth of background knowledge to deal with the more "controversial" issues, such as climate change. Changes in curriculum, like those discussed in Pons, Olivia, and Maas (2010) can help further the integration of buildings into the curriculum. In their study of Spanish schools, they noted, "teachers nowadays can comply with the curriculum by carrying out educational projects about these school buildings because the curriculum is organized according to competencies related to educational edifices" (p. 262). Specifically, Pons et al. (2010) were interested in introducing the construction methods "as topics in educational projects in order to work on important values such as sustainability with pupils" (p. 250). All of this becomes possible as a result of the curriculum's organization.

CHAPTER III

METHODOLOGY & METHODS

This study centers on an innovative professional development workshop based on the concept of transformative professional development (TPD) for a small cohort of sustainability coordinators in K-12 education. It aims to answer the following questions: (a) What impact does this innovative PD model focused on place-based education and sustainability have on school personnel's ability to integrate school facilities (in particular the built environment) with their school culture? (b) How do sustainability coordinators, as participatory researchers, shape professional development and envision teaching with a focus on the school's facilities in a frame of place-based education? (c) How do participants' sense of ownership evolve over time through their participation in this process? (d)What evidence is there of their ownership/leadership within the workshop and how does it manifest itself?

Ary et al. (2002) assert that the goal of qualitative research "is a holistic picture and depth of understanding, rather than a numeric analysis of data" (p. 25). Accordingly, this research employs qualitative methods. The questions require a holistic understanding in part due to the nature of sustainability itself. Attempting to understand the systems within which sustainability coordinators operate, the varied experiences that influence their perceptions, and the nuances inherent in small scale, personal research undergird this study. In order to sufficiently depict the participants, qualitative methods provide the proper approach.

Transformative Professional Development (TPD)

Johnson and Marx (2009) warn against "existing frameworks for professional development, which are typically prescriptive and developed without involving practicing teachers from participating schools" (p. 130). In order to combat this, Johnson and Marx (2009) propose the implementation of "transformative professional development" or TPD. "TPD is presented as a possible solution to this problem, as it is responsive to the needs of individual schools and teachers and the focus of each program is emergent in nature" (p. 130). The inclusion of school personnel, as well as the emergent nature of TPD, dovetails with participatory action research as a guiding framework for this study. The innovative nature of this program derives from several factors. These include the following: (a) the workshop takes place on a university's campus, (b) it focuses on buildings as teaching tools, (c) builds on participants' interests, (d) it strives to integrate best practices in teaching (guide on the side), (e) it finds its basis in Bransford et al. (2000) *How People Learn*, and (f) it addresses issues of sustainability. The workshop exhibited an emergent nature, as much of the discourse followed the participants' lines of inquiry and interest. Goals were outlined in the documentation, but questions from participants, along with daily debriefing sessions provided feedback about each day's value as well as direction for the succeeding portions of the experience. Flexibility, where applicable, allowed for participants to chart their own paths. Senge (1990) notes that "Compulsory training, or 'elective' programs that people feel expected to attend if they want to advance their careers, conflict directly with freedom of choice" (p. 172). With this in mind, the professional development program reflected the participants' interests and followed their lead.

Theoretical Frameworks

The notion that a single paradigm can accurately reflect multiple perspectives and differing ways of knowing seems highly unlikely and slightly anachronistic. To combat this, Kincheloe and Berry (2004) take a pluralistic view, employing the term bricolage to refer to situations in which multiple perspectives and paradigms help inform the research. "Kincheloe and Berry's (2004) interpretation of bricolage makes awareness and use of different viewpoints, and different scholarly literatures a virtue" (Willis, Jost, & Nilakanta, 2007. p. 333).

Phenomenology and the Role of Experiences

In large part, this study looks at the experiences of two individuals in their specific roles as sustainability coordinators at their schools during the 2012-2013 school year. Since “phenomenological research is a strategy of inquiry in which the researcher identifies the essences of human experiences about a phenomenon as described participants” (Creswell, 2009, p.13), phenomenology provides an essential lens and framework for this study. However, in so much that I would have to set aside my “own experiences in order to understand those of the participants in the study (Nieswiadomy, 1993)” as cited in Creswell (2009, p.13), the phenomenological approach fails to reflect the true breadth and depth with which I am embedded in this subject. In truth, I am unable to extricate myself completely, and rather unwilling to separate myself, as it lends a perspective necessary to understand the lived experiences of Chip and Matt as sustainability coordinators in independent schools. Given this arrangement, phenomenology informs the strategy and methodology, but is informed in part by

grounded theory. With Kincheloe and Berry's (2004) pluralistic perspective in mind, these paradigms guide my approach to research.

As Welch (1939) describes it, Husserl's phenomenology centers on experience. The experience Matt and Chip relate through their responses to questionnaires, comments in focus group discussions, and replies during interviews, coupled with the direction in which they push the professional development as engaged participants, tells a story of their experiences. In the end, phenomenology offers a framework to view – and potentially to understand – the experiences of these two sustainability coordinators. The resultant narrative aims to convey this phenomenological research carried out over the course of a year, and in the case of Chip, beyond as our professional paths intertwined. Phenomenology as a theoretical framework necessitates a constructivist lens to data collection and analysis. Howe (2001) argues, "knowledge, particularly in social research, must be seen as actively constructed – as culturally and historically grounded, as laden with moral and political values, and as serving certain interests and purposes" (p. 202). Wee, Shepardson, Fast, and Harbor (2007) make a similar argument. They claim, "A study that investigates the experiences of teachers in their real world calls for an approach grounded in the constructivist–interpretivist perspective" (p. 67). Indeed, a study in which participants' experiences, reflections, and self-reported sense of development serve as the primary data, a constructivist-interpretivist perspective seemingly offers the most comprehensive way to make sense of the data. Part of the issue at hand revolves around trying to determine the participants' points of view. Bredo (2006) reminds us "In qualitative research in education . . . it creates the challenge to understand all of the interrelated parts of an activity, and not just to sample those that conform to an initial

interpretation" (p. 15). With this in mind, it is not realistic to expect agreement from all participants on the meanings they develop throughout the workshop. Each individual brings a different background to the study and constructs knowledge in a unique way depending in part on their funds of knowledge (González, Moll, & Amanti, 2005). Donmoyer (2001) makes the assertion that a majority of

> quantitative research - but also a fair amount of research that could be labeled qualitative - reflects the sort of purposes that traditionally have motivated researchers: (a) to find the 'truth' about something; (b) to determine which answer is more 'correct'; and (c) to assess which strategy or program is more 'effective.' The difference between researchers in the past and most researchers today . . . is that most researchers today realize that terms such as *truth*, *correct*, and *effective* need to be surrounded by quotation marks because such terms refer to characteristics that are not absolute (p. 190).

I do not believe that there will be one truth emergent from this research. Donmoyer's reorienting of the research endeavor toward relative "truth" helps inform this study. Since determining educators' experiences and perspective serve as the main goal of this study, it is important to grasp this notion.

Grounded Theory

Grounded theory plays an essential role in this research. In the attempt to address the research questions, determining the impact of a PD model upon participants will lend itself to an understanding of how sustainability coordinators envision their roles, the challenges rooted in their positions, and ways in which they navigate these complexities. Grounded theory finds its roots in the views and experiences of its participants (Creswell, 2009), supporting the theory via their unique experiences, not a contrived laboratory setting. Grounded theory considers a slew of factors,

> (a) the need to get out into the field to discover what is really going on; (b) the relevance of theory, grounded in data, to the development of a discipline and as a basis for social action; (c) the complexity and variability of phenomena and of

> human action; (d) the belief that persons are actors who take an active role in responding to problematic situations; (e) the realization that persons act on the basis of meaning; (f) the understanding that meaning is defined and redefined though interaction; (g) a sensitivity to the evolving and unfolding nature of events (process); and (h) an awareness of the interrelationships among conditions (structure), action (proves), and consequences (Strauss and Corbin, 1998, p. 9-10).

These factors make grounded theory an important component of the study. Since participants play a major role and hold insight into the ways in which the professional development may or may not impact their teaching, grounded theory lends itself to understanding the impact of the workshop on their attitudes. (See Table 1 for the connection between grounded theory, TPD, and green schools).

Participant Selection and Sampling

In order to satisfy the necessary characteristics for this study I employed criterion and purposeful sampling (Schensul, Schensul, & LeCompte, 1999; Patton, 2002). Educators who take part in the professional development workshop need to demonstrate an interest in the material and concepts conveyed in the study as well as an interest in changing their teaching practices. Patton (2002) points out,

> The logic and power of purposeful sampling lie in selecting *information-rich cases* for study in depth. Information-rich cases are those from which one can learn a great deal about issues of central importance to the purpose of the inquiry, thus the term *purposeful* sampling (p. 230).

Since purposeful sampling "is based on the assumption that the investigator wants to discover, understand, and gain insight [they] must select a sample from which the most can be learned" (Merriam, 2009, p. 77), it suits the aims of this study most closely. Furthermore, LeCompte, Preissle, and Tesch (1993) assert that criterion-based selection "is the starting point for all research" (p. 69). Lecompte and Schensul (2010) further this argument by claiming, "researchers choose individuals to study because they possess a

set of characteristics that match those of interest to the researcher" (p. 158). LeCompte and Preissle (1993) point out that the "Choice of whom to study is an interactive process which takes place first in the initial phases of a qualitative . . . study" (p. 57). They go on to suggest that groups are chosen "that poses some personal, empirical, or conceptual interest" (p. 57). As a former science teacher, this group is a natural focus for this study.

Participants were chosen based on their interest in the topic, and application (see Appendix E and Appendix F). The cohort included sustainability coordinators in Colorado. Due to the nature of the sustainability coordinator position, the participants came from independent schools. Though multiple individuals from the same school would have been ideal, so as to create a small community of support within a single institution, the sustainability coordinator position only accounted for a half-time role for one participant and less than a quarter time position for the other, making it unrealistic to have multiple people in the same position at the same school.

Initial recruitment of participants took place through professors at the University of Colorado, Denver and the researcher's professional networks, which were developed over the course of two years teaching at an independent school in Denver, working at the University of Colorado, Denver, and pursuing interests in green schools by attending conferences on the topic.

Individuals that attended the workshop self-selected; they were not coerced into taking part in the PD. The participants were a nonrandom, self-selected sample and not representative of all sustainability minded educators in the field. However, the aim of the study was not to represent this group in its entirety. As stated earlier, the need for participants who demonstrated an interest in the topic furthered the aim of the study.

Table 1: Relationship Between Components of Grounded Theory, TPD, and Green Schools and Place Based Education

Components of Grounded Theory	Transformative Professional Development	Green Schools/Place Based Education (PBE)
The need to get out into the field to discover what is really going on	Involves participants in a meaningful conversation in an attempt to understand their practices	Exhibit a need to experience and involve the local environment
The relevance of theory, grounded in data, to the development of a discipline and as a basis for social action		PBE requires action in the social sphere, connecting back to learning objectives
The complexity and variability of phenomena and of human action	Focuses on urban science teacher change and is responsive to school climate, teacher needs, and teacher beliefs with the intention of promoting change in practice.	Given the diversity of local environments and communities, PBE embraces the variability and employs it in educating students
The belief that persons are actors who take an active role in responding to problematic situations	Participants in the study shape the direction and content that they feel is most meaningful and engaging	Green schools offer the opportunity to engage students in active roles in the environment
The realization that persons act on the basis of meaning	Focus on building relationships	
The understanding that meaning is defined and redefined though interaction	Used to meet the needs of individual teachers and the collective needs of schools in reform efforts	PBE situates learning in the local environment, making meaning from one's surroundings
A sensitivity to the evolving and unfolding nature of events (process)	Focused on the development of student conceptual understanding through culturally relevant science and effective teaching methods	
An awareness of the interrelationships among conditions (structure), action (proves), and consequences	Participants see first hand how their agency impacts the structure of their experience in TPD	Green schools and PBE demonstration inter-relationships in content and action

Since my experience was largely in independent schools, I tapped into this network. Given the curricular freedom at many of these schools, it very well may allow for easier integration and thereby explain why these organizations have sustainability coordinators. Unfortunately this may come as a limitation when looking to generalize some of the findings. Since this study relied on a quasi-convenience sample, Creswell's (2007) admonition that convenience sampling "Saves time, money, and effort . . . at the expense of information and credibility" (p. 127) must be taken seriously. In an effort to increase transferability, "the degree to which the findings of a qualitative study can be applied or generalized to other contexts or to other groups" (Ary et al., 2002, p. 454), I sought a broad group of participants, while trying to keep the total size of the cohort small so as to increase individualized attention. However, with two participants agreeing to take time from their personal lives and summer break to engage in the PD workshop and year long follow up, the cohort ended up small or than originally anticipated. While this allowed for in depth conversations, it reduced the degree to which findings can be generalized.

Site Selection

The University of Colorado Denver is my home institution. Familiarity with the buildings and surrounding neighborhood was developed over the three years prior to the study. Denver was chosen as the site of the study for numerous reasons. My affiliation with the USGBC Colorado Chapter's Green Schools Initiative allowed me access to a number of professionals in the arena of green school building, design, and advocacy. The specific site, the University of Colorado Denver, contains both LEED certified and non-LEED certified structures. Current campus policy stipulates that all buildings constructed

or renovated since 2009 adhere to LEED specifications (University of Colorado Denver, 2009). This provided a contrast for the PD to look at the built environment in terms of existing building stock and structures with energy and water efficient components

Features of LEED certified buildings are key to the goal of the study, but so too are the availability of "traditional buildings," those constructed prior to the advent of LEED certification. Traditional buildings are essential since LEED certified structures comprise a small number of the total structures currently in existence. Although growing daily, there are only 32,271 total LEED certified projects, representing all building types, not just schools (USGBC, 2012). This pilot PD workshop also takes place on the campus of University of Colorado, Denver due to the fact that participants do not come from the same district or school, creating a greater need for a central location. Furthermore, during the course of the workshop, the university renovated the facility housing the business school, allowing the workshop participants an opportunity to tour the site and compare traditional buildings to a LEED certified structure, thereby providing a unique insight behind the scenes of a green building renovation.

School Demographics

Participants in the student hail from two independent schools in the Rocky Mountain Region. Braeburn Day School (BDS), located in a large metropolitan city serves kindergarten through eighth grade. Valley View School (VVS), situated in a smaller college town that serves as the county seat, services all grade levels from kindergarten through twelfth. BDS is situated in an affluent neighborhood where the median household income was $93,383 in 2011; nearly double that of the surrounding city (city-data.com, n.d.). While not all students live in the neighborhood, as a proxy, it

demonstrates the high socioeconomic status of its residents and the school's clientele. Property values, indicated here by estimated home value in 2010 ($779,119) far outstrip the city ($346,933) where the neighborhood is located (city-data.com, n.d.). According to the school's website, only twenty-one percent of the 645 students (approximately 135 individuals) identify as students of color, leaving nearly 4 out of 5 members of the school hailing from white families. With nearly half the student body, though more grade levels, Valley Vista has approximately 315 students. The school's website does not contain information on how many students of color attend VVS. Census estimates from 2012 can provide some insight into the ethnic composition of the school. According to the census data, Rio County, whose largest city is Valley Vista, has a high level of college graduates (58.0%) and is predominantly white (91.2%). Furthermore, using the school's tuition and fees, at a cost in excess of $18,000, for the high school grade levels, monetary constraints preclude students of lower socioeconomic status from attending.

Professional Development Design

Following the direction of the Piedmont Project at Emory University (Barlett, 2004) and the Ponderosa Project at Northern Arizona University (Chase and Rowland, 2004), this workshop aimed to have educators alter existing lesson plans in ways that infused sustainability and facilities into their course syllabi, or what J. Cloud (personal communication, March 23, 2012) referred to as "sustainabilizing [*sic*] the curriculum." These two projects focused on professors at the two schools working in small groups to learn about sustainability and then adjusting their courses by swapping out existing materials and concepts with those related to sustainability. This workshop attempted to achieve a similar aim by having K-12 educators look at their current lesson plans and

devise ways to exchange instructional episodes that previously used a centrally produced text or some other nondescript content with one centered on the facilities. Additionally, participants were to create one new lesson plan with a student driven project employing the facilities as a central component of the exercise. By doing so, the goal was to connect students with their surroundings and increase awareness of how everyday actions impact the environment and energy consumption. Various speakers and presenters were brought in to provide lectures, demonstrations, and mini-workshops to teach about components relating to energy audits, construction, the built environment, and energy usage. Participants were given time to reflect on the speakers, discuss their own schools and challenges faced on their respective campuses. (For a full schedule of the program, see Appendix D.) As the focus shifted from classroom educators to sustainability coordinators, the goal became developing an understanding of their daily challenges, ways in which they overcame opposition, built networks, and participated in the PD process.

As part of the need for intentionality, Guskey (2000) recommends beginning with a clear statement of worthwhile goals that can be assessed. Perhaps the most challenging aspect of the three recommendations for professional development design put forth by Guskey (2000) is the notion of systemic process. Guskey (2000) points out "fragmented, piecemeal approaches to professional development do not work. Neither do one-shot workshops based on the most current educational fad" (p. 19). As such, the workshop focused on reflection and discussion so participants could move more fully toward a systematic approach to integrating place into their curriculum.

Participatory Research

Participants stand at the center of this research and the professional development undertaking. As such, the problem of adequately assessing and understanding the attitudes of the participants reigns supreme. My experiences in public schools stem from my time as a student in the Los Angeles Unified School District (LAUSD) and as a student teacher in the New York City public school system while I obtained my teaching degree, as well as consulting work with Mar Costa Charter High School. With these issues in the forefront of my mind, as well as the need to engage teachers as part of the transformative professional development model, I decided to commit to a participatory action research model (Merriam, 2009). "In this type of critical research the political empowerment of people through their involvement in the design and implementation of a research project is central" (p. 36). Additionally, the insights that educators can provide from their own experiences, helped shape the professional development course in ways that may be more meaningful to them as practitioners. Furthermore, teacher-participants' acumen will serve as a sort of "tacit knowledge" (Sayer and Campbell, 2004).

Community based participatory research (CBPR) offers another avenue for this study. The technique lends itself well to environmental justice (EJ), a related arena of research. CBPR has been used on a number of occasions in environmental justice work (Minkler, Breckwich Vásquez, Tajik & Petersen, 2008; Shepard, Northridge, Prakash, & Stover, 2002). In CPBR the community plays a key role in linking concerns about the environment with social justice. Furthermore, CBPR can serve to achieve the dual goals of place-based education and the proposed research project by engaging members of the

community to help strengthen relationships between the physical environment and the curriculum.

From its inception, the workshop was intended to be participant driven. Roadblocks existed early on though, as it was not feasible to get participant feedback and direction prior to obtaining IRB approval. The time frame from this point was a bit rushed and the first two days were planned without insights from participants. However, even at the close of the first day, there were examples of participant driven change, including one that led to an agenda alteration for the second day of the workshop. Originally, the workshop schedule included an outside speaker to present on energy audits, but both participants had undergone audits at their respective schools. As a result, we mutually agreed to remove this option. In its place, one of the participants wanted to visit a local LEED certified building (EPA Region 8 headquarters) so this replaced the audit. Unfortunately I could not arrange a personalized guided tour on short notice, but the facility offers a self-paced tour, which provided some general information that fulfilled the participants' needs.

After the first two days of the workshop, the participants decided to resurrect a previously existing committee of like-minded educators from other independent schools across their home state. Matt Anderson offered to host the initial gathering at his school. He worked with Chip to set a preliminary agenda (Appendix G) and reached out to the wider community through a listserve that was created for the original committee. Chip sent out a questionnaire to potential attendees ahead of the meeting (Appendix H) and shared his responses (Appendix I) with those who confirmed their plans to attend the meeting at Matt's school.

Implementing a professional development program that engages participants and provides significant opportunities to lead and to influence the direction of the experience has great utility. Garet, Porter, Desimone, Birman, and Yun (2001) suggest

> Apart from opportunities to observe teaching, plan classroom implementation, and review student work, professional development activities may also offer teachers the opportunity to give presentations, lead discussions, and produce written work. Active participation of this kind may improve outcomes by permitting teachers to delve more deeply into the substantive issues introduced (p. 926).

Alexander and Henderson-Rosser (2010) employ an alternative to the one-size fits all schematic by integrating technology, previously seen as the purview of students in the classroom and not PD, to create a more customized approach that allows for smaller group interaction. This example of altering PD to fit educators' schedules and expose them to a specific modality that has applicative value in the classroom serves as a potential model for the type of work undertaken in this study.

Varela (2012) argues that PD should consist of "development that helps mentor, nurture, and enhance [educators'] professional repertoire" questioning "Cookie-cutter approaches that do not match the real needs of teachers " (p. 17). This study addresses two of the three "major sins" that Varela (2012) identifies as plaguing professional development, the "one-size-fits-all mentality" and the fact "that it is not ongoing". To combat these concerns, Varela (2012) suggests that PD experiences "Involve teachers in the ... selection of activities" (p. 19), a key component of the design of this workshop. By engaging Chip and Matt in this type of hands-on PD, the goal becomes not only their increased sense of ownership, but also a more meaningful extension of the process. Passive reception of the ideas espoused throughout the course of the workshop runs counter the constructivist epistemological foundation of this study.

Reflexivity

"Reflexivity refers to the importance of reflecting on the assumptions that we make in producing what we regard as knowledge" (Hardy & Palmer, 1999, p. 381). As the researcher, I bring a certain set of biases, assumptions, and a perspective that is uniquely mine to this research endeavor. As such, I am unable to see all facets and factors of an issue. In an attempt to address these biases, I maintained a journal with my thoughts from each component of the workshop. Additionally, I engaged the participants in discussions of their biases and preconceptions in an effort to better understand my own predilections. At the same time, my biases are essential to my desire to undertake research centered on education, energy conservation, and the local environment. If it were not for these factors, I would not take the measures to pursue this avenue of research in the first place. The challenge remains to adequately recognize and name these biases.

Wohl (2009) discusses the "internal conflict between serving as a detached scientific observer and an activist scientist" (p. xviii) in relation to issues pertaining to the environment. This study concerns itself with the society and education's role in educating for a sustainable future. I taught middle school science for five years. Three of those years I employed a textbook with the title, *Science and Sustainability* (SEPUP, University of California, Berkeley, Lawrence Hall of Science, & Lab-Aids, Inc., 2001). This served as my first foray into the realm of Educating for Sustainability. After attending the Reggio Collaborative Winter 2008 Institute: Questions that Matter: Exploring Sustainability & Creativity I was introduced to systems thinking by Jaime Cloud of the Cloud Institute for Sustainability Education. Upon relocating to the Rocky

Mountain region, I looked for ways to bring Educating for Sustainability to the school where I worked as a technology coordinator. It was in December of 2008 that I attended a workshop presentation from Henry Jameson, a consultant in the area of Educating for Sustainability. At that presentation, I met several individuals who were involved in the field of EfS at neighboring schools.

> When people genuinely care, they are naturally committed. They are doing what they truly want to do. They are full of energy and enthusiasm. They persevere, even in the face of frustration and setbacks, because what they are doing is what they must do. It is *their work* (Senge, 1990, p. 148).

And so it was as Senge (1990) notes, those committed, energetic people who inspired me to pursue a doctorate. As it turns out, several people at that meeting took part in this research, including the two participants in this study.

Distancing myself from these people would not be possible on any real level. My work is intertwined with theirs, and I would not want it any other way. However, this makes separating myself from the participants and subject matter impossible. I am biased. There are no two ways about that. Despite this, I aim to remain impartial. I am biased by the questions I ask, the answers I select, and the story I choose to tell. Additionally, I can only see what I can see, whether because I am looking for it or I am slightly blind to the external "truths" that the participants may allude to through the transcripts. All of this is not to say that my flaws are unnatural or inhumane, in fact, if nothing else, they serve as testament to my "humanity", by which I solely mean my human-ness.

What exists in this document flows directly from my experience. Reared in a positivist world, but seeing it in a constructivist light, I hesitate to inject myself in the experiences of the participants, but because of a shared history, there is overlap and familiarity. Building rapport came naturally as the shared experiences provided me with a

level of cachet in the participants' eyes. I try to maintain objectivity, while coming to grips with the fact that their stories intersect with my own.

My Role as Researcher and Participant

Taking a page from the interpretivist/constructivist line of thinking, I believe that "reality is a 'social construction'; that is, what people know and believe to be true about the world is *constructed or created and reinforced and supported* as people interact with one another over time in specific social settings" (Lecompte and Schensul, 2010, p.67). Ary et al. (2002) provide the following interpretation of science: "Perhaps science is best described as a *method of inquiry* that permits investigators to examine the phenomena of interest to them" (p. 10). With these perspectives as a guide, I view research as an exercise in knowledge creation. I see it as an on-going, iterative process through which answers to questions may be ascertained. However, there are instances where answers to questions remain elusive. Since the subjects are human, with wide-ranging experiences, knowledge, and cultural understandings, I do not anticipate a singular response to address the questions. Furthermore, the effectiveness of this professional development will depend on participants (and you) connecting with the material in meaningful ways. These may include changes in their (and yours) educational philosophy, a shift in the language they (and you) employ in the discourse of education, or a re-ordering of the curriculum to center on place and the local built environment.

Building Rapport

LeCompte and Schensul (2010) provide an overview of the role of the researcher (as well as the role of the researched) organized by epistemological stance. Since this work stems from the multiple paradigm perspective, this section aims to explicate my

role as researcher. While I have attempted to clarify my role in previous sections, I plan to further elucidate my role. Kincheloe (2004) raises the issue that critical "consciousness refuses the passive acceptance of externally imposed research methods that tacitly certify modes justifying knowledges that are decontextualized and reductionist" (p. 3). As much as possible, I guard against the reductionist approach. In working with these participants, I owe them my fullest attention to detail. The relationship I cultivate depends on the actual individuals. As noted, my network draws largely from independent schools, a community that does not necessarily represent the range of faculty in Denver Public Schools (DPS).

Since the participants maintain a central role in the construction of both the workshop and the data being collected, it is imperative to pay attention to the distinction Quinn (1982) makes between neutrality and rapport. He states "*Rapport is a stance vis-à-vis the person being interviewed. Neutrality is a stance vis-à-vis the content of what that person says.* Rapport means I respect the person being interviewed" (p. 171). Due to the relationship with the participants, this notion of respect (i.e. rapport) is an important one because it allowed me to engage in an honest dialogue and elicit responses from Chip and Matt that represent their realities as they came to see them.

Observations will be a significant part of the data collection process. I did not conceal my role as a researcher. Instead, I served in the role of "observer as participant" (Creswell, 2009, p. 186). Spending time with the workshop participants provided ample data and opportunities to interact with them on a regular basis.

In my dual roles as researcher and workshop organizer, I had to step back and ask for assistance when interpreting participant responses as well as designing the workshop

to ensure maximal benefits for the participants. I did not have all the answers, but I was extremely committed to the inclusion of energy conservation, as well as ensuring that students were exposed to these ideas. Keeping a journal of my own biases, helped maintain a conscious thought processes, while allowing me to revisit conversations throughout the course of the workshop. Furthermore, reflection on each day and how it went for me provided some further consideration for the iterative process that shaped the PD experience. Balancing these dual roles led to the ultimate goal of supporting the participants as they worked to integrate energy conservation and place-based principles into their schools. As Smith and Williams (1999) point out in the above quotation, "I . . . want to help develop and demonstrate that an education that studies the world right around us is superior to a standardized, generic education" (p. 61).

Data Collection

Timeline

The workshop portion of the research took place on August 7-8, 2012, with in person meetings at the participants' institutions occurring on September 21, 2012 and January 25, 2013. Additionally, the participants attended "Graduate to Green" on October 25, 2012, the green schools conference hosted by the USGBC's Colorado chapter. Data collection began with the aforementioned applications and continued into the 2012-2013 school year. Follow up conversations in person, over the phone, and via email continued with Chip Prentiss through the writing of the dissertation and continue to the present day. Interviews, observations, and all school-based research took place during this period. Transcription and data analysis occurred between December 1, 2012 and February 28, 2013. The findings were written up over the course of 2013 and sent to constituents for member checking on March 14, 2014. See Table 2 for an outline of the data types.

Table 2: Meetings with Participants, Including Data Collected

Date	Data Type	Participants	Note
8/7/12	Observations	Chip, Matt	Participants submitted documentation
8/7/12	Focus Group	Chip, Matt	
8/7-8/8/12	Observations	Chip, Matt	Field notes from workshop
9/21/12	Pre-Meeting Joint Interview	Chip, Matt	Recorded interview with both participants prior to meeting
9/21/12	Observation, Fieldnotes	Chip, Matt	Meeting hosted at BDS
9/21/12	Post Meeting Joint Interview	Chip, Matt	Participants formal interview recorded before meeting, and informal (not recorded) after meeting
10/24/12	Informal Interview	Chip	Met Chip at neutral location in his hometown
10/26/12	Individual Interview	Chip	Recorded after participant attended morning sessions at green school conference
10/26/12	Individual Interview	Matt	Recorded after participant attended morning sessions at green school conference
1/25/13	Observation	Chip, Matt	Meeting hosted at VVS
5/10/13	Informal Interview	Chip	Met Chip at neutral location in his hometown
8/15/13	Phone Conversation	Chip	Chip called after email conversation
9/26/13	Informal Interview	Chip	Met Chip at neutral location in his hometown

Goals of the Study

The primary goal of this study is to assess Matt and Chip's – two sustainability coordinators at independent schools – experiences and perspectives vis-à-vis a professional development course aimed at incorporating school campuses into the curriculum. Understanding the culture of the schools through Chip and Matt's work represents a major, yet significant charge of this research. My research aims align with the approach espoused by Smith and Williams (1999):

> Rather than requiring all teachers to teach environmental education, I would rather give teachers the freedom to teach from their hearts and give parents the freedom to choose the teaching approach they want for their children. I then want to help develop and demonstrate that an education that studies the world right around us is superior to a standardized, generic education. If we demonstrate this convincingly, then there will be a growing demand from parents for teachers who teach this way (p. 61).

Guskey (2000) warns of unintended consequences in professional development and the need for multiple indicators to determine the effectiveness of a program. Since the research questions set forth look at the impact of the professional development workshop, Guskey's admonishment will lead to various sets of data (indicators) being collected to guard against potential consequences. (See Table 3 for a summary of which data will be employed to answer the corresponding research questions.) Participants in the workshop were asked to submit the following documents as part of the application process:

- Educational philosophy
- Demographic information (see Appendix E)
- Cover letter
- Brief questionnaire (see Appendix F)

After each section, participants were given time to reflect in a journal, however, participants chose not to take part in reflective journaling. A brief – 15-30 minute discussion at the end of each day – enabled the participatory process for influencing the second day to unfold in an organic manner. In order to understand my personal thoughts, I maintained a journal to reflect on the daily structure, positives, and pitfalls of the participatory PD experience. These reflections informed my reflexivity statement and served as an opportunity to collect my thoughts as I spent time with the participants and presenters.

Semi-structured interviews (Merriam, 2009) allowed for some exploration of topics that arose, but to also provided responses to a baseline of comparable questions. A list of potential questions can be found in Appendix A. In my role as researcher, I am not tasked with making judgments about the participants' statements, only to clarify their intent for later analysis. Each interviewee was given a consent form (see Appendix B) before agreeing to interviews. Protecting human subjects is of the utmost importance. All names were altered in order to protect their identities. Likewise, interviews were electronically recorded to ensure accuracy and provide an opportunity to review responses during data analysis. In addition, I took notes during the interviews, focus groups and meetings orchestrated by the participants, and after conversations with the participants. The digital recordings were stored on my password-protected home computer and not made available. Transcriptions also altered the names of any party – individual or organization – in order to further ensure anonymity. Demographic details of the schools were not changed as they play an important role in understanding the culture.

The initial research question was answered by employing Creswell's (2009) four criteria for qualitative research: observation; interview; documents; as well as audio and visual material. Yin (2003) includes participant-observation and subdivides audio-visual material into archival records and physical artifacts. These additional data points will supplement Creswell's four criteria in my research.

Table 3: Research Questions and Related Data Sources

Research Questions	Primary Data Sources	Secondary Data Sources
What impact does this innovative PD model focused on place-based education and sustainability have on school personnel's ability to integrate school facilities (in particular the built environment) with their school culture?	Focus group interviews (before and after the PD)	Individual interviews after final official meeting
How do sustainability coordinators, as participatory researchers, shape professional development and envision teaching with a focus on the school's facilities in a frame of place-based education?	Focus group interviews (before and after the PD)	Observations in meetings organized by participants
How do participants' sense of ownership evolve over time through their participation in this process?	Observations in meetings organized by participants; Questionnaire prior to workshop	Individual interviews after final official meeting
What evidence is there of their ownership/leadership within the workshop and how does it manifest itself?	Observations in meetings organized by participants	Focus group interviews (before and after the PD)

Furthermore, focus groups were integral to collecting multiple perspectives. Agar and McDonald (1995) and Delgado Bernal (1998) suggest that focus groups can serve as

an additional, or complimentary, source of data. At the same time, Agar and McDonald (1995) warn against the domination of one or two individuals using focus groups. By recording these sessions and transcribing them at a later date, I was able to determine that both participants took part in fairly equal measure. In essence, the recordings helped demonstrate, and guard against the possibility of either party dominating the discussion. Focus group interviews (see Appendix C) served as a quasi-pre- and post-assessment of the participants' attitudes.

Originally, the study intended to provide PD for science educators. However, as recruiting took place, the network of interested individuals were connected by their role in sustainability. Given the interdisciplinary nature of sustainability – and place-based education – those interested in teaching about sustainability and placed-based education come from a variety of disciplines. Therefore, the science educator focus shifted to individuals working at K-12 schools within the realm of sustainability. For example, Matt Anderson's predecessor as sustainability coordinator at Braeburn taught in the English department then obtained a Master's degree in Educating for Sustainability (EfS). Chip Prentiss started his teaching career in social studies, demonstrating that sustainability coordinators can enter the field from a range of disciplines. Perhaps the ultimate example in terms of green schools comes from Rachel Gutter, head of the Center for Green Schools, which serves as USGBC's green schools initiative. Gutter, arguably the national spokesperson for green schools, majored in English (Ebner & Gutter, 2011). While environmental sustainability lends itself to the environmental sciences, sustainability writ large consists of two other prongs, economics and social equity. The artificial divisions in academic disciplines (Language Arts, Science, Math, and Social Studies) often inhibit

sustainability across the curriculum, instead of allowing for sustainability to bridge the gap in a transdisciplinary approach to teaching and learning.

Data Analysis

Qualitative research depends on a plethora of sources in order to answer the research question (Creswell, 2007). Comments from interviews, focus groups, and informal conversations were compared to the participants' applications (Appendix F) to evaluate whether a change in thinking occurred. Evidence of the change include comments during the focus groups, emails, or phone conversations; general reflection (metacognitive or otherwise); debriefing at the end of a day of the workshop; via questions asked and responses given throughout the course of the workshop; or other informal means.

The analysis of the collected data required organization and preparation of field notes. As such, I typed hand written notes from interviews, observations, and artifacts – including documents and audiovisual materials. In addition, I replayed all recorded interviews, and made secondary notes. The typed notes were then sorted and arranged "into different types depending on the sources of information" (Creswell, 2009, p. 191).

The data collected and analyzed from the study served as the foundation for my dissertation. I wrote up my field notes, transcribed recordings, and coded the data. Once all the data was organized, collated, and arranged, I read through the transcriptions, highlighting phrases and terms that appeared numerous times, which led to the creation of a list of recurrent themes. Coding helped me to identify common themes vis-à-vis barriers to implementation, ways in which buildings are incorporated into the curriculum, and unforeseen connections.

Verification and Member Checking

As with any study, the validity of the results is essential. Given the narrow focus of this study (i.e. a small professional development workshop focusing on sustainability in education), the aim is to understand the phenomenon and open doors for future study in the discipline.

In order to validate the findings, I incorporated Creswell's (2009) strategies (see Table 4 for examples).

Table 4: Strategies for Validating Findings

Strategy	Explanation
Triangulate different data sources of information	This allowed for corroboration and verification of potentially conflicting information. Furthermore, the differing data sources helped create a unified data set
Member checking	Facts, figures, and quotations were shown to the project participants to verify validity
Clarifying researcher bias	I provided full disclosure in an attempt to clarify any potential bias on the researcher's behalf
Present negative or discrepant information that runs counter to the themes	When discrepancies arose, which they were bound to do, I provided all the pertinent information, dutifully working to avoid selectively choosing data that merely supported a convenient argument

Table adapted from Creswell (2009)

The themes that emerged from the data analysis are depicted below as headers. Excerpts from the transcriptions provide evidence for the theme and lend insight into how I arrived at the themes. The interpretations of data, combined with the literature from the field, served as the basis for the thematic development. Each of the themes proffered in this analysis emerged from the data collected (Table 5). Chip and Matt variously, and

alternately, over the course of the workshop and subsequent conversations touched on the following ideas in one form or another.

Table 5: Themes and Their Meanings

Theme	Explanation	Source (of theme)
Institutionalization and Creating a Culture of Sustainability	Overarching theme, which includes student involvement/engagement and institutionalization; goal of both participants; also connected to barriers Imbuing sustainability in a school, including curriculum, grounds, and buy-in from faculty, staff, administration, and students	Barlett and Chase (2004)
Student Involvement/Engagement	Working with students to take ownership of sustainability related functions (from extracurricular clubs to organizing school wide events)	
Building as Teaching Tools	Using the grounds, buildings, and local neighborhood to teach concepts; this was fundamental to the intent of the workshop's design, but became less of a focal point as the participants molded the experience to their needs	Li et al. (2006)
Curricular and Instructional Barriers	Participants, along with researcher and previous research, identified a series of barriers to the implementation of EfS and related sustainability measures	Sosu et al. (2008); Ernst (2007); Barrett (2007)
Hidden Curriculum	In contrast to the overt curriculum – lesson plans, textbooks, and codified instruction – the hidden curriculum entails examples set by the school's actions, the structure of schooling, and the school grounds themselves	Orr (2002)
Collaboration (and the Clearing House)	The need to work with other schools, and outside organizations, ranked highly among participants and members of ancillary group who met with participants	

Development of Themes

Schensul, LeCompte, and Schensul (1999) point out "It is *never* possible to capture everything in our fieldnotes and records" (p. 12). With this in mind, my aim to reveal common themes from the transcribed interviews, focus groups, and artifacts inherently will miss points. However, this approach will capture other insights from my participant-researcher perspective. As a qualitative researcher aware of my role of "researcher as key instrument" (Creswell, 2009, p. 175), I employ an interpretive lens in analyzing the data. Miles and Huberman (1994) put forth interpretivism as one of their three approaches to data analysis. This approach befits my phenomenological perspective. As Gummesson (2003) exclaims, "All research is interpretive!" (p. 482). To further elucidate his point, Gummesson (2003) provides the following analogy,

> No ready-to-consume research results pop out like a soda can from a vending machine once we have inserted sufficient money and pushed the right button. There is interpretation all along, from the very start of a research project until the very end (p. 482).

Given this iterative process, I engaged the data with a goal of understanding the process and expectations of my participants, knowing full well that my interpretations will evolve and potentially conflict with one another until I reach some level of internal consensus.

I derived each of the six themes in Table 5 from this interpretivist analysis (Erickson, 1986) of the focus group, individual interviews, questionnaires, and observation over the course of the workshop. Using these artifacts, I set my unit of analysis as the individual. For example, I transcribed all the interviews from each participant manually, which served as a sort of first, rough pass through the data. By listening to each recording, and transcribing the data without use of a modulating pedal to slow the speech, I had to return to each segment multiple times. As an example of the

time it took to transcribe, I spent roughly 1 hour to type 10-15 minutes of conversation. During this deliberate process, I started to formulate a sense of the participants' unique – and shared – challenges. Miles and Huberman (1994) warn against completing this task all at once. It would have overwhelmed me to try and spend one continuous stretch with the material. My efforts were spread over several months in the winter of 2012-13. As a benefit, this ongoing process allowed me to take a fresh perspective, often hearing the participants' words for the first time in weeks. Additionally, the rough pass through the data reacquainted me with the participants' thoughts and positions. In reality, transcription served as a second pass through the data, having been present at the initial data collecting phase. This process aligns with grounded theory in that the participants' words and ideas form the basis of the understanding about their background. By searching for commonality – and dissension – among their responses, the explanatory model of their experiences comes to the fore.

Many of the themes were influenced by the literature and issues addressed therein (see Table 5). I used these themes to guide data interpretation, with the understanding that my own experiences as a sustainability educator, graduate student and founder of an organization dedicated to sustainability also shaped these findings. The following excerpts from the data help to describe this process in greater detail.

Institutionalization and Creating a Culture of Sustainability

The idea of "institutionalizing" sustainability evolved from the thematic example set forth in Barlett and Chase (2004). Throughout the chapters in their edited volume of sustainability in higher education, this notion repeatedly arose, sparking my interest in institutionalization and leading me to investigate it further at Braeburn and Valley Vista. I

aimed to take this idea one step further by looking at how well, or poorly, Matt and Chip felt the culture of sustainability developed, and its status in their schools. The following selection comes from an individual interview with Matt Anderson on October 26, 2012 after attending a morning of presentations about green schools:

31 Interviewer: Um, what are the barriers remaining now that you do have that new
32 building? What barriers are still there in trying to create the culture of sustainable
33 thinking?
34
35 MA: I think a lot of it is that we have, uh, like 50 staff members, that not everybody
36 has that same goal, I mean it's like a lot of them are just looking to get through the
37 year, not necessarily how do I change my, change any of my practices to fit into
38 sustainability. So it's like within the 6, ah, within the 6 science faculty, then we have it,
39 but probably have 20 to 30% real buy-in in the regular teaching staff, and then we
40 have, uh, 10% that really don't want to be bothered by it, so (laughs).

The question clearly centers on the connected concerns of barriers and creating a culture of sustainability. In this example (lines 36-37), Matt's comment that a lot of [the staff] are not looking to change their practices reflects the difficulty with cultural shifts at his school. This interpretation is further supported by Matt's comment (line 40) about staff not "want[ing] to be bothered by [sustainability practices]."

Student Involvement/Engagement

From the first meeting, a two-day intensive experience that kicked off this workshop, Matt and Chip expressed concern over the student involvement in sustainability as a part of the school's process. In the following interaction, transcribed from the focus group style interview on August 7, 2012 after the first day completed, Matt and Chip discuss the challenges of engaging students:

5 MA: ... cuz that's my problem . . .cuz I . . . I mean, um, we have a green club and the
6 green club meets over lunch and just finding enough time to do anything was the hard
7 part . . . trying to . . . cuz we only have a 40 minute period every other week and . . .
8

CP: . . . right

MA: . . . and trying to organize kids is like herding cats, trying to get them there . . . I ... I keep looking for a new idea of how to, how to organize the club and I'm just trying to figure out . . .

CP: Well, I . . . I. . . this year I . . . I think a major focus will be . . . I did most of the organizing of the Earth week events and I ... I think that's something I think would be great for the students to do. And to do a hunger banquet that I mentioned earlier and there are so many other things that we could do that I think would be student led, um, during that week which I think could be . . . take, uh, few months to organize and get speakers lined up and get the, the community trash pick-up organized and maps made and there's plenty to do with that. (MA interjects) So I think specific projects . . .

MA: . . . cuz that's the thing. There's plenty to do. I'm trying to get . . . I'm having a hard time finding time **to** do them. (speaker's emphasis).

CP: Right

MA: Like all those projects with . . .

CP: If you're trying to do them just during that time period.

MA: Yeah.

CP: That 45 minutes or whatever you have. That's difficult. But if you can have, if you can have subcommittees if you will, for lack of a better word . . . in working on these things, and . . . and . . . the purpose of these meetings is to come together and say how are the subcommittees . . .

MA: Report back

CP: . . . doing. The reports, instead of trying to get things done during that meeting, it's really kind of a touching base. And my role is to coordinate those groups, make sure they're, they're following through and getting things going.

MA: Yeah, that's . . . that's . . . that's . . . always been . . . I mean cuz that's just trying to find the time, I need, I need to figure out a better way cuz right now it's not working for the kid based stuff . . . it's, I mean a lot of it is kids helping me with things that, that, I need to get . . . that we need to get done, but trying to get them to take more ownership, that's where the difficulties come in right now . . .for me.

The conversational nature of their discussion also hints at their joint desire to collaborate on the myriad issues, not just student involvement and engagement. Matt

shares his frustration (line 11) in trying to get his middle school charges together, likening his work as the green club's faculty mentor to "herding cats." He notes (lines 23-24), "There's plenty to do" yet "finding time" in the highly structured day presents a challenge to getting his students to work on the club's initiatives, further thwarting his efforts to engage students. Chip faced a similar challenge with his high school students. He discusses (line 15-18) the desire to move the onus onto the students and have them take responsibility for organizing activities.

> "I did most of the organizing of the Earth week events and I ... I think that's something I think would be great for the students to do… there are so many other things that we could do that I think would be student led."

Building as Teaching Tools

After the green schools presentations that Matt, Chip, and I attended on October 26, 2012, I posed a set of related, albeit differentiated questions to Chip and Matt, due to the fact that Matt's school had a LEED certified building that essentially necessitated teaching about it to maintain its certification. Their responses, shown below hint at the role of buildings in the hidden curriculum, as opposed to the overt, school sanctioned educational plan:

17 Interviewer: What do you see as the role of the school facilities, the building,
18 especially now that you have (MA: mmhmm) your LEED certified, in the culture of
19 the school? And kind of, trying to bring about the idea of sustainability? How's that,
20 how's the built environment fit in?
21
22 MA: Well, I think a lot of it's the kids, the kids see that they're, that school has kind
23 of made that investment, and put that, put that in practice. And then also that we want
24 to u—, that it's not just a building, it's a tool for us to actually teach about water and
25 electricity and various, uh, consumer products and things like that, so, compost, so it's
26 uh, I think that the kids see that we see that/it as important so they start saying,
27 "maybe I should start paying attention to this"

128 Interviewer: It kind of leads to one of the questions I was curious about. What do you
129 see as the role of the school facilities in your, in the culture of creating that kind of
130 environment. So, what, what role do you see the built environment, if any, playing in
131 trying to foster that community and that culture, and it could include what you've
132 talked about in terms of the zero waste, so not just the, just the physical plant, but
133 also what you've already done at the school.
134
135 CP: Well, one thing, I'm, I'm really working on and designing a curricular piece for
136 the eco-club, which is a, a class, an elective class at Shining Mountain, is I'm going
137 to have the students, is when they focus on their individual environmental impact,
138 their carbon footprint if you will. And I'm going to have them help me to calculate
139 the school's, the high school's, um, carbon footprint and environmental impact and I
140 think that's a, that's a great way to raise awareness about, huh, okay, you look at
141 building energy, you look at water and waste stream and can you calculate that, can
142 you come up with an, an index, is another way that I want to do it, I want to establish
143 different indexes that we can then compare a Shining Mountain, a school of 317, a
144 high school of 80+ with University High, [the] high school of 2,000 because you can
145 do it per student, you could do energy per student and that kind of thing, so I think
146 engaging them with numbers about their particular environment that they live and
147 just raise awareness about, huh, um, what's going on in this particular building.

In both of these excerpts, Chip and Matt discuss the influence of the local environment. Based on my interpretation, Matt is more concrete in that he focuses on (lines 24-25) the "water and electricity and various … consumer products," which befits his middle school audience. This represents a developmentally appropriate approach for children. It is possible that middle school students see the physical structure and the "school's investment," while Chip's high school pupils experience a more abstract interpretation of the facilities as teaching tools. His perspective (lines 145-146) of "engaging them with numbers about their particular environment that they live and … rais[ing] awareness" appropriately addresses the issue for high school-aged students. The use of the surroundings, a place-based approach, signifies the modality through which buildings as teaching tools can enter a sustainability curriculum.

Curricular and Instructional Barriers

During this group interview (August 7, 2012), when Matt was asked what barriers he perceived to "The use of facilities, specifically ... into the daily instruction or, you know, swapping out parts of a unit?" he stated that he did not see (overt) barriers to bringing sustainability into the school. However, Chip countered with his experience at Valley Vista. Valley Vista follows a prescribed educational approach, not unlike an authentic Montessori experience might unfold for its students. Here are Chip's thoughts in light of his school's somewhat rigid philosophy on sustainability education:

517 CP: I actually, I see huge barriers at Valley Vista, because of the curricular issues,
518 but I'm wondering whether, uh, it has to be one more thing that the teachers add into
519 their curriculum. Maybe it's something where "Hey, if you do it well enough . . . do
520 it like the Alliance Center with the signage and the signals maybe it's possible to do
521 it without, uh, and you take baby steps with the science teachers and with the math
522 teachers, or whatever. Uh, I don't know.
523
524 Interviewer: Is the curriculum prescribed in the sense of, not pacing guides, but . . .
525 content . . . this has to be covered, or just what general concepts at which ages? . . .
526 the development piece. Is it very prescribed?
527
528 CP: The classroom teachers have a lot of leeway in how they take the core
529 curriculum and make it there own, and present it. I just, I, this type of thing would
530 not be comfortable for a lot of teachers period, let alone Valley Vista teachers, to try
531 to integrate on top of all the other things that they're trying to do. So I just see that as
532 the major deal. At the high school level? Yes, but I think below that would be very
533 difficult.

Chip and Matt work at independent schools, which ostensibly have greater autonomy in their curricular decision-making. However, (lines 517-519) Chip points out that Valley Vista has "curricular issues" that stand in the way and present "one more thing that the teachers add into their curriculum," which already contains a prescribed set of concepts and activities. He points out (line 529-530) "this type of thing would not be comfortable for a lot of teachers period," echoing Sosu et al.'s (2008) findings that

teacher competency in the realm of environmental, or this case sustainability, education serves as a barrier to the implementation of these concepts and themes within the educational structure of the school.

Hidden Curriculum

Orr (2002) discusses the hidden curriculum's influence over the learning process. In the following response on his workshop questionnaire, Chip reflects on the hidden curriculum:

1 Question: What do you see as the barriers to integrating school facilities into the
2 curriculum?
3
4 Response: It's hard to make the "hidden curriculum" explicit rather than implicit—to
5 raise awareness and change habits is a difficult task.
6
7 Training teachers to see their built environment as part of the curriculum is not "natural"
8 because it can't be caught in a textbook.
9
10 Anything that is "place-based" as much as this curriculum is would be difficult to
11 teach to teachers on a large scale.
12
13 Most likely one would have to encourage this type of thinking in schools of education-
14 -places that are famously conservative in their thinking.

Chip acknowledges (lines 4-5) that "mak[ing] the 'hidden curriculum' explicit … is a difficult task." He points out (lines 7-8) "Training teachers to see their built environment as part of the curriculum is not 'natural' because it can't be caught in a textbook." Since buildings and facilities exist outside of the codified curriculum, making them explicit presents a challenge to educators. Additionally, he touches on the issue of textbooks as limiting the curricular scope, acting as a barrier in its on right to sustainability education.

Collaboration (and the Clearing House)

At the first of two meetings (September 21, 2012) hosted by the participants at their respective schools, Chip and Matt voiced a similar interest in collaboration, making it a hallmark of the meeting's agenda and our steps forward after the meeting.

1 Interviewer: I just wanted to get your guys' sense of what your goals are for the
2 meeting today, what you're hoping to get out of it, before other people come in
3
4 CP: Glad you asked.
5
6 MA: —'cuz, we just wrote up there just kind of looking for collaboration opportunities,
7 looking for next steps, being able to meet more often, uh, just trying to see, sitting
8 down, and what are other people's goals.
9
10 CP: I think the sense in general is that, that we have worked as individuals if you will,
11 schools, and they've done some great things as individuals, but we think that there's
12 power to be had in collaboration and getting together and really seeing what is a, a
13 model that we could use and use consistently. We've tried a couple things in the past
14 that, that have not been able to be sustainable, so how do we move beyond.

Finding common interests and goals to push their shared visions forward, and working with other like-minded individuals to shepherd a sustainable future ranked high among the interests – and goals – of Chip and Matt. In the goals they set for the meeting (lines 6-8), Matt discussed an interest in "looking for collaboration opportunities," "next steps," and seeing "other people's goals." Speaking with one voice, using "we," Chip stated (lines 11-12) "we think that there's power to be had in collaboration and getting together."

CHAPTER IV

FINDINGS

The emergence of major themes, as described previously in qualitative data analysis (see Table 5), is elaborated upon in this chapter to give voice to participants' experiences in this study. Specifically, this chapter further explores the meanings within the comments, interviews, and observations of Chip and Matt in an attempt to make sense of their work. The following is an integration of primary findings in this study (major themes) and a discussion of the opportunities/challenges in effective PD where school campuses become teaching tools.

Institutionalizing a Culture of Sustainability

Student engagement may be considered a subset of a larger issue at Braeburn Day School (BDS) and Valley Vista School (VVS). Both sustainability coordinators attempted to inculcate a culture of sustainability at their schools. However, Matt acknowledged that it's an uphill battle. When asked why he chose to take part in the workshop, he said "everything that I do, it's frustrating. There's just not enough buy-in. There's enough buy-in with the idea . . . that sustainability is a good thing, there's just not enough buy-in to get the work done" (focus group, August 7, 2012). To bolster this assertion, Matt mentioned an episode that occurred prior to hosting the first meeting. Before the meeting he hosted on September 21, 2012, Braeburn's annual Family and Friends Day – an important event to raise the school's profile and invariably gifts to bolster the school's endowment – each guest received a single use plastic water bottle. He tacitly acknowledged the inability to breakthrough to this deeper level of the school's culture. In addition, Matt intimated that the expectation was for everyone to have their

own water bottle, as opposed to a more sustainable option like reusable cups, bringing water bottles from home, compostable containers, or using the drinking fountain – a time honored tradition in grade schools. In a similar experience, Chip recounted efforts to engage students in a contemplative exercise wherein they reflected upon Henry David Thoreau's *Walden* at a nearby body of water. Despite the pond's proximity to the school, less than a quarter mile by Chip's estimation, students drove to the site, demonstrating not only the hegemony of consumption, but of the automobile (Wilson, 2011a). Despite Matt's and Chip's efforts, sustainability remains a fringe element at their schools, in part due to the fact that it inhabits a realm outside of the daily knowledge and experience. Because it resides beyond the everyday, institutionalizing sustainability not only continually presents a challenge, in some respects it represents an unattainable goal at this juncture.

This disconnect between supporting the idea in theory but not in practice, presents a major challenge in moving from talk about sustainability to action vis-à-vis sustainability in education. Matt needed to find ways to get "buy-in," that is, to motivate students, faculty, and staff, in order to develop some shared understanding and appreciation of sustainability. He posed the following question, "how do you develop a community feel for sustainability?" (field notes, September 21. 2012). In an attempt to accomplish this, one of the future agenda items Chip brought up at the first meeting (see Appendix G for agenda) was "having the conversation, how to facilitate, [and] how to develop the community of practitioners" (field notes, September 21, 2012) when creating a school culture open to sustainability. The initial meeting hosted by Matt at BDS demonstrates an important step in having Matt's input shape the direction of this PD

experience. It may play an important role in helping to generate a discourse at schools that has not been present. Talking about sustainability in a non-threatening manner can also alleviate concerns about additional workload, unfamiliarity with content related to the topic, or perception that sustainability has no connection to one's disciplinary focus. Stephens, Hernandez, Román, Graham, & Scholz (2008) point out that "there are challenges associated with limited cross-disciplinary and inter-departmental communication that could foster and enhance collaborations to address the integrated and complex challenges of sustainability" (p. 330). Silos in education often prevent these conversations from transpiring in the first place. Those who exhibit a commitment to sustainability need to engage others and help guide them toward sustainability. Barriers to change abound. Equipping sustainability minded folks with the vocabulary, values and skills to navigate the dialogue can prove fruitful. Kurland (2014) discusses how a small liberal arts college moved toward a more fully integrated and functional conception of sustainability through committee work in which students, faculty, and administration worked cooperatively, learning from one another. Kurland (2014) found that "a willingness to engage in an ongoing process of shared understanding" (p. 63) represents a key component in framing the discussion of sustainability in educational settings.

Not everyone views sustainability as pertinent to his or her livelihood. C. Howett made the point that her university's position as a healthcare leader – which includes a medical school, nursing school, and school of public health – provided a common set of goals that everyone could support, namely sustainability as a health concern (personal communication, November 5, 2012). Given sustainability's varied definitions (Williams & Millington, 2004), schools looking to implement EfS need to find common ground, a

purpose that unites stakeholders in a shared vision. What works for one school, as alluded to in Howett's comment, may not suffice at another. Having the conversation, finding the common goals and interests, and coalescing around a shared vision remains essential to fostering sustainability in education. Due to its malleability – and pervasiveness – sustainability can act as a unifying principle, the trick being identifying how it relates to a particular school's mission, goals, and purpose. Invariably, the core tenets of sustainability as laid out in the Brundtland Report (World Commission on Environment and Development, 1987) – namely preserving resources for future generations – can serve as a thread tying together academic disciplines,

When students, faculty, staff, and community members identify sustainability with tangible facets of their lives, it becomes an actionable goal. The Cloud Institute for Sustainability Education (n.d.) suggests EfS aims to restore "the health of the living systems upon which our lives depend" (para. 1). This represents on overarching goal of EfS, regardless of the methodology or locally rooted conception of sustainability. While improved student performance, healthier communities, increased access to services and employment may speak to specific stakeholders, finding the commonality may provide inroads to engage an entire school in sustainability initiatives.

Institutionalization

On a few occasions throughout the workshop, the notion of institutionalizing sustainability arose. One of Chip's goals was to work on institutionalizing sustainability at his school. However, his position as sustainability coordinator was a limited, two-year position funded by a family donation to VVS, specifically for the purpose of sustainability. Due to this finite window, Chip exhibited a much greater sense of urgency

than Matt at times. The workshop began in the summer between the first and second year in his position and he wanted to ensure that the sustainability components he enacted would remain in place at VVS. This highlights the challenges of sustaining sustainability efforts – short term incentives (like Chip's situation) are not ideal whereas long term, *institutionalized* opportunities (like Matt's position at BDS) can have greater potential to affect change. Having a voice on the faculty/staff at a school officially tasked with coordinating sustainability measures reflects a school's commitment, but also creates an institutionalized position codified by the administration and recognized throughout the community. However, lack of administrative support may hamper the individual's effectiveness. Institutional support – in the form of a committee with representatives from the student body, clerical and custodial staff, faculty, and administration – or informal networks of committed individuals can ensure that the sustainability coordinator represents more than an empty promise, and achieve long term commitments to sustainable initiatives.

Chip hosted the second meeting of the ad hoc sustainability group on January 25, 2013 at VVS. In addition to Chip, VVS's head of grounds and a teacher from the high school attended the meeting. VVS, a relatively old school (30 years), situated on 11.8 acres in the town of Valley Vista, benefited from the head of grounds who worked to further sustainability initiatives . For example, he maintained several green spaces on campus and continually looked to improve the school's energy efficiency during his 25-year tenure there. Having an integral member of the school's administration/staff plays an important role in VVS's attempt to make sustainability more than a superficial endeavor. With Chip's imminent departure, a real need existed for numerous members of the

community – in a variety of roles – to take ownership of sustainability related actions, ranging from curriculum to operations. The literature suggests that institutionalizing sustainability has presented challenges at various other educational institutions, particularly higher education (Uhl, 2004; Jahiel & Harper, 2004). Documentation of sustainability initiatives in primary and secondary schools remains the realm of collections of stories about sustainability initiatives and green programs (Chapman, 2012; Stone & The Center for Ecoliteracy, 2009), with scant research in academia vis-à-vis institutionalizing sustainability practices in K-12.

Perhaps due to his upcoming departure, institutionalizing sustainability served as a major goal of Chip's work at Valley Vista. Given the nature of his job funding, title, and duration, and the fact that he did not have a full-time position lined up with the school after the funding expired – Chip's work aimed to set a framework for sustainability in the daily functioning of VVS.

Overburdened, Balancing Roles

Matt, with his primary role as a classroom teacher, did not display the urgency that Chip expressed. His responsibilities as a classroom teacher dominated his time. Matt stated that the position of sustainability coordinator accounted for roughly 20 percent of his contractual obligations, though in reality he estimated that it probably more closely approximated 10 percent (field notes, August 8, 2012). Additional duties at BDS split Matt's time and focus between various pursuits, namely teaching, advising, coaching, and sustainability. From independent schools to public ones, teachers have responsibilities ranging far beyond daily instruction. During my time in the classroom, I constantly dealt with initiatives from the administration, including but not limited to technology infused

lessons, student centered classroom designs, and formative assessment practices. All of these were on top of gender-responsive, inquiry based curriculum, and the sustainability lens I wished to add to the lessons, As described to me when I began teaching at an independent "country day school," the model for teachers includes advising and coaching, not to mention serving on any number of committees. All of these demands on my time were exclusive of the No Child Left Behind and Adequate Yearly Progress measures public school teachers deal with constantly, as manifested by high-stakes testing. Furthermore, in Colorado, Senate Bill 10-191 (Colorado Department of Education, 2010) evaluates teachers in part based on student performance on these test.

Having inherited the position, as opposed to creating it like Chip, there may have been a slightly lower level of urgency in Matt's work. Matt had limited opportunities to pursue an agenda of his own creation. While he received support from BDS, there appeared little room for him to expand the role. In part this resulted from the aforementioned commitments, but the lack of strong administrative push undoubtedly manifest itself in a reduced role for Matt, regardless of his passion for the position or desire to implement greater sustainability measures. He demonstrated his passion for his work, but BDS demanded Matt's time in a way that precluded him from fully engaging in his role as sustainability coordinator. Matt's predecessor created the position for herself, though she also maintained a dual role of teacher and sustainability coordinator at BDS. Braeburn's previous sustainability coordinator secured a 75/25 split (L. Gleason, personal communication, April 27, 2012) prior to the head of her division leaving to take a role elsewhere. When Matt took over, the individual who granted the quarter time position no longer worked at the school.

While Matt served in a quasi-administrative position, he acted in more of an advisory role to the administration. Matt's role as a liaison to the administration did not afford him the same level of access that Chip appeared to have (even though Chip was ultimately unable to get the administration to move completely in the direction that he pushed). The limited access to power structures and decision-making hindered both Chip and Matt's ability to ingrain sustainability throughout the school. Resistance from faculty and staff that failed to acknowledge the need for EfS arose in conversation. Chip cited the response he received from teachers where they viewed sustainability as "one more thing that the teachers add into their curriculum" (focus group, August 7, 2012).

Engendering a Cultural Shift: Voicing Frustration and Perceived Failure

Throughout the professional development experience, Chip and Matt relayed a sense of failure when it came to institutionalizing sustainability. Challenges in altering their respective school cultures presented a constant struggle. While content crept into the curriculum, the behavioral and paradigmatic shift envisioned failed to take hold. Confronting the hegemony of consumption and its antecedents thwarted both sustainability coordinators as they moved forward with their attempts to reconcile what they were integrating into the curriculum with the lack of sustainability's assimilation into the school culture. Chip and Matt perceive that their communities (students, fellow faculty and staff, parents, administrators) do not adhere to ideals of sustainability and voiced frustration over the lack of culture building around sustainability.

Senge's (1990) discussion of vision and purpose may shed some light on Chip and Matt's perceived struggles to imbue sustainability throughout their respective schools. He argues, "vision is a specific destination, a picture of a desired future" and purpose is "a

direction, a general heading" (p. 148-9). The former represents the concrete, while the latter signifies the abstract. Whether Chip and Matt felt stuck in the vision phase, only picturing an end state for their respective schools or in regards to a "purpose," both shared their frustrations at what they believed to be an inability to transition their schools from wasteful to sustainable. In the end, their own perception of what they accomplished may not have lined up with reality. In order to more accurately determine this a discussion ensued where Chip and Matt would assess their schools on various sustainability indicators. While these were not developed over the course of the workshop, Chip's questionnaire (Appendix H) serves as a pre-assessment of sorts. However, without a follow-up, the data needed for Chip (or Matt) to verify their perception that they had not accomplished their goals, becomes difficult. Furthermore, codifying goals could galvanize supportive elements within the school to rally around the tenets of sustainability as laid out by Matt and Chip in a formal document.

Hidden Curriculum

In order to achieve systemic change, Chip discussed the need to bring to light the hidden curriculum. The hidden curriculum in this study refers to implicit messages sent by the school – including personnel and the buildings. In particular, it relates to the unintended lessons students learn from the actions of school personnel. A lack of overt, visible commitment to sustainability represents a discordance that exemplifies the hidden curriculum. In his pre-workshop questionnaire, Chip pointed out, "It's hard to make the 'hidden curriculum' explicit rather than implicit--to raise awareness and change habits is a difficult task" (August 7, 2012). Orr (2002) also touches on the hidden curriculum as it

pertains to buildings and landscapes. By unmasking the heretofore unseen, schools can start to address these changes. Chip states,

> as we talked, there's congruence between the overt curriculum, the science curriculum . . . the every curriculum, the every, and the hidden curriculum . . . and they all make sense, that it is fully in coordination, there's nothing where you go '*huh, they're teaching about it, but then they're doing this'*...that's the conversation I'm really interested [in] (joint interview, September 21, 2012, italics added).

Furthermore, Chip's comment above delves into the need for schools to model sustainable behavior and attitudes. Higgs and McMillian (2006) describe how students see through the platitudinous overtones educators pay to sustainability in schools that fail to walk the proverbial talk. For example, schools may integrate sustainability into the curriculum, but the "concepts being taught sometimes conflict with unsustainable behaviors that the schools model to their students" (Higgs & McMillian, 2006, p.40), creating a disconnect between the school's actions and their teachings. Higgs and McMillian (2006) point out that this "Inconsistency between teachings and practice has confused students (Berryman & Breighner, 1994) and decreased both the likelihood of emulation (Bandura, 1986) and educational effectiveness (Pintrich & Schunk, 2002)" (p. 40).

Determining the role that school facilities play is important in setting the precedent. Matt echoes this sentiment when talking about Braeburn's LEED-certified building, "I think a lot of it's the kids, the kids see that they're, that school has kind of made that investment, and put that, put that in practice" (interview, October 26, 2012). The school's newest building houses the dining facility and uses abundant natural light, as well as systems that students may not readily see – such as an organic waste disposal that consolidates a majority of the compostable waste, thereby reducing the amount of

solid waste generated in the building. Matt estimated that the reduction in waste surpassed 90% (reducing the daily waste from15 trash cans to a handful each week). In this case, the school's actions speak loudly and ring true. As Higgs and McMillian (2006) point out,

> It appears that modeling allows schools to foster learning about sustainability and the adoption of sustainable behaviors without the need to preach or proselytize . . . If students learn through direct and continual observation that the people and institutions they respect engage in sustainable practices, rather than simply being told of their value, they may be more likely to adopt such behaviors (p. 50).

A hidden curriculum also raises the question of prescribed education and its benefits. Short (2010) suggests "environmental education means educating 'for' the environment—with strategies that promote critical thinking over knowledge transmission, investigation over indoctrination, and collaborative, local, science-based solutions over advocacy- driven measures" (p. 8). With sustainability education that minimizes a 'hidden agenda', students are not responding to a lesson from the textbook but rather, to real world cues and issues of importance to them. This achieves the goal of student-centered classrooms, an integral component of how people learn (Bransford et al., 2000). Flanagan, Syvertsen, and Wray-Lake (2007) identify preservation of shared environmental resources as a one of five resonant themes motivating youth activist projects. Given that sustainability is a forward facing concept, teens arguably have a more vested interest in sustainability than older populations, despite what appears to be a waning concern for environmental issues amongst teens over the past three decades (Wray-Lake, Flanagan, & Osgood, 2009). Student centered classrooms can put the onus – and ownership – on students to find connections between sustainability and the curriculum.

For independent schools like BDS, they do not participate in high-stakes testing tied to funding or external pressures in terms of curriculum. This provides the latitude to cover sustainability related material without fear of students losing time in order to prepare for a standardized test that fails to acknowledge their place. This integration represents hands-on learning that employs tangible assets that students can see, touch, and feel, not just read about in a textbook.

After Chip's two-year position ended, VVS discussed embedding sustainability in the curriculum, moving it from the hidden to the enacted. However, in Chip's estimation, the administration's consideration of hiring a sustainability teacher does not reflect true integration (interview, September 26, 2013). He views the addition of a sustainability instructor position as a tokenistic nod to sustainability, not an attempt to weave it into the daily core curricular experience. This tacit acknowledgment that sustainability maintains some level of import, yet it does not reside within the overt curriculum, reflects VVS's half-measures in terms of EfS.

Student Involvement/Engagement

Both Chip and Matt realize the need to engage and involve students in the process of embedding sustainability at their respective schools. The power of students to be the agents of change was driven home at the green schools conference. After attending the conference, Matt reflected, "a lot of the sessions are talking about [how] the kids are the ones that are good police and call the teachers out on things" (interview, October 26, 2012). Reinforcing the idea of students as leaders was an important realization. Both Chip and Matt struggled moving the onus of sustainability onto the students when overseeing student groups, especially in the preparation of school events and school wide

announcements. Chip's green club, a collection of high school students at VVS, spearheaded the Earth week festivities at his school the previous year. However, Chip saw the need to move that responsibility to the students. "I did most of the organizing of the Earth week events [last year] and I . . . I think that's something I think would be great for the students to do" (focus group, August 7, 2012). He continued to explain that while the students were focused, "a lot of it is kids helping me with things that, that, I need to get . . . that we need to get done, . . . trying to get them to take more ownership, that's where the difficulties come in right now" (focus group, August 7, 2012). One avenue to complete this transition in Chip's mind, was to set better expectations.

> I need to do a better job of having a specific club mandate, for example, I mean this is what the club is about, this is when it meets, this is how decisions are made, this . . . this is who we report to. That, I think, that's very helpful to have that laid out." (focus group, August 7, 2012).

While Chip and Matt ran into some obstacles, they were not dealing with the same populations. Chip worked with high school students (ages 13-19), while Matt's included seventh and eighth graders (ages 11-14). BDS and VVS students come from fairly affluent, predominantly white families. Valley View families may seek out the pedagogical foundation of the school, but it is still seen as a stepping-stone to college. Braeburn Day School tends to attract high achieving students interested in their secondary education preparatory programs. Given the latter factor, it comes as a bit of a surprise that self-serving (or self-starters) students pass up the opportunity to lead their schools' green clubs in an effort to pad their applications to college in the case of VVS or prestigious high schools for middle school students at BDS, which ends at eighth grade.

Matt struggled to get his younger students to follow through, let alone lead. Much like Matt's various commitments diverted his complete attention, his students had limited

time to dedicate to the green club. Although BDS's student body tends to exhibit high levels of motivation, the green club meets during lunch, competing with time for eating and other student organizations. Many students participate in various other activities during lunch, like student council, and do not have time for the green club, precluding the high achievers from taking part in the green club. As he saw it, the lack of motivated students and time crunch hindered the club's ability to make substantive progress. He presents a typical scenario here, "last year one of the things the kids wanted to do was, like, kind of like Eco-tips that go into, into our . . . newsletter, website, those kinds of things" but he found "the kids that I had weren't intrinsically motivated enough just to do it" despite the high achieving nature of the school and its students. Matt espoused similar sentiments to Chip by stating, "my goal is that they lead" (focus group, August 7, 2012).

Matt did not view interest level in the work as an issue. "I got a lot of the kids who really were fired up and wanted to do whatever they can, but when it came to actually doing the work it was like pulling teeth to actually get them to do the work" (focus group, August 7, 2012). He hypothesized that students lacked motivation largely because they did not receive a formal grade. Without measures of accountability – whether standardized tests or graded assignments – sustainability exists outside the traditional school experience. Schools send students signals as to what they deem important. From an early age in school, report cards and standardized tests act as the arbiter of significance. If no test or report card exists to serve as an indication that society – or schools acting as their proxy – value sustainability, arguing for its benefit in the face of the traditional evidence (i.e. tests) appears contradictory to societal norms. While sustainability may not lend itself to a report card for students, this may demonstrate one

of the ways to increase its stature and make schools – and thereby students – accountable for it.

One major difference between Matt and Chip's connection to students can be seen in their roles outside of sustainability. Matt's position as a classroom teacher, coach, and advisor provided him with the access to students and educational opportunities that arose in the course of an average school day. Chip's lack of regular interactions with students thwarted him from direct connections to learning that takes place. Striking the balance between access to students and to decision making represents a major challenge for sustainability coordinators in schools. While Chip recalled a few occasions where he interfaced with students as part of Valley Vista's zero waste initiative, these sporadic interactions precluded Chip from acting as a reinforcing guide in the realm of sustainability. Rowe (2004) suggests broad coalitions and identifying champions in various areas in order to institutionalize sustainability. Although funding may present an obstacle to having multiple paid sustainability coordinators, finding champions in the support staff and a range of academic disciplines to create committees or informal networks to support EfS offers a multi-pronged approach to combat the isolation of sustainability with an individual.

Ultimately, Chip and Matt wanted increased student engagement. They each expressed interest in figuring out ways to do so. As one possibility, Chip suggested that Matt have students put together an annual report. He recommended they

> take real data from the school and they would be responsible for going to Eliot Browne [Braeburn's Director of Buildings and Grounds], or the business manager or director, whoever has this data, and put it together. This is the baseline report. Every year, that group is responsible for doing an annual report. This is what we accomplish this year. This is what we did and this is, this is how the school's doing (focus group, August 7, 2012).

Douglas County schools – in suburban Denver, Colorado – succeeded at involving students in energy conservation measures. Students took the lead, approaching teachers and staff members throughout the school to turn off lights and unplug unnecessary appliances, like small refrigerators. The school district enacted a program that saved millions of dollars by reducing energy consumption, largely at the behest of students (Garcia, 2013). Run by the district's former Energy Manager and now its current Sustainability Manager, students played a central role in encouraging faculty and staff across the district to reduce their energy consumption. Over a six-year period, the district saved $15 million (Garcia, 2013).

Curricular and Instructional Barriers

Numerous barriers exist in the implementation of sustainability in the classroom. Many of these remain covert, while others permeate multiple facets of school life. Chip and Matt elucidated several barriers throughout the course of the yearlong workshop.

Scale of Implementation

Matt's experience echoes the findings of Chapman (2013). In independent schools, Chapman (2013) found inadequate staffing, insufficient buy-in, and lack of training as the three top personnel issues thwarting the advancement of sustainability. Matt states,

> we have, uh, like 50 staff members, that not everybody has that same goal, I mean it's like a lot of them are just looking to get through the year, not necessarily how do I change my, change any of my practices to fit into sustainability. So it's like within the six, ah, within the six science faculty, then we have it, but probably have 20 to 30% real buy-in in the regular teaching staff, and then we have, uh, 10% that really don't want to be bothered by it (focus group, August 7, 2012).

Cutter-Mackenzie and Smith (2003) support Matt's assertion. They found that primary school teachers "tend to maintain low levels of content knowledge of environmental

concepts and do not consider content knowledge to be overly important" (p. 499). Chip offered a supplementary argument in his pre-workshop questionnaire. He stated, "Anything that is 'place-based' as much as this curriculum is, would be difficult to teach to teachers on a large scale" (focus group, August 7, 2012). Trying to reach a staff of similar size felt like a Herculean task to Matt and Chip. Barlett's (2004) model of working with eight to ten faculty members at a time offers an alternative approach to the large-scale implementation. Within half a dozen years, all faculty and staff could cycle through a professional development program, with new hires joining as part of their orientation to the school's sustainability initiative. While this does not address their concerns about a one-time seminar, the large group interaction may not work if the true goal remains cultural change. To suggest that a single professional development experience could alter ingrained habits of mind ignores the long, involved work needed to affect change.

As further evidence that Matt sees students as ready and willing to engage in environmental and sustainability related discussion, Matt shared his belief that "kids are not the ones we have to convince, it's the, the faculty that, that are kind of set in their ways" (October 26, 2012). This lends credence to the notion that a single event will not change the faculty's mindset in relation to Educating for Sustainability. However, even Matt acknowledged his own barriers, namely time. In discussing the wealth of information produced regarding sustainability in education, he said, "I don't have the time to go through all of the stuff" (focus group, August 7, 2012).

Chip was a bit more circumspect. Where Matt saw strides being made, Chip saw "huge barriers at [VVS], because of the curricular issues. [He was left] wondering

whether, uh, it has to be one more thing that the teachers add into their curriculum" (August 7, 2012). Because VVS adheres rather strictly to the doctrine set out by the school movement's founder, Chip felt constrained and saw the barriers manifesting themselves as a result of the demands this philosophy placed on over burdened teachers. Specifically addressing the idea of using the school's facilities as teaching tools, Chip replied, "this type of thing would not be comfortable for a lot of teachers period, let alone [VVS] teachers, to try to integrate on top of all the other things that they're trying to do" (focus group, August 7, 2012). This is not to say that he failed to see the import and value of place based education.

> For me it's big in place based, but I can't force something on the school. I think it's a valuable piece, but then again who am I to say that the science teachers' pet experiment isn't more valuable to them (Interview, August 7, 2012).

In part because his role existed outside the classroom, Chip's experiences are inherently different than Matt's. Chip inhabits the role of an outsider at VVS. The absence of an institutional commitment to his work – the school chose not to fund his position after the two-year grant expired – made his status at the school tenuous.

Institutional Barriers

Chip held the belief that VVS lacked the leadership on the issue of sustainability, commenting that his position fell into their laps, while intimating that they failed to take full advantage of it. During a follow-up conversation in September of 2013, Chip discussed how the school could have better used him during his tenure and how the new position they were looking to create – a sustainability teacher – would only serve to treat sustainability as a separate concept, not an integral part of the school. This one off opportunity expired without the school taking further action, losing the opportunity to

capitalize on his time, energy, and knowledge. While at VVS, Chip implemented a number of changes to the physical plant and the school's strategic plan, the former representing the ideal opportunity to connect with lessons in the classroom. According to Chip, the trouble came when his position ended and he left the school in a formal capacity.

Chip's time at Valley Vista focused largely on facilities projects from an administrative perspective. These were not at the forefront in the school's curriculum. As Chip explains it, the unique philosophy of the school constrains what teachers include in their curriculum. While Chip's school also belongs to the Rocky Mountain Independent School Association, they have a tightly defined curriculum that does not lend itself to the flexibility of Braeburn.

Lone Voice for Sustainability

The feeling of being the "lone voice for sustainability" was one Chip and Matt anxiously strived to overcome. Matt stated that one of the goals for the meeting he hosted was to look "for collaboration opportunities, looking for next steps, being able to meet more often, uh, just trying to see, sitting down, and what are other people's goals" (joint interview, September 21, 2012). Chip, has seen schools and people working on their own, but envisions people coming together for a sustainable future.

> I think the sense in general is that, that we have worked as individuals if you will, schools, and they've done some great things as individuals, but we think that there's power to be had in collaboration and getting together and really seeing what is a, a model that we could use and use consistently. We've tried a couple things in the past that, that have not been able to be sustainable, so how do we move beyond (joint interview, September 21, 2012).

For his upcoming work in consulting, Chip said he was

> interested as a consultant, to see whether there are certain ways we do business as schools that we could, uh, share . . . we're not reinventing the wheel . . . that we are taking full advantage of the, of the collective intelligence in our schools (joint interview, September 21, 2012).

Matt extended the idea to organizations in the community that are engaging in sustainability. As noted, Chip invited several organizations to the meeting he hosted at VVS, with representatives from two outside groups attending.

After the meeting, Matt commented on how he enjoyed all "the meeting cohorts and seeing all the things, the different people that came to this, versus, they aren't all instructors, they aren't all coordinators, they're facilities people, or finance people" (joint interview, September 21, 2012). The mix of individuals in various roles included business managers, facility coordinators, a classroom teacher, a parent running a consulting business in Educating for Sustainability, and the two sustainability coordinators, Matt and Chip, as well as the researcher. The group's enthusiasm ranked high on Chip's list of takeaways from the meeting. Specifically, he mentioned, "feeling the energy in the group for this kind of effort. And it wasn't that they were forced to come, it was all personal initiative that uh, they want to see this happen" (joint interview, September 21, 2012).

Ahead of the green schools conference, Matt indicated that he wanted "More of this, this collaborate, figure out who's there, figure out where we can . . . have even more people to invite to these kind of meetings" (joint interview, September 21, 2012). A month later, after attending the Green Schools conference, Chip reiterated his position

> it's really about the collaborative piece that is very powerful for me. It's, it's, it's finding out what are the great ideas out there and how do we distribute those great ideas, and huh, and not, not look at schools [as] inherently competitive, and not willing to share, uh, but how can we tap into the collective intelligence of everyone that works in schools (interview, October 26, 2012).

In many ways, collaboration lies at the heart of sustainability. If schools, let alone society, have any serious hope of making inroads on sustainability, it will need a large-scale collaborative effort.

Both Chip and Matt mentioned concerns about having sustainability associated with a single individual. BDS weathered the transition to a new sustainability coordinator, while VVS let the position expire. The passing of the coordinator position from his predecessor to Matt demonstrated that the position could survive at BDS. However, as Edelstein (2004) writes, initiatives often suffer if a particularly vociferous leader leaves. He lobbies for "cooperative ventures … and to allow redundancy and resiliency of social systems" (p. 291).

Matt's comments after the meeting he hosted at BDS present another consideration for Edelstein's warning. With the prospect of a long school year ahead, he lobbies for

> …check-ins and making sure that we, we're doing what we need to be doing, that we haven't lost our oomph, 'cuz, the reality of school is that you get into school and school drains a lot of that out of you. So it's like, it's September and it's early on and we're all excited, like, here comes February (joint interview, September 21, 2012)

Here, the barrier seems to be more human, the idea that the hectic nature of the school year will suppress sustainability initiatives as they struggle to gain traction and prominence during the inevitable grind of the school year. He reiterates this a month later, after the conference, saying,

> as the year goes on, it's like we all think, like life happens, and like priorities, like staying within yourself is easier than it is to network, so it's like alright, how do we keep ourselves going out there and talking, and getting people involved (interview, October 26, 2012).

Matt strikes at the heart of sustaining sustainability. When innumerable barriers stand in the way of implementing sustainability themed programs and engendering a paradigmatic shift, those engaging in the work need ways to sustain themselves.

Chip touched on the sense of isolation he experienced at VVS. As part of the January 25, 2013 meeting at Valley Vista, Chip brought in members from the town of Valley Vista, known for their efforts in sustainability. Chip voiced a desire to work cooperatively with these people, but also other independent schools. In his view, independent schools have shared goals, despite the common narrative that they engage in competition for students. Chip argued for a collaborative approach, saying "there's power to be had in collaboration and getting together and really seeing what is a, a model that we could use and use consistently" (joint interview, September 21, 2012).

To suggest that BDS and VVS only have one voice for sustainability belies the fact that multiple people work on sustainability related issues. As noted, both schools have facilities managers dedicated to reducing resource consumption. They have an existing culture of sustainability in terms of operations. However, the penetration into the classroom remains tepid. Matt discussed the level of integration science teachers achieved when using the school's LEED certified building (USGBC, 2013) – and his own attempts to bring real-world, sustainability related lessons to his students. Yet, beyond his efforts, those of the science department, Chip's attempts to foster zero waste principles, and behind the scenes work by both schools' facilities departments, these all represent isolated examples. Suggesting all teachers incorporate sustainability in every lesson is not only impractical, but also fantastical. Penetrating beyond the "safe" examples of science classes and energy conservation would provide tangible evidence of sustainability as a

core value. Until people beyond those whose job requires them to exhibit sustainable – not just environmentally friendly – behaviors, the culture remains suspect.

Teacher Competency/Training

In a study of classroom teachers and their incorporation of environmental education into the curriculum, Sosu, McWilliam, and Gray (2008) pinpoint a number of obstacles, namely "a restrictive and compartmentalized curriculum and the absence of background knowledge to deal with controversial environmental education issues" (p. 182). In their study, Cutter-Mackenzie and Smith (2003) found that primary school teachers prefer "to focus upon attitudes and values in the teaching of environmental education" (p. 497). Chip sees the barriers as

> …mainly, uh, curricular. The, the feeling that, uh, a defensiveness if you will, on the part of faculty, primarily, this, this feeling that we can't add too much, or that's cute, or but we aren't going, it's not really going to become an integrated part of our curriculum, so that's, that's a major, that's a major hurdle I believe... But there's a, there's a certain hesitance to, to try something new which is a little surprising, but that's just the way it is (interview, October 26, 2012).

Additionally, Chip laid blame at the feet of teacher education programs. "Most likely one would have to encourage this type of thinking [EfS] in schools of education--places that are famously conservative in their thinking" (pre-workshop questionnaire, August 7, 2012). To expect that individual schools or districts would assume responsibility for preparing teachers for embedding sustainability in their syllabi maybe a stretch, however, invariably some schools will try. More so, it is likely that schools with sustainability at their core attract educators who are already sustainability-literate. The time and resources needed for individual schools to accomplish this task certainly consign it to education's waste bin. Chip's comment speaks to the concern raised regarding the difficulty in scaling professional development for the entire school faculty. Determining who

maintains responsibility for teacher preparation in the arena of sustainability lingers, creating the quintessential chicken and egg dilemma. How do we educate students to become advocates of sustainability when not enough teachers have the requisite training to nurture advocacy in the first place. Which comes first?

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CHAPTER V

DISCUSSION

Place-Based Education

The movement toward using one's surroundings to learn various concepts has been gaining strength, though slowly. A homogenized, whitewashed curriculum, devoid of local references has been the norm for generations.

> Our present 'leaders'—the people of wealth and power—do not know what it means to take a place seriously: to think it worthy, for its own sake, of love and study and careful work. They cannot take any place seriously because they must be ready at any moment, by the terms of power and wealth in the modern world, to destroy any place (Berry, 1991, para. 13).

Sobel (2005) defines place-based education as "the process of using the local community and environment as a starting point to teach concepts in language arts, mathematics, social studies, science, and other subjects across the curriculum" (p. 7). He goes on to mention the emphasis on "hands-on, real-world learning experiences" (p. 7), which are also an integral component of place-based education. Sobel (2005) does not explicitly address the notion of the built-environment as part of placed-based education, but it is central to the notion of learning from one's surroundings. Younger et al. (2008) point out that "The built environment influences human choices, which in turn affect health and the global climate" (p. 517). This connection between local spaces (like schools, which Younger et al. (2008) include in their definition of the built environment) and local environment also has implications on a global scale. Tye (2003) discusses the push toward global education, which is seen by some as a form of neocolonialism. Demonstrating the value and applicability of place-based education through its impact on the worldwide scale helps to justify its inclusion in educational practices and may fend

off critics who see the movement as solidifying “a world economic order based on cynicism and individual profit” (Tye, 2003, p. 168).

EIC: Environment as an Integrating Context

EIC, Environment as an Integrating Context, provides another system for considering the built-environment as a teaching tool in the classroom. Developed by SEER, the State Education and Environment Roundtable, EIC “is about using a school's surroundings and community as a framework within which students can construct their own learning, guided by teachers and administrators using proven educational practices” (SEER, 2005, n.p.). Sobel (2005) stakes the position that "Embracing sustainability as an organizing principle means that we accept a concept of limited resources and start to look for ways to simultaneously enhance economic vitality, environmental quality, and school improvement at the local level" (p. 17).

Ernst and Moore (2004) use the term environment-based education (EBE) to refer to “formal instructional programs that adopt local environments as the context for a significant share of students’ educational experiences. Its defining characteristics are interdisciplinary learning based on the local environment, project-and issue-based learning experiences, learner-centered instruction, and constructivist approaches” (p. 510).

Dewey (1990) implied that schools act as a hindrance to learning and that children learn from their surroundings, a concept touched on in Banks et al. (2007). Dewey (1990) suggests students’ experiences external to school – what one might refer to as education, as opposed to schooling – hold little value in the structured classroom setting. Additionally, what passes for a lesson within the confines of schools has next to no

applicability beyond its walls. This disconnect exemplifies the split between the students' surroundings and their education.

Orr (2004a) insists on a place-based approach to education, arguing for a "deep concept of place as a repository of meaning, history, livelihood, healing, recreation, and sacred memory and as a source of materials, energy, food, and collective action" (p. 163). Louv (2008) stakes a similar claim, namely that children have lost the connection with the outdoors. In order to meet students where they are, using the school's campus can potentially mend this disconnect. Campuses with large windows, native vegetation, and other "green" features may also serve to reconnect students with the outdoors in non-threatening, yet meaningful, ways. Chen (2007) uses the example of Sidwell Friends in Washington DC. Sidwell's middle school – which achieved LEED Platinum, the highest possible designation for certification from the US Green Building Council – merges "pedagogy, sustainability, and behavioral modification" (p. 107). The school's assistant head and chief financial officer describes the building, which is part renovation and part new construction, as changing the way science is taught (Chen, 2007). Teachers can integrate these "green" components into their lesson plans, eschewing centralized examples of ecosystems in favor of those created by environmentally sensitive architecture. In New England, The Center for Place-Based Education at Antioch University works to further the aims of place as teacher, which can include physical structures as well as landscapes.

As this research takes place in the Rocky Mountain region, and deals with place in education, Wohl (2009) challenges the notion of the West as pristine, suggesting that interactions with the land are largely linked to human domination and not some altruistic

or naturally occurring phenomenon bereft of mankind's influence. Wohl (2009) also provides some context for the consumptive habits of populations in the American West, stating, early settlers "saw no need to conserve or foster the seemingly limitless abundance of America's resources" (Wohl, 2009, p. 12). Placed based and EBE models can begin the process of aligning consumptive patterns, resource availability, and natural spaces within the school setting.

Bransford, Brown, and Cocking (2000) argue that 21st learning environments need to be student centered. This approach takes into account the knowledge, skills, and attitudes students bring to the class. In addition, Bransford et al. (2000) call for community centered environments. In these settings, the schools themselves can become fodder for teaching and learning. Instead of generic content from textbooks that students fail to connect with on a personal, meaningful level, the school grounds with their systems (HVAC, water, etc) can serve as the foci for student study. Students can compare the energy savings from efficient structures to those that do not have such features. This deep, meaningful experience allows students to connect their content knowledge to the world around them, thereby scaffolding the information in a coherent, contextual manner. An education focused on the immediate environment presents a more meaningful experience than one driven by generic, standardized tests (Smith & Williams, 1999).

Building as Teaching Tools and Place Based Education

Couched in place-based education, the initial direction of this research aimed to look at how educators use, or can make use of, the school facilities in the curriculum. Berg (2001) notes, "the original purpose of a study may not be accomplished and an alternative or unanticipated goal may be identified in the data" (p. 251). As the research

and process is participant driven, they guided the workshop in a direction relevant to their interests. Though the notion of "buildings as teaching tools" maintains a place in this research, it became a secondary theme to those that emerged from the participants' needs. As Chip noted, the use of buildings as teaching tools faced a huge hurdle. "Training teachers to see their built environment as part of the curriculum is not 'natural' because it can't be caught in a textbook" (pre-workshop questionnaire, August 7, 2012). This reliance on textbooks emphasizes the challenges facing buildings as teaching tools.

Matt addressed how the school's new building on campus, a LEED (Leadership in Energy and Environmental Design) certified structure, made its way into their curriculum:

> we take various materials and portions of it and the kids do research on like building materials and flooring and paint and colorings and lighting and HVAC and all the different things that go in to a building and might have a little competition (focus group, August 7, 2012).

In Lieu of Textbooks

Current textbook centered approaches do not coincide with the world of buildings as instructional tools, place-based education, EIC, or authentic experiences in science. However, "the textbook holds a unique and significant social function: to represent to each generation of students an *officially sanctioned* [emphasis added], authorized version of human knowledge and culture" (de Castell, Luke, & Luke, 1989, p. vii).

They also serve to preserve a resource intensive industry that supports the hegemony of consumption. Harwood (2005) points out that the commercially created textbooks are not pedagogical artifacts. Dewey (1990) recounts a visit to a school where students learned about the Mississippi river from the textbook, despite the fact that their town sat on the waterway. Thornbury and Meddings (2001) argue that "coursebooks" fail

to support the emergent nature of language and therefore have no place in English class. Similarly, science falls into this category of an emergent discipline. New findings occur on a regular basis. Discoveries serve as the basis for the scientific endeavor with the body of knowledge continually expanding. Trying to capture the content in a textbook that will be outdated as soon as it is produced, not to mention the natural resources required to print and bind them, seems antithetical to the pursuit of science as a discipline. While Thornbury and Meddings (2001) deal with language, they mention the value of textbooks in other disciplines, namely Geography, History, and Mathematics, but science is not included in their list. Thornbury and Meddings (2001) suggest one could easily use readily available material. Textbooks on the other hand have little connection to the student. These centrally produced documents do not take into account regional differences, in particular as pertain to climate, energy use, and resource availability. Ecological education needs to exist outside the traditional boundaries of disciplines and classroom settings, altering not only the content, but the process of education and aims of learning (Orr 2004a). This entails reworking the traditional textbook and classroom walls that have hemmed in students and teachers since the industrialization of education, which McMannon (1997) argues was brought about by shifts in "job specialization, industrialization, technological advance[ment], urbanization, and similar developments" (p. 2).

The current system of educating large groups of students under the instruction of a single individual stems from urbanization itself (McMannon, 1997). Instead of relying on small-scale educational situations, the need arose to educate large numbers at once, hence the industrialization of education. Given the long history and shifting educational

landscapes (McMannon, 1997), globalization (Friedman, 2008), and threats of climate disruptions (IPCC, 2007), a return to the local, as called for by Orr (2004a) dovetails well with the opportunity to learn from one's surroundings, in particular green buildings that have more of a role to play in education than merely providing shelter from the elements.

Forty years ago Meadows et al. (1974) raised the red flag about resource consumption patterns. In his 30-year comparison of Limits to Growth to the current trajectory, Turner (2008) demonstrated that the original models created in the *Limits to Growth* (Meadows et al., 1974) remained valid and that consumption patterns have continued, indicating a crash course with resource depletion. Education must be forward looking. Continuing patterns of consumption and teaching to the status quo will not address the issues brought forth in Limits to Growth. Teachers educate not for the world as it exists today, but as it will be (Senge, 2000). Teaching youth to consume like people have for the past two centuries represents a backward looking approach, and as seen in Meadows et al. (1974), a potentially destructive one at that.

Enter the school campus. Possibilities abound for how to use the facilities, grounds, and the larger campus in the curriculum, but a formal review and methodical research are needed to find out what schools are currently doing, and how they can be further integrated into the formalized curriculum. Orr (2002) claims, "The typical campus is regarded mostly as a place where learning occurs, but is, itself, believed to be the source of no useful learning" (p. 127). The time has come to capitalize on these opportunities to engage students in meaningful learning experiences that incorporate the campus. Wiebenson (1998) presents the radical notion that buildings "can actually help teach" (p. 61). As part of buildings helping to teach, he suggests "We and our institutions

– particularly our schools – need to find ways of collaborating more closely with the environment" (p. 64). Orr (2004b) writes about his experience at Oberlin College, where he spearheaded the effort to build a structure that would serve as a central component for the environmental science department. In designing the Adam Joseph Lewis Center for Environmental Studies, Orr (2004b) explains that including the buildings and landscapes as part of the curriculum represented a conscious decision. By bringing these elements into the design process and making a concerted effort to include them, Orr (2004b) discusses how Oberlin College aimed to connect urban dwellers with the natural world.

When buildings are intentional, they provide more than shelter, they can teach in clearly defined ways. Franz (2004) further develops the connection between buildings and the curriculum. He states, "academic lessons are often better learned in conjunction with real-world applications rather than simply as conceptual abstractions" (p. 232). Here the buildings come to the forefront of the educational landscape, not as an after thought. Both Franz (2004) and Orr (2004b) shared their experiences in a compendium about sustainability on campus (Barlett and Chase, 2004), work and teach at the collegiate level. The information about using school grounds and buildings in K-12 education exhibits several gaps.

The designing of schools, as discussed by Orr (2004b) does not have to remain the domain of higher education. Numerous architectural firms work to build green schools on K-12 campuses. Several of these are featured in Ford's (2007) work. Ford (2007) supports connecting students' minds to architecture and the environment, making high quality schools with healthy indoor air; acoustically enhanced classrooms; imbuing

learning spaces with natural light; and providing spaces that encourage teacher retention and reduced absenteeism, a place where the campus serves as a teaching tool.

Hegemonies

The twin hegemonies of consumption and standardized high-stakes testing, serve as barriers to the purposes of sustainability as well. Offering a counterstory to the dominant themes of consumption and testing, sustainability struggles to find an audience. Schools like EMS (Environmental Middle School) in Portland, Oregon, the Denver Green School, and Minnesota's School of Environmental Studies, among others, represent outliers. These public schools have used the environment, not necessarily sustainability, to organize their schools. Given the compartmentalization of content, with each discipline in its own neatly constructed world, the likelihood of schools employing a unifying theme (e.g. sustainability) seems highly unlikely. This by no means suggests the current paradigm represents a more evolved way to teach. On the contrary, scaffolding concepts and helping learners visualize connections is virtually nonexistent in the current approach to education. Instead of helping students build on ideas from one discipline to strengthen their overall comprehension, the system thwarts this interdisciplinary approach. With reductive, high-stakes tests narrowing the curriculum and controlling the content, grandiose attempts to educate students with a thematic design have no position in schools. Until testing as a base exercise, instead of a formative way to assess understanding, can relinquish its grip on education to more informed sensibilities, schools will continue to shortchange learners by failing to present material in a cohesive manner. Aided by the need to churn out consumers, testing focuses on factual content that hampers the type of systems thinking needed in Educating for Sustainability. Decontextualized recitation of

facts without a framework (read: sustainability) further education's role in creating a society unable to consider both the ramifications of their actions and one that accepts a linear, cradle-to-grave (McDonough & Braungart, 2002) mentality that stands in direct opposition to sustainability's aim of long term survival of the species and proper management of resources. Furthermore, it lends credence to the anthropocentric viewpoint that humanity exists outside the realm of nature and not as a part of nature, making the consumption of resources an acceptable proposition, indeed a necessity for the continuation of the consumptive society, which it perpetuates. This point demonstrates a key reason why I employ a phenomenological – not a positivist – perspective in the attempt to understand the role of Chip and Matt in their struggles to embed sustainability throughout their respective communities.

The Hegemony of Consumption

The student bodies of Braeburn and Valley Vista are inimical to the interests of sustainability in one major way. These students largely come from white, upper-middle class families. In the case of Braeburn, only twenty-one percent of the 645 students (approximately 135 individuals) identify, according to the school's website, as students of color, leaving nearly 4 out of 5 members of the school hailing from white families. According to their website, Valley Vista has 315 students. Information on students of color is not readily available. At a cost in excess of $18,000, for the high school, which includes fees, monetary constraints preclude students of lower socioeconomic status from attending. According to census estimates from 2012, Rio County, whose largest city is Valley Vista, has a high level of college graduates (58.0%) and is predominantly white (91.2%). With the addition of Mar Costa Charter High School (MCCHS), which shares

some socioeconomic characteristics with BDS and VVS, though as a public school it relies on public funding, these three schools have a vested interest in maintaining a capitalist society. From the leadership on down through the students, consumption reigns as the dominant paradigm. Independent schools require tuition paying students to fund schools. Some have endowments that bolster the fiscal bottom line, but private money keeps these schools afloat. By definition, capitalism and consumption underpin their viability. Given this scenario, how can these schools – though the argument stands for all schools since they depend on funding tied to consumption (property values for instance, which determine school funding via tax collection) – carry forth a message of sustainability when the hegemony of consumption enables their existence in the first place? Navigating this dichotomy, and engaging students in the discussion, represents the perfect opportunity to make the hidden curriculum of consumption and unsustainable practices overt. Gruenewald (2001) discusses the hegemony of consumption and its implicit role in the miseducation of students. Arguing that globalization exacerbates and creates problems for sustainability, Gruenewald (2001) sees unsustainable schools simultaneously as victims and perpetuators of unsustainable behaviors, and traditional approaches to EE as ignoring social concerns while taking an uncritical view of education's role in creating this unsustainable paradigm.

Simply put, schools reinforce the structure of an unsustainable society. In particular, VVS and BDS, struggle with the divergent goals of Educating for Sustainability, while acting as a force for the continuation of consumptive behaviors. Without material success and its concomitant consumption, these schools would likely struggle to attract tuition paying families that opt out of the public schools. The

hegemony of consumption undergirds many of the challenges that Matt and Chip face in institutionalizing sustainability. Not only do their schools benefit from this hegemony, they rely on it.

Despite the, at times, overwhelming evidence that sustainability loses out to these hegemonies, Chip continues to push forth in an attempt to make this his life's work. Overwhelming odds offer an opportunity to prove one's mettle. The challenge with integrating sustainability is vast, but the risks associated with complacency far outweigh the seemingly insurmountable obstacles currently in place.

Prevailing Paradigm

Interestingly, the prevailing paradigm – our post-industrial consumptive ways – in society did not enter into the conversation. At one point Chip called for a paradigm shift, but in the context of water treatment. In essence, both Matt and Chip argue for a paradigmatic shift in our approach to education by making sustainability central to schools. This may present the greatest barrier of all. Arguably, the hegemony of consumption pushes the current paradigm forward and crowds out discussions of sustainability, relegating it to thought experiments. Collectively, our inability to identify the hegemony of consumption and its role in subverting sustainability indicates its pervasiveness as the dominant discourse.

Multicultural Education

Chip's observation about VVS's decision to hire a sustainability coordinator exemplifies how Educating for Sustainability exists apart from the traditional curriculum. Educating for Sustainability is not alone in its struggle to gain a foothold in the curricular landscape. Like its curricular cousin, environmental education, and other disciplines such

as multicultural education, EfS suffers from the perception of being an ancillary course of study, not one ingrained in the schooling experience. Multicultural education and EfS share other characteristics, in particular the incorporation of diversity and social justice. Schoorman and Bogotch (2010) discuss the evolution of multicultural education from the former to the later, both of which are integral to EfS. Beyond curricular similarities, Nieto (2000) makes an analogous claim to Orr (2004a), who argued that all education is environmental education. Nieto (2000) stakes the position that "multicultural education must be understood as *basic* education. Multicultural literacy is as indispensable for living in today's world as are reading, writing, arithmetic, and computer literacy" (p. 309).

In a display off the interdisciplinary nature of environmental education, Orr (2004a) argues, "all education is environmental education" (p. 12). In order to realize this vision, students must experience environmental education, here a proxy for EfS, from multiple angles in all disciplines, not as a stand alone course. For multicultural education (MCE), Schoorman and Bogotch (2010) outline the ways in which multicultural education can be implemented in schools, including social justice, equity pedagogy, and empowering school culture. They advocate moving past the tokenistic approaches (i.e. food and flags), a valuable lesson for sustainability, which has its own token exercise like Earth Day, or in the case of Chip's school "Earth Week," activities. The difficulty, nee inability, to integrate MCE and EfS into the culture of the school indicates that these amalgams currently occupy a shared position outside the traditional curriculum. For a course of study outside the core disciplines, hurdles to their integration prevent them from gaining a foothold regardless of their intrinsic or extrinsic value. Unless

multicultural education exists as part of the core curriculum Nieto (2000) argues “it is perceived as irrelevant to basic education” (p. 309). The same can be said for EfS.

The Canon

Nieto (2000) includes a discussion of how the cannon has ossified on to discuss over the past several decades. Dating back to the Committee of Ten in the late nineteenth century, the work of deciding the canon rested with a select group of academics (Eliot & Robinson, 1894). Today’s world retains little of the quaint 1890s when the proverbial smoke filled back room yielded what would become the core curriculum for all. The twenty-first century inhabits a world more diverse and interconnected. Consisting of ten “gentlemen”, this group of five university presidents, a high school principal, two head masters, a college professor, and the commissioner of education (The National Education Association, 1894) still dictate what students learn 120 years later. Traditional coursework crowds out MCE and EfS, concerns deeply rooted in today’s world. Instead of adapting, the canon remains largely unchanged, reflecting white male patriarchal values, not those of a pluralistic society living in era of Limits to Growth. Much like multicultural education, EfS struggles against the in situ curriculum. Nieto (2000) points out "The canon, as understood in contemporary US education, assumes that the knowledge that is the most worthwhile is already in place" (p. 309). Without a wholesale reimagining of the content, and not just adopting Common Core Standards, the existing curriculum retains its position as undisputed guide to all that is worth knowing. Both MCE and EfS remain on the outside looking in, treated as second-class citizens. Sadly, there is little to no room in the curriculum for new content, let alone rethinking what is taught. Furthermore, Nieto’s (2000) stakes the position that some educators view content,

like multicultural curriculum, outside the accepted curriculum – which represents the European American establishment – as less than rigorous. In reality, "making a curriculum multicultural makes it more inclusive, inevitably enriching it" (Nieto, 2000, p. 312). Bringing more voices into the conversation provides students with incentive and ownership. As such, MCE and EfS offer a counter example of how to think about and to organize content and learning. They represent student-centered ways of teaching and learning, by giving credence to the learner's voice. Banks et al. (2007) propose that students are life long and life deep learners, bringing a wealth of experiences to the classroom. Much in the same regard, the integral, everyday nature of Educating for Sustainability intricately relates to students, their lives, and their well-being. Experiences serve as important components of learning in these contexts.

Just Sustainability: The Intersection of MCE and EfS

Much in the way EfS, by definition, necessitates a future for all peoples, Nieto (2000) argues "multicultural education is by definition inclusive. Because it is *about* all people, it is also *for* all people, regardless of their ethnicity, language, sexual orientation, religion, gender, race, class, or other difference" (p. 311). In order to create a more just and sustainable world, all people must take part. All learners, all students, all citizens must strive to coexist in a way the supports inclusivity and pluralism. Biodiversity – a key component of a sustainable ecosystem – and diversity – a vital element of a multicultural society – must complement each other, as they are essential to the aims of MCE and EfS. Agyeman (2008) proposes that a "Just Sustainability Paradigm" consider more than the green/New Environmental Paradigm or the brown/Environmental Justice Paradigm. These include, a) Quality of Life; b) Present and Future Generations; c) Justice

and Equity; and d) Living within Ecosystem Limits. A just sustainability remains the only way to realize "the true potential of sustainability and sustainable development" (Agyeman, 2008, p. 755).

Thematic Approach: MCE and EfS as Transdisciplinary

Chip and Matt as sustainability coordinators at their respective schools occupy tenuous positions outside the traditional roles of curriculum coordinators in schools. While Matt is also a classroom teacher, his ability to impact the school culture and wider curriculum is somewhat limited. Chip has worked to make sustainability a unifying experience at Valley Vista. EfS crosses boundaries in terms of curriculum and facilities. It does not reside in the science department, although that is often where schools find the sustainability coordinator as in the case of Matt. As noted, BDS's initial coordinator came from outside the sciences, lending credence to the transdisciplinary nature of sustainability. EfS is not alone. "Multicultural education is not something that happens at a set period of the day, or another subject area to be covered" (Nieto, 2000, p. 312). The same rings true for sustainability. Much like multicultural education, EfS filters through all subjects, it is not beholden to a single class period. To suggest that one person teach a multicultural education class where students sit for 45 minutes only isolates the philosophy from the rest of the curriculum and educational experience (Nieto, 2000). Taking this view, a sustainability coordinator position, similar to that held by Chip and Matt, exemplifies this issue in EfS. Transitioning to a multicultural or sustainable focus requires that MCE and EfS move beyond the "'decorated landscapes' of educational reform [that] concentrate on economic growth and do little to promote the conservation of Earth's natural environments that sustain life itself" (Mueller and Bentely, 2006, p.

321). Nieto's (2000) assertion is an important one. "Having specialists take complete responsibility for multicultural education gives the impression that a multicultural perspective is separate from all other knowledge" (p. 312-3). Neither MCE nor EfS are separate from all other knowledge. Rather, they are integral to it, so much so that they offer a thematic framework for learning.

Hegemonic Structures

Several factors collude to thwart the inclusion of MCE and EfS in daily lessons. Western schooling, which is diametrically opposed to education in the sense of true learning that occurs through one's experience, relies heavily on testing, paternalistic attitudes, and perpetuating the status quo. Each of these facets have their own structures that enable their continuation, all of which serve to strengthen the foundational, accepted approach to schooling, namely consumption and the hyper-competitive nature of testing. Entire economies exist to prop up the testing culture. Whether considering textbooks, high stakes tests themselves, tutorial services, or prescribed curricula that pigeonhole what educators can realistic hope to teach in their lessons, the hegemonies of testing, consumption, and school structure undermine EfS and MCE. By nature, EfS and place based education takes the onus off the educator and shares the classroom in a more egalitarian community. Teachers transition from sage on the stage to guide on the side, thereby supporting engaged learners who co-construct meaning and knowledge. Students become leaders, learners who teach and influence the path of their own learning, what Bransford et al. (2000) envision as a student centered classroom. Learning becomes more practical and ultimately more visceral, connected to real-world examples, reflective of how Banks et al. (2007) suggest people learn, especially in diverse communities. Power

is transferred from a single individual, the teacher, to a diffuse group of people, the learners, which ultimately includes the educator. Everyone in the classroom engages in the process.

Instead, what we have today is a situation where these hegemonies conspire to thwart real learning and authentic experiences in the classroom that acknowledge and consider various viewpoints; not just a positivist, Western perspective that aims to ingrain itself in another generation of students. Instead of learning to acquiesce to the teacher as gatekeeper, power sharing becomes an acceptable form of educating. For sustainability, one of its foils remains the bombardment of messaging around mindless consumption. At every turn the implicit message students hear entails the need to buy more, consume greater quantities, and strive for as much as possible (i.e. more is better). These narratives combine to create the hegemony of mindless consumption. At its roots, consumption remains a necessity for the continuation of life. However, wonton consumption with no regard for resource management or long term viability will continually damage the aims of Educating for Sustainability. It remains possible to encourage mindful consumption and a sustainable society that grapples with these questions.

Globalization

Lane-Zucker (2005) describes the "pressures for communities and regions to subordinate themselves to the dominant economic models and devalue their local cultural identity, traditions, and history" (p. i), what I refer to as the hegemony of consumption. In this process of subordination, Multicultural Education and Educating for Sustainability offer alternatives to the prevailing globalization paradigm. However, both must struggle against this paradigm and its concomitant hegemony. Lane-Zucker (2005) goes on to

draw the connection between environmental degradation and a disregard for the local, which suffers from the homogeneity brought on by globalization. This relationship is essential for EfS, as well as varying cultural perspectives. The loss of biodiversity and cultural diversity makes society less resilient, therefore less sustainable.

High Stakes Testing

MCE and EfS represent an alternative to the "banking education" notion against which Freire (2000) rails. These two approaches to learning have a distinctly process based pedagogy, as opposed to the rote memorization at the heart of banking. In *Teaching Community: A Pedagogy of Hope,* hooks (2003) connects with Freire's notion of banking education. Her treatment of the topic brings to light the hegemony of testing. Institutionalizing standardized testing thwarts public education from integrating creativity into education by requiring the transmission of content (hooks, 2003). High-stakes testing supports the pressure to subordinate oneself to the dominant economic model as well. In addition, testing of this ilk prevents the integration of local educational experiences (Sobel, 2005) creating a barrier to place-based education and ultimately to EfS.

Multicultural Education and Educating for Sustainability compete against reductive, standardized tests that measure canonical knowledge. In an era of high stakes testing, demonstrating that alternative curricular approaches can improve student performance cannot be overlooked. Smith (2004) provides evidence of the positive impact an ecologically focused school can have on student performance, noting the EMS in Portland, Oregon received an exemplary designation, the only secondary school in the state.

Social Justice and Environmental Sensibilities: A Counter-epistemology

EMS, Portland Environmental Middle School, focuses on more than ecological awareness. As part of the connection to the trinity of sustainability, social justice also has a home in the curriculum. This well-rounded approach to education ties social justice to environmental sustainability. Smith (2004) goes on to connect "the development of this kind of careful attentiveness to other people and the world . . . with the cultivation of a willingness to address issues related to environmental degradation or social injustice" (p. 81). This relationship has deep roots in the environmental justice movement. Agyeman, Bullard, and Evans (2002) argue that it is "increasingly apparent that the issue of environmental quality is inextricably linked to that of human equality at all scales" (p. 77). Schools can support the teaching of conservation-based concepts, especially with populations of students coming from neighborhoods subject to environmental degradation. By integrating energy conservation measures in the curriculum, students can enact changes at home, saving money and bringing in the third strand of sustainability, economics. Bullard (1993) puts it bluntly, "The environmental crisis can simply not be solved without social justice" (p. 23). Nieto (2000) goes as far as making the claim that social justice represents a developmentally appropriate learning opportunity for students in the middle elementary grade level. In a world where the increasing disparities are linked to inequities (Pickett & Wilkinson, 2009), Educating for Sustainability and Multicultural Education offer a counter narrative, a counter-epistemology.

A Narrowed Curriculum

Barriers to integrating environmental education, not just environmental justice or LEED-certified school buildings, into the everyday curriculum abound. Barrett (2007)

provides the following examples: “Structural barriers such as too much curriculum material to cover, difficulty working across disciplines, lack of resources, time, or the ability to take students outside continue to be cited as problems” (p. 209). Environmental beliefs and values by themselves cannot overcome the dominant discourse, which prevents environmental concerns from gaining traction in both academic research and schools (Barrett, 2007). This assertion that the dominant discourse preempts the inclusion of environmentally oriented content presents a substantial challenge.

The question remains of how to integrate the facilities, grounds, and campus into schools where the curriculum has narrowed. McCaw (2007) argues that learners may be at greater risk when the curriculum narrows to focus on test scores in science, math, and English. Berliner (2011) calls curriculum narrowing “the most pernicious response to high stakes testing” (p. 287), arguing that it precludes a large portion of students who might otherwise exhibit their talents and creativity while restricting thinking skills (Berliner, 2011). Crocco and Costigan (2007) point to the phenomenon of curricular narrowing as responsible in part for teachers leaving the profession. Sustainability, seen as an ancillary concern to begin with in schools, stands little, if any, chance of making headway in schools beholden to high-stakes testing, which remains ultimately responsible for the narrowing of the curriculum.

A Counterdiscourse to Testing

Gonzalez, Moll, and Amanti (2005) address high-stakes testing, but offer a different take on the pervasive practice. By offering a counter narrative, they aim to take control of the conversation. They couch their work in the world of testing given its ubiquity and reality, but suggest that effective pedagogy connect to students’ lived

experiences and contextualized in their local environment, while urging PD for educators that considers these factors (Gonzalez et al., 2005).

High-stakes testing may exist as part of the educational milieu for the foreseeable future. The path forward proposed by Gonzalez et al. (2005) calls on educators to forsake the skill and drill approach that a narrowed curriculum has created. Yes, the test will remain, but it does not have to dictate how educators teach or students learn. The time has come to take back education, regardless of the setting, and the resultant conversation. Finding a way to filter EfS into the curriculum from the bottom-up, until that day when the top-down joins the push, will begin the process. As Chip and Matt suggest, the students are ready.

Decorated Landscapes

Mueller and Bentley (2006) argue that the "decorated landscapes of educational reform have historically and continue to marginalize the importance" (p. 327) of pluralistic, multicultural approaches to learning. The authors argue that science education in particular should not aim "to colonize student minds with the Western canon" (p. 333). With regard to science education, Muller and Bentley (2006) argue for embracing student voice in an attempt to move past the tokenistic, “decorated landscapes” and providing the opportunity for them to participate in meaningful ways.

Here is where the intersection of multicultural education, science education, and educating for sustainability comes to life. Schools focused on sustainability and EfS must incorporate a plurality of visions, approaches, and voices. A more sustainable future reflects the diversity and biodiversity of life. Muller and Bentley (2006) make the case for a unified approach, stating

> As embedded and situated human beings, it can be very difficult to see beyond the decorated landscapes. It can be even more difficult to think beyond today to the future. However, as the authentic and meaningful landscapes emerge, we begin by acknowledging the many categories of culture and recognize communities where students' unique voices are embraced and valued. These voices must be recognized if we expect our students to make informed decisions and participate fully as members of society. In addition, we must reintegrate educational projects within the curriculum that promote conservation of culture and of the Earth's natural environments . . . We do this by acknowledging that between education that is culturally relevant and education for conserving the Earth's natural environments a relationship exists that is reflective, reliant, and reciprocal of culture (p. 332).

Creating this culture remains a major stumbling block for MCE and EfS since they represent paradigms, not single serving lessons. They relate to multiple facets from curriculum to the school's cultural and physical environments. MCE and EfS pervade all aspects of a school's operation, from procurement to performance. "Multicultural education is a philosophy, a way of a looking at the world, not simply a program or a class or a teacher" (Nieto, 2000, p. 313). Replace "multicultural education" with "sustainability" and Nieto (2000) could have been writing about Educating for Sustainability, which is a philosophy, a way of a looking at the world, not simply a program or a class or a teacher. It embodies a way of thinking and being. In a school where EfS underlies the mission, tacit knowledge (Sayer & Campbell, 2004) would be honored. Western, positivist thinking would be a way, not *the* way, of thinking, teaching, and learning. Pluralistic perspectives would gain a foothold and learners would take their rightful place alongside, not subservient to, educators. Meaningful, relevant curriculum, created in thoughtful ways that reflect multicultural values, inclusivity, pluralism, and sustainability could revolutionize education. However, Nieto (2000) makes the point that exchanging content is much easier than changing the process, or culture, at a school.

Differences between MCE and EfS

As Agyeman (2008) noted, environmental sustainability evolved as a largely Western, white concern. He recounts asking a "Greenpeace staffer if she felt that her organization's employees reflected multicultural Britain. She replied calmly, 'No, but it's not an issue for us. We're here to save the world'" (Agyeman, 2008, p. 751). This insularity reflects the monocultural approach with which environmentalism evolved. In more recent times, corporations have hijacked sustainability (Wilson, 2011b). Organizations dealing in nonrenewable, polluting fuel sources have co-opted the term for their benefit.

Multiculturalism has not gained traction in the public consciousness in quite the same manner. Rebranded as "diversity," companies have taken to touting their credentials and purported diversity in order to drive the perception that they hold diversity (as a proxy for multiculturalism) as a key value. Wilkins (2004) points out that business and the military came to see diversity as a driver for success in the global economy. It turns out this represents the "normal" course of business. Senge (2008) details how large companies (e.g. Xerox and Coca-Cola) have pushed into the sustainability realm as they see profits at stake. Capitalism drives both diversity (read: multiculturalism) and sustainability into the boardroom. In fact, Wilkins (2004) makes the argument that "diversity advocates feel substantial pressure to justify their actions in terms of the all-important bottom line" (p. 1556).

Sustainability remains a largely white, upper class concern, while multiculturalism finds itself in the realm of higher education and amongst populations

outside the white, male patriarchal system. Multiculturalism has not been subject to commercialization in the same manner, rather largely though the guise of "diversity."

CHAPTER VI

IMPLICATIONS

"Schools, by nature, shape the future" (Gleason, 2012, para. 15).

Viewed in relation to the "three-legged stool of sustainability", where economic, environmental, and equity issues combined to form a triadic Venn diagram with sustainability at its center, the potential for EfS to engender sustainability in future generations suggests education (and EfS in particular) as a fourth "E" to encompass all three "E"s. Education for Sustainability at its core aims to ingrain not just content based knowledge, but behavioral change. Making schools themselves into models of sustainability starts this process. By creating a culture of sustainability, the ultimate goal of both Chip and Matt, regardless of their ability to overcome the hegemonies of consumption and academic pursuit – standing in for high-stakes testing given their schools' autonomous position as independent organizations – schools have the opportunity to teach implicitly and explicitly, eliminating the hidden curriculum and molding the overt one into a coherent whole that helps students see the connections between thought and action, culture and progress, sustainability and the future of humanity. "We need to educate the next generation as to how they can reap the benefits of economic growth without sacrificing shared natural resources or exploiting populations (both human and non-human)" (Wilson, 2010, para. 2). In my mind, this is the power of sustainability education, or Educating for Sustainability.

Key Findings

Based on the discussions with Chip and Matt, listening to their struggles, and considering the successes they had as sustainability coordinators, there are a few main takeaways. Having a dedicated sustainability coordinator that has access to both students and administrative decision-making represents the most important component of structuring the position in a school. This directly relates to the second finding, in which a hybrid approach of top-down and bottom-up initiatives involves the students in sustainability actions, not just isolating sustainability at the level of business managers and administration. Student driven initiatives, combined with executive level programs in sustainability, allow schools to treat it as both a community value and an educational imperative. Having a committee that can support the position of sustainability director is important, however, it has to have real authority, autonomy, and accountability. A committee must aim to relieve the burden, spread the responsibility, and help institutionalize sustainability across the academic and administrative departments.

The Role of Sustainability Coordinator in a School

With membership totaling 611 four-year institutions (as of March 8, 2014), the Association for the Advancement in Sustainability in Higher Education (AASHE, 2014) stands as the preeminent organization concerned with sustainability in education. While no similar group operates in the K-12 space, it is safe to safe that higher education leads the way in this area. Presumably many of these institutions of higher learning have offices of sustainability, regardless of whether they have a dedicated coordinator. Sustainability coordinators are a rare breed in K-12 education.

Sustainability Committees

Part of the process of institutionalizing sustainability may result in the formation of sustainability committees, groups of ostensibly like-minded individuals dedicated to sustainability. Both Valley Vista and Braeburn have these committees in place, but they tend to meet infrequently, which hampers a sense of commitment to sustainability. While the committees were not part of the research, and only arose in discussion briefly, their work may hold one possible key to ensuring the success of sustainability initiatives in these, and other, schools. Two members of Valley Vista's ad hoc sustainability group attended the meeting that Chip arranged (the head of grounds and a high school teacher), while no BDS's members attended the initial meeting hosted by Matt at Braeburn. Because the meeting took place during a regular school day, teachers could not attend without some measure of disruption to their classes. Having teachers on such a committee plays an integral part in reaching students. However, educators – especially at independent schools where they must advise, coach, and/or lead student clubs, not to mention take part in the occasional faculty group or committee – have a number of constraints on their time. While they have direct access to students and can serve as conduits for sustainability via curricular instruction, competing with innumerable distractions inherent in the school day takes a toll on their ability to commit the time and energy needed to push forward yet another initiative. Buy-in from educators who implicitly understand the need for incorporating sustainability into the curriculum and culture of a school have to ally themselves with coworkers and students in order to find common ground and affect change on a greater level.

Members of VVS and BDS's sustainability groups include their head of grounds/head of facilities. Having these people on board has proven essential to the implementation of changes in the schools' operations. In their roles, they oversee the physical plant and as a result, they maintain responsibility for waste, water, energy, buildings, and maintenance. So much of the sustainability work relates to the physical plant. However, the classroom component falls to teachers and curriculum coordinators, often the department chairs at independent schools. Again, these gatekeepers must play a role in the process of integrating sustainability throughout the school. From social justice issues to economics, sustainability resides in all aspects of the school curriculum. English, social studies, and science represent more obvious examples, but the arts, foreign language, and mathematics can all reflect issues pertaining to sustainability. Having representatives from these disciplines serve on the sustainability committee can bridge the gap between a school's operations and its educational mission.

Advisory Committee

The proposal for MCCHS (Appendix J) calls for the establishment of a committee that would distribute the workload and responsibilities across a group of people, ideally from an array of departments, both academic and administrative. Initial discussions of an advisory committee to the core sustainability group were shelved due to the perceived lack of feasibility. This group could include students, community members, local businesses, and policymakers, providing a voice to stakeholders in a school's sustainability initiative. However, concern over stretching faculty too thin with added responsibilities took precedence, resulting in the decision to indefinitely postpone an advisory committee. Concentric committees and dispersing the workload derived from

Rowe (2004), who cautions against having sustainability associated too closely with any one individual and aiming for "a minimum of three articulate supporters" (p. 148) to help push sustainable initiatives forward. This triumvirate at MCCHS consists of the school's principal, the director of a small program within the school that has taken the charge in implementing many of the sustainability initiatives within the curriculum, and myself, as an outside consultant to their efforts. Even this structure, for a school with more than 3,000 students, seems too concentrated. Other members of the faculty and administration take part in the conversations, and no formal committee has convened as of yet, but the push thus far in their initial foray has come from a small group. A lack of diversity – including gender, age, experience, ethnicity, and position – present a significant hurdle for sustainability at MCCHS.

Dedicated Sustainability Coordinator vs. Dual Role

Whether a sustainability coordinator should also teach presents an intriguing question. Given the demands on a teacher's time, can a full-time classroom teacher devout the necessary time and energy to sustainability – and vice versa, can someone who spends all their time at the administrative level connect with teachers and more importantly students? As Higgs and McMillian (2006) assert, modeling sustainability conveys a host of benefits. For students, seeing educators behaving in sustainable ways serves to reinforce lessons in the classroom. What then happens when the sustainability coordinator exists outside of the classroom and outside the purview of students? While further study could elucidate the relationship between sustainable behaviors and the role sustainability coordinators have in the school, having a visible sustainability coordinator sends a positive message, one in which students see a school supporting its sustainability

initiative and providing it with the full relevance it needs in order to have an impact. Otherwise, schools fall prey to sustainability becoming a vacuous mantra, one which students, and frankly educators will see through, thereby harming sustainability's mission instead of enhancing it.

Dual Role: Faculty Member as Sustainability Coordinator

Matt's position as a teacher comes with access to the classroom and students, not just in an extracurricular setting like Chip. However, Chip's sole focus on sustainability issues as well as his direct line to the seat of power and decision-making at the school gives him the cachet needed to spearhead more comprehensive initiatives. During his two-year stint, Chip successfully completed a number of projects: an audit of the school, installation of a daylighting system (in the form of tubular skylights), overseeing a photovoltaic panel setup, and the creation of Earth Week activities. His sole dedication to this endeavor allowed him to accomplish more than Matt, but at the end of his commitment, he no longer had a role in any official capacity at VVS. After his departure, Chip discussed VVS's interest in sustainability as an integral portion of the curriculum, but to his knowledge, implementation of this plan did not have a coordinator. Herein lies the perfect example of how a single person, despite other people's efforts at VVS, whose role clearly contains one component, that of Sustainability Coordinator, has less value in the sense that their position becomes expendable without the procurement of additional funds.

Matt, as a science teacher, has added value to BDS. As his sustainability coordinator duties decrease (as a percentage of his time spent on these activities) the school explicitly devalues that aspect of his position. Both schools fall prey to Rowe's

(2004) concern in having sustainability too closely associated with any one person, but for different reasons. Since neither Chip nor Matt have full time commitments to sustainability as defined by their schools, they become expendable. Until sustainability receives the attention it deserves as one the most pressing issues of the twenty-first century, schools will continue supporting the status quo, which belittles sustainability. As it's shunted toward the back of the proverbial line, students will implicitly learn that sustainability has little to no value.

Dedicated Sustainability Coordinator: A Full-time Commitment

What then is the right answer? Should schools look for a dedicated individual to focus on concerns related to sustainability, find a faculty member to take on these duties, or can there be another way forward? Until a culture of sustainability develops at a school, work toward this end has to start somewhere. No one answer exists. To suggest that all schools take the same path would ignore all the signs that sustainability must reflect local values and fit within the school's culture. An ideal situation may not exist, but sustainability coordinators need to maintain a visible role on campus – not just for students, but faculty, staff, administration, community members, and parents. By promoting sustainability and the people that work to coordinate its multifaceted aspects, a school makes the statement that it values sustainability and believes in its tenets. The examples from VVS and BDS indicate how easily this position can fall victim to time and budgetary constraints. These two schools may value sustainability implicitly, but their actions suggest otherwise. Committing to sustainability may take on a number of appearances, but an institutional allegiance to sustainability ought to include, at a minimum, full-time support in terms of time and resources. Sustainability coordinators

can benefit a school's fiscal bottom line, while improving what Elkington (1998) termed its triple bottom line: an institution's economic, environmental, and social equity. Realized savings from efficiency enacted by sustainability coordinators can result in a fiscal argument for their positions. However, sustainability needs a champion in the seat of power, especially at charter and independent schools, where decision-making may lie in the hands of a small group of people.

Ultimately as with implementing sustainability in general, there is not a one size fits-all answer. Factors including budget, size of the school, school philosophy (as in the case of Valley Vista School), and availability of expertise all weigh into the decision. During the meeting at Braeburn, the idea of several schools sharing a Sustainability Coordinator, perhaps with the assistance of the Rocky Mountain Independent School Association, came about in a brainstorming session where new ideas were proffered. In the post meeting discussion with Chip and Matt, Chip mentioned the role of RMISA, stating

> we're going to need the support of the leadership bodies of the schools, certainly, and I'd like to also figure out what kind of support, if any that RMISA, Pat and RMISA, can give to this type of . . . or is it always going to be this kind of, well, extra piece (joint interview, September 21, 2012).

Chip addresses a larger question of sustainability's centrality in schools. However, in this discussion, the significance of his point lies in the alternative possibility of shared responsibilities with the governing structure playing a role in supporting sustainability in schools by coordinating efforts.

The Ideal Solution

Jaheil and Harper (2004) believe administrative support plays an essential role in the greening of a university As such, a full-time, dedicated Sustainability Coordinator that can impact purchasing, construction, curriculum, professional development, facilities, maintenance, stakeholders, etc would seemingly provide the optimal situation for schools. Such an individual would need to maintain connections to the physical plant and student body, the community at a large and staff members, the curriculum and administration.

School Gardens as a Teaching Tool

By linking lessons with the school grounds and sustainability, students start to see the tangible aspects of sustainability. Whether classified as traditional, underserved, or "alternative" students, sustainability relates to their daily life. For those who will seek jobs out of school, or drop out prior to completion, accessing green collar jobs (Pinderhughes, 2006) is vital to employment opportunities in a sustainable economy. In the case of students who continue on to a collegiate program, Educating for Sustainability and using facilities as teaching tools provides context to learning and a lens through which they can view their education.

Initially, this research focused on facilities, namely buildings. However, given an underutilized plot of land, a school garden can transform the landscape into an outdoor classroom. With the rise of globalization's twin impacts on food and energy (Friedman, 2008; Brown, 2009) and that people often lack a local connection to their food source (Pollan, 2006), school gardens provide an opportunity to reconnect people to the land that nourishes them. By in large, humans no longer manage their own resources (grow their own food, cut down wood for heat and cooking), making it difficult to see how these

systems interrelate and connect to the environment. This disconnect speaks to Louv's (2008) concern about the lack of natural space in the lives of children. Louv maintains that natural spaces, as well as experiences in nature, are increasingly scarce. In relationship to the food humans consume, Pollan (2006) points out the complete disassociation people have with their food. This represents a major educational opening for green schools. Alice Waters eloquently states the case for food production as a cornerstone for green schools and sustainability, pointing out a wide range of ways to integrate food into daily lessons, from measurement and counting to irrigation and decomposition (Hoffman & Waters, 2009). Waters (2008) writes about her experience working to develop a garden at an underserved middle school in Berkeley, California. Through the project Waters (2008) describes the connections that students can make by experiencing their science through food and a school garden.

> By the time a young girl has finished a delicious meal and returned her table scraps to the garden soil, and gone back to planting and harvesting with her science class, she is well on her way to understanding the cycle of life, from seed to table and back again - absorbing almost by osmosis the relationship between the health of our bodies, our communities, and the natural world (p. 10).

In this space, school gardens present an opportunity to both reconnect children with their food, but also as an ideal space for student inquiry in the arena of science and arithmetic. Additionally, history and social studies can intertwine with the aforementioned subjects as students learn about the cultural and historical roots of food in their area. Schools with gardens have the opportunity to supplement the information garnered inside buildings with examples from the school grounds. This represents yet another potential arena for connections between the facilities and the curriculum and demonstrates the interdisciplinary nature of Educating for Sustainability.

Interdisciplinary Approaches to Education

Much like Barrett (2007) arguing that academia seems inimical to environmental concerns, Kincheloe (2004) relates the view among colleagues that interdisciplinarity has little cachet when applying for tenure. Kincheloe's (2004) retort – "if one is interested in only doing good research, one should embrace" (p. 50) interdisciplinarity – has ramifications for how schools educate their students. If one is interested in only doing good education, one should embrace interdisciplinarity. Educating students ought to more closely approximate the real world. When students exit the classroom, they do not experience math, science, language arts, and social studies independent of one another. Sustainability exists in all facets of humanity's daily interactions. Combining these two facts leads to an educational system that needs to prepare students in a way that reflects this reality. Unfortunately, as Gleason (2012) points out "The American educational system is not designed to teach about the interconnectedness of systems. Rather, for generations we have been taught to compartmentalize" (para. 5). Kearins and Springett (2003) argue, "the complex and holistic concept of sustainable development requires more than a narrow disciplinary approach to developing [students'] own awareness and knowledge base" (p. 197). Making students cognizant of the far ranging, interdisciplinary nature of sustainability remains a major obstacle to implementing concepts related to this foundational concept throughout schools and education.

EfS and Sustainability on a Societal Scale

At the end of the day, the point of Educating for Sustainability revolves around the notion that sustainability needs to rest at the heart of society and education offers the best route to reach the next generation. Why bother educating for something that will not

play a central role in the lives of students? Unfortunately, sustainability has been hijacked by organizations that seemingly have little to do with the notion of sustainability (Wilson, 2011b). If sustainability, and by extension sustainable development, aims to live within the means of nature, a modified version of what Goodland (1995) refers to as "strong" sustainability, humankind must learn how to accomplish this goal, which by in large appears antithetical to the West's consumptive ideology. Kearins and Springett's (2003) critical approach to Educating for Sustainability "involves students thinking through both personal and broader societal values and ethics and how these might have impact on management decisions" (p. 193). By challenging the prevailing paradigm of consumption, looking at the context in which sustainability resides, and considering the ethical components of our societal values, students can engage in the dialogue necessary to push the sustainability conversation forward.

Until we can educate today's youth, as well as their teachers, models, mentors, and educators about sustainability – and its paradigmatic shift from rampant consumption to mindful existence within the limits to growth – overcoming deeply held consumer tendencies remains highly unlikely. The comedian George Carlin (1992) once opined, "the planet is fine. The people are fucked." Carlin's assertion seems to have some merit. A rather intriguing thought experiment by Weisman (2007) about how long it would take nature to reclaim the planet in the absence of *Homo sapiens* supports the notion that the earth indeed will be fine. Given this, sustainability becomes an anthropocentric attempt to prolong our species on the face of the planet. In order to do so, we as a species must educate for this survival, for sustainability. Without knowing the direction that the future – of humanity or future in general for that matter – will take, the imperative becomes to

plan and teach the next generations how to live within the limits of the earth. As Meadows et al. (1974) warned 40 years ago, the current trends in population growth and consumption outstrip the resources available to us in the upcoming century (i.e. this century, the twenty-first century). These limits to growth serve as the number one reason why Educating for Sustainability must progress and cultural shifts in schools from consumptive forces to paragons of sustainability have to dominate the twenty-first century agenda.

On its own, the peril faced ought to present an ironclad argument in favor of Educating for Sustainability. The fact that its merits as a pedagogically sound approach to education with positive impacts on student performance – see Lieberman and Hoody (1998) – have been demonstrated only strengthens the argument for large-scale adoption. Whether or not society moves in this direction remains to be seen. However, Educating for Sustainability in terms of societal goals and improved student performance on standardized tests – the current measure, flawed as it may be, of student success – has value. Schools may not always have the opportunity to institute EfS, let alone sustainable practices given governance structures. The system currently in place exemplifies the self-reinforcing model. Those who rose to power under the current regime perpetuate the system from which they came, one focused on testing and narrowing the curriculum to the exclusion of EfS and Multicultural Education, among other "non-traditional" approaches to learning. While constructivism as a classroom philosophy and inquiry as a pedagogical tool have infiltrated teacher preparation programs, their implementation in the classroom as a force for engaging students has not provided the anticipated bump in performance. Elmesky and Tobin (2005) claim, "there is evidence to suggest that, despite

reform initiatives, the quality of science instruction remains well below the ideal" (p. 808). They cite a study from Weiss, Pasley, Smith, Banilower, and Heck (2003) that found one out of three lessons nationally had a positive effect on math and science, while one-sixth have a negative impact, with the remainder having either no effect, or both positive and negative impacts. Engaging students as partners in the learning process will not serve as a panacea. Quality teacher preparation, professional development, and ongoing feedback all have roles to play. However, classrooms that passively transmit information and irrelevant content, exemplify the staid approach to teaching that continues to dominant many classrooms.

Engendering a Paradigmatic Shift

Paradigms act as a lens through which we understand the world around us. They tend to reflect tightly held beliefs that change slowly, if at all. In the case of our educational system, the lack of a student centered approach represents the perpetuation of a system that now appears antiquated. However, a paradigmatic shift requires a crisis, which occurs when anomalies cannot be resolved (Kuhn, 1996). It appears we have not quite reached the point of an anomaly, but the disconnect between our rampant consumption, exploitation of resources (people and natural capital), the way in which we educate, and the need to create a sustainable path forward may rapidly foment a crisis. Beveridge (1957) argues that scientists at times are so entrenched in the current view – or paradigm – that they are unable to see new discoveries as valuable. Populations at large fall victim to the same effect. The blinders, with which they go through their daily work, prevent them from seeing the intrinsic value of the new ideas or discoveries. Kuhn (1996) would argue that this results from the fact that they are constrained by the paradigm

within which they are working. When a paradigm and new evidence become incompatible, a different paradigm must emerge, one that can explain new findings. The extant paradigm of consumption runs counter to sustainability: an anomaly. Could a crisis come next? Gruenewald (2001) asserts, "An unsustainable society is the context in which children - all of us - are educated" (p. 5). This sure sounds like a crisis.

Proposed Solutions

A number of the issues that arose over the course of this research have no clear solution. However, some options exist for dealing with the barriers and concerns of how to more fully articulate a vision of EfS in K-12 education.

Overcoming barriers

Despite the barriers laid out by Chip and Matt, as well as the literature, both participants see hope in the sometimes bleak endeavor. Matt provides in house professional development via brief presentations to the faculty at BDS. As the consummate educator, he sees more education for staff, as a significant part of the solution.

> I think more education to, for staff I'd do every year, I do this kind of basic, this is, this is what we're doing, this is how you can help, this is how you can educate your kids, I do with all the science teachers, particular because they, they have more of that in the curriculum, but I also do that with all the lower school classroom teachers as well so they get a chance to see what is the purpose of what, why should, uh, why should I care about this in literacy, why should I care about this in social studies, and it's like they can figure out where to bring it in to all those different curricular areas so it's not just, uh, something you do on the side, it's something you integrate into everything you do (interview, October 26, 2012).

Chip saw students as the key to overcoming the barriers. In the individual interview after the conference, he picked up on the same note, observing "if we can get some enthusiasm from the students, from the bottom up, I think that can be overcome" (interview, October

26, 2012). Looking at the example from Douglas County schools (Garcia, 2013), where students conducted energy audits, students may well represent the greatest hope to affect change with regard to sustainability education.

Chip's commitment to sustainability in schools extends beyond the spatial and temporal represented in this research. His efforts to engage leaders in the independent school movement began in earnest after the completion of this study. He identified the following needs in independent schools vis-à-vis sustainability:

> • closing the gap between aspirations and ability to act on those aspirations
> • developing common/shared metrics
> • real-time data/reporting
> • data driven decision making
> • best practices understanding
> • ability to benchmark progress
> • developing indexes to promote collaboration and common goals
> • risk management (energy, environment)
> (personal communication, October 24, 2013)

These factors go to the root of decision makers at schools, the seat of power. What Chip starts to address is the lack of coordinated effort at schools, the need for administrative support, and ultimately the resources from schools' leaders.

Top-Down vs. Bottom-Up

Unfortunately, the lack of coordination does not portend well for individuals trying to instill sustainability throughout their respective campuses from the bottom-up. Chip's comment about "enthusiasm from the students, from the bottom up" (October 26, 2012) is telling. Hope abounds, though solely working from the bottom-up may feel like a Sisyphean task, especially as students age out of the school and club or group leaders must re-introduce goals every few years to neophytes.

A Hybrid Approach

A combination of top-down and bottom-up strategies – the hybrid approach – requires coordination and dialogue between constituencies. Fostering a sense of sustainability and its associated behaviors within various groups – faculty, staff, students, and community members – must also play a vital role in the process. Chip's assertion that schools need metrics to make the case for sustainability sits firmly in the business end of schools. The autonomy of independent, and to an extent charter schools, provides an opportunity to consider these facets of sustainability. Because their fiscal health depends on fundraising, these schools have a unique opportunity to align their actions in the realm of environmental sustainability with the long-term financial well being – the fiscal sustainability – of their schools.

Mandating Sustainability via School Accreditation

In what may amount to the ultimately top-down thinking, in conversations after the workshop ended, Chip considered the role of the accreditation organization and their governing principles in relation to sustainability. Governance structures and accreditation requirements for independent schools represent a major component of their existence, with oversight at regular intervals. Chip's discourse shifted to include these metastructures, unearthing the foundational barrier of a school's operations. If the documents and guidelines of organizations responsible for oversight and enforcement fail to acknowledge sustainability, thereby failing to assess schools on this principle vis-à-vis accreditation, then the system effectively denies its importance.

Schools can individually choose to embrace sustainability, but they have little to no external impetus to further sustainable goals in light of their accrediting organization.

Discussion at the first meeting, hosted at BDS, included the idea of having a local branch of the National Association of Independent Schools (NAIS) sustainability group and how the Rocky Mountain Independent School Association (RMISA) did not include sustainability in its mission. Chip in particular picked up on this, questioning the role of the statewide organization to lead. He wanted to see if RMISA "can really be a leader in the, in the country on how to establish this type of, of relationship, collaboration amongst schools that are, I guess, theoretically competing, but we're trying to find avenues of collaboration" (joint interview, September 21, 2012).

Finding a Best Fit

Whether employing a top-down, bottom-up, or hybrid approach yields the greatest impact remains unclear and ultimately depends on the extant school culture. Chip achieved a series of accomplishments throughout VVS's campus. His effort in fundraising returned the investment of a 10-kilowatt photovoltaic array, which came from the donation that also paid his salary. It appears, in part at least, that Chip's success, though not up to his standards, may follow from having a seat at the table and buy-in from the top levels of the school's administration. This seemingly plays an important part in these schools' attempts to integrate sustainability. Personal experience supports this, as my work with Mar Costa Charter High School demonstrates. The principal contacted me to help engage the school community in sustainability measures. Along with his guidance, the Chief Business Officer played a key role in pushing the initiative forward. Having buy-in from top-level administrators ensures that MCCHS will implement its sustainability programs, whatever shape they may take. Whether the initiative will succeed is unclear, as guaranteeing buy-in from all stakeholders remains uncertain at this

juncture in the collaboration. Regardless of the approach, Senge (1990) cautions, “It can truly be said that nothing happens until there is vision. But it is equally true that a vision with no underlying sense of purpose, no calling, is just a good idea -- 'sound and fury, signifying nothing’" (p. 149).

Good Intentions: Unfulfilled Aims

The Clearinghouse

Another focus of Matt’s over the course of the workshop centered on the notion of developing a clearinghouse for sustainability related content. In the opening days of the workshop, I mentioned my work with a statewide environmental education organization that potentially would construct a database of local experts. Matt repeatedly touched on this idea over the course of the year long PD.

> I’d like to see that, like, figure out that clearinghouse, figure out that, those organizations, like how we can bring ideas together and be able to use each other as idea generators and also figure out, um like, that whole idea of that purchasing power, that power in numbers and trying to figure out how we can do that, and do that better than currently, ‘cuz I know that, I mean I’ve talked to [Eliot], I was . . . he, he was, he told me earlier he probably wouldn’t be able to make it to the meeting, ‘cuz, ‘cuz of Grandparent’s Day I wanted to see what his input was on . . . ‘cuz that’s one of the big things, is the purchasing, like how the things cost more, if they’re, if they’re going to be green or non-toxic or something like that, so um, how do you justify that in a world where you have to watch your bottom line (joint interview, September 21, 2012).

Initially discussed on the first day of the workshop, the clearinghouse elicited a positive response from Chip as well. “I like the idea of a clearinghouse of people that are experts in the field, different sustainability fields. Yeah, how to keep up on what are the cutting edge ideas out there. What are, what’s going on” (focus group, August 7, 2012).

Pooled Purchasing of Sustainably Sourced Products

On several occasions, Matt laid out his vision for the potential collective purchasing power of schools governed by the Rocky Mountain Independent School Association. Matt brought this notion up on numerous times, including trying to tie purchasing of sustainably sourced materials with one of the nearby universities that has a sizeable purchasing program geared toward procuring sustainably sourced materials.

Matt pushed for leveraging the collective ability of this group to make a push in purchasing.

> I think, strengthening the networking that we have, understand like, it's not just talk, put some actions to it. So, how do we do maybe do something with purchasing. How do we do stuff with knowing what each others' programs are and how we can help each other with like, clubs, and help each other with, uh, organ— like organizing staff and like parents and things like that (interview, October 26, 2012)

He brought this notion up at the second meeting as well, making the case for bargaining power to purchase more sustainably produced goods. At the first meeting, one business manager attended, but like many of the ideas espoused, the notion of pooling purchasing failed to gain traction.

Community of Practice

After a December 2008 workshop in which sustainability consultant Henry Jameson presented at Braeburn, an informal meeting of like-minded individuals began with the intent of regular conversations and interscholastic competition between Rocky Mountain Independent School Association members around various environmental sustainability goals. A battery recycling competition took place and plans were in development for an energy conservation contest. Meetings ceased until the formation of this research project. In essence, this represents the second attempt at regular meetings.

However, much as happened in the first iteration, the meetings fell victim to busy schedules, other priorities, and the daily minutiae Matt alluded to in his call for "check-ins" early in the process. Without formal buy-in from the association or heads of school, no budget, set schedule, or expectations existed outside those created by Chip and Matt.

Given the diffuse nature of the participants in the two meetings organized and run by Chip and Matt, it could be argued that they developed a sort of community of practice consisting of both practitioners and lay people from organizations throughout the nonprofit and educational worlds. With several people moving in and out of these meetings, Chip and Matt began to develop a network of like minded individuals with expertise in a number of areas related to sustainability, but only tangentially connected to education. It becomes their task to weave these disparate pieces together with other school personnel from various independent schools throughout the region. This community of practice must coalesce though in order for Chip and/or Matt to realize success on the broader level.

Changing the Way Schools Operate: Cultural Shifts

Changing the way schools operate will not happen overnight, nor will it happen within a generation. In fact, institutions that have stood as long as schooling has – and enjoying the unfettered support from policymakers – can only be expected to continue in their position of dominance. Subverting these structures falls on the shoulders of the individual. Matt and Chip can affect change on the individual level, though even this proves difficult. Although Margaret Mead is credited with the following quotation, "Never doubt that a small group of thoughtful, committed citizens can change the world; indeed, it's the only thing that ever has" Lutkehaus (2008) suggests no record of it in her

published work exists. Aside from question of attribution, the point relates to Chip and Matt. For a more contemporary example, Malala Yousafzai points out in her battle against ignorance, "*If one man … can destroy everything, why can't one girl change it?*" (author's emphasis) (Yousafzai and Lamb, 2013, p. 141-2). With this grassroots/go it alone mentality, I make the case that change must indeed start on the level of the individual. While a hybrid top-down, bottom-up approach embodies the ideal situation, suggesting a single archetype for engaging in a paradigmatic shift toward sustainability within our schools runs counter to the notion of progress. What works in one location will not necessarily guarantee success in another. Assessing the culture and attempting to work within the confines of the individual school, or in some cases school system or district, represents a more realistic way forward. To think that EfS will become the standard simply because it represents a better way forward is not only foolish, but ignorant of the hardships demonstrated by such educational movements like Multicultural Education.

"Shifting a culture requires a tremendous amount of patience, persistence, and collaboration" (Gleason, 2012, para. 1). To that succinct list, I would add dialogue. Conversations where stakeholders can make their case for sustainability as integral to a school's mission take time. To suggest a complete shift would be a fool's errand. However, incremental steps can move schools to become more sustainable, specifically when the institution itself benefits. Leadership, whether originating from the administration, faculty, students, or staff, must incorporate multiple perspectives. A pluralistic approach may threaten those in power. Helping these people, who may feel threatened by change, see how a shift benefits all participants in the school, as well as the

school's reputation (either through student performance or recognition in the community as a leader), takes precedence. Change can be slow and painful, though it need not be.

Part of the discussion needs to include systemic change. At the end of the day, without systemic change, the hegemonies that shackle education remain. By heading in a direction where stakeholders – including students, community members, and parents – all have a voice, schools can create localized sustainability hotspots. When these discussions move beyond the classroom, beyond the curriculum, beyond the institution, and into the community, into the policies, into the seats of power, then sustainability will take root. Starting with a single teacher, or a committed group of students, as a staunch supporter for EfS represents the commencement, but at some point that energy has to lead to systemic change.

The Need for Buy-in and Strong Leadership

Without strong leadership, buy-in from stakeholders, and open communication, sustainability initiatives will suffer from a lack of direction and ownership. Developing a Sustainability Management Plans (SMPs) needs to take place on the local level. Implementing a generic, centrally generated plan to integrate sustainability into schools will undoubtedly fail. Context matters. The one-size fits all standardized model cannot work for schools that have a variety of needs and unique characteristics. Finding local solutions to match the culture of a school is paramount. In the case of Emory University, healthcare served as the linchpin that brought the community together (C. Howett, personal communication, November 5, 2012). Cultural change focused on sustainability requires buy-in to the idea that sustainability, whichever facet a school deems important to its long-term survival, has value. Decoupling sustainability from ideological positions

starts the process of understanding sustainability's role at a given school. Each institution has different needs, but at the end of the day educating students remains a common goal of schools. Indeed, they educate not for yesterday or today, but for the future. Coming together around this notion of educating for the future good of humanity yields one major theme, sustainability.

Power Structures and Inhibiting Voice

An important, and significant, corollary exists to the strong leadership argument. When a leader pushes against sustainability and stifles dissent, sustainability will fail to flourish if it is not part of the leadership's vision. Leadership need not solely come from the top. Just as the hegemonies of consumption and testing thwart sustainability and multiculturalism, so to can the hegemonic power structures existent in schools. Giving voice to students, faculty, and families represents an integral part of curricular and cultural change. Dictates from administration and transmissionist instruction prevent organic ideation and creativity from bubbling up through the system. Students who may exhibit a passion for sustainability, multiculturalism, or feminist thought often fall victim to a system that inhibits dialogue. Lemke (1990) outlined the didactic nature of many science conversations, demonstrating how little opportunity exists for meaningful discourse in the classroom. In order for bottom-up initiatives to gain momentum, school power structures need to support students, faculty, and parents in the partnership of education. A one-way transmission of knowledge fails to adequately prepare the range of students in a given class for the "real world." Projects and proposals by traditionally under-represented groups in a school's power arrangement need support to come to

fruition. Cultural change of this ilk would represent a veritable sea change, a true paradigm shift.

Charter Schools and EfS

While independent schools employed both participants in this study, there is a burgeoning sect of schools in the public education realm that can engage in the tenets of EfS due to their autonomy. Starting in August of 2013, I began working with MCCHS, a charter high school on the West Coast, to implement a plan modeled on this workshop. Unique from a start-up style charter, a few years ago, MCCHS converted to an autonomous organization after having been organized under the auspices of the local public school board since its founding more than 40 years ago. Amongst the school's features that provide inroads for EfS, is an integrated approach to curriculum among one of the school's three tracks. The administrative team approached me to consult for them as they work to integrate sustainability throughout their school's campus and culture. As the only high school in their city with an alternative school under their administrative structure, MCCHS is in the unique position to work with both nontraditional and high-achieving, pre-collegiate students.

MCCHS's principal asked me to write a proposal (Appendix J) for the school that would look at how they could become more sustainable. Without having met the administrative staff and having only spoken to the principal, the proposal was intended to serve as a starting point for conversation as to the school's needs. After an in person meeting with the principal, three assistant principals, the Director of Facilities, the Chief Business Officer, Chief Technology Officer and his assistant, the alternative education program's director, co-chair of the science department, and director of MCCHS's

interdisciplinary curriculum track, the school's interests materialized and led to a statement of work (Appendix K) that reflected what the school needed in their attempt to become a more sustainable school. First among the order of business was an assessment of the school's sustainability culture. Appendix L contains the survey submitted to all faculty and staff members of MCCHS. Next steps include student, parental, and community responses to the survey. Getting responses will be challenging as MCCHS maintains a large student body, roughly 3,700 students, including the alternative education program.

Project Based Learning and Workplace Opportunities

In keeping with the anti-textbook rhetoric, Educating for Sustainability has the opportunity to make use of project-based learning in a way that provides students with real-world, hands-on experiences in an interdisciplinary approach. Innumerable possibilities exist for project based learning in the realm of sustainability. At MCCS, we have discussed a handful of ideas for their alternative school, which serves students that have met with challenges in traditional classroom settings. The ideas proffered for project based approaches to their curriculum intend to engage students, introduce them to the concept of sustainability, and prepare them for jobs that might otherwise be out of their reach. See Table 6 for a brief overview of potential project based learning scenarios for the alternative school at MCCHS.

Underserved Student Populations

In Philadelphia, Pennsylvania, The Workshop School takes at risk students and employs project based learning to teach students principles of science, mathematics, literacy, and engineering, while couching the curriculum in an appealing, sustainability

laden manner that engages youth who otherwise fail to receive the attention and energy of the educational establishment. Their mission is

> to unleash the creative and intellectual potential of young people to solve the world's toughest problems. We do this by putting real world problems at the center of the curriculum, and evaluating students' work based on the progress they make in defining, exploring, and ultimately developing solutions to those problems. We create a culture that fosters creativity, risk-taking, and responsibility for self and others. And we help students understand that setbacks are a necessary part of doing challenging work, and that the most important thing is to learn from them and press on (The Workshop School, n.d.).

This approach could prove useful beyond underserved populations, but it provides a real incentive for those that have been chronically oppressed by the education and workplace systems. Project based learning offers an engaging approach to learning as well as real world experience in areas that may have reliable and locally sustainable job opportunities. By couching education in a more application oriented fashion, students that choose not to continue their schooling can access quality jobs out of high school.

Green Jobs as Post-Secondary Opportunities

Marginalized groups like Native Americans often live in the most deplorable conditions (Riley, Thatcher, and Workman, 2006). Low-income urban children (Krieger, Song, Takaro, and Stout, 2000) often live in similarly wretched, unhealthy conditions. By designing a course aimed to educate under-served populations and prepare them for work in the field of energy efficiency, weatherization, and retrofitting, participants can gain valuable skills that will place them at an advantage in the "green economy," or what Gray (2009) refers to as "green collar jobs." My work with MCCHS aims to implement curricular themes centered on EfS with specific worker readiness goals. As outlined in the project based learning section, the hands-on, minds-on approach plays an important role in reaching out to the alternative school population at MCCHS. In response to the

use of a bicycle repair shop as the classroom, the assistant principal in charge of the alternative program put it best saying,

> Our kids at the alternative site so prefer manual labor to desk type jobs. I really like this because there is immediate feedback--learning mechanics that is applied, marketing with the rentals, and of course the physical exercise part (L. Ring, personal communication, November 19, 2013).

By preparing students for jobs that benefit their community and environment, while earning a living wage, schools can lift students out of the cycle of unemployment and underemployment that terrorizes young adults, especially those of color and lower socioeconomic status. According to the Bureau of Labor Statistics (2011),

> From April to July 2011, the number of employed youth 16 to 24 years old rose by 1.7 million to 18.6 million. . . . This year, the share of young people who were employed in July was 48.8 percent, the lowest July rate on record for the series, which began in 1948. (The month of July typically is the summertime peak in youth employment.) Unemployment among youth increased by 745,000 between April and July, more than last year's increase of 571,000 (p. 1).

Pinderhughes (2006) outlines 22 areas for green collar jobs reproduced in Table 7. These sectors represent jobs that cannot be outsourced. By focusing on these areas, education can offer a path to independence. A recent story from National Public Radio discussed the skills gap and how the German system of apprenticeship can serve as a model to put workers in jobs that need filling (Capelouto, 2014). Preparing high school students for green jobs represents a major area for growth and an opportunity to improve their earning potential.

Moncarz and Crosby (2004) report that those with less than a college degree fill most of the jobs in the United States.

> Between 2002 and 2012, BLS expects about 56 million job openings to be filled. Of this total, about 42 million openings are projected to be filled by workers who do not have a bachelor's degree and who are entering an occupation for the first time. About 27 million of these openings are expected to be held by workers who

have a high school diploma or less education. Another 15 million openings are expected for workers who have some college education or an associate degree but do not have a bachelor's degree (p. 3).

Table 6: Hands-on Learning, Green Jobs Preparation, and Alternative Schools

Project	Explanation	Disciplinary Connection(s)	Sustainability Component(s)
Auto/Bike Shop	Auto shop for high efficiency cars; converting cars from diesel to biodiesel; making your own biodiesel; converting cars to electric cars; bike repairs with potential for operating a small business focused on rentals	Physics, Engineering, Math, Economics	Transportation, Employment opportunities
Wood/Metal Shop	Welding and craftsmanship; skills that cannot be outsourced and that encouraged conscientious resource use; entry point for green jobs	Math, Engineering	Resource conservation, employment opportunities
Nursery/Garden	Grow food and greenery (possibly in a greenhouse); cooking of harvested food; potential for operating a small business focused on food, farmers market, or nursery	Epidemiology, Health, Math, Language Arts, Nutrition, Economics	Healthy/locally produced food, employment opportunities
Energy and Water Audits	Learn the process of conducting an energy or water audit; perform audits in neighborhood/community	Economics, Math, Physics, Fluid Dynamics	Community engagement, resource conservation, employment opportunities
Retrofits and Renovations	Using existing facilities in need of renovation/retrofit to maximize energy and water efficiency, thermal comfort	Physics, Math, Health, Epidemiology, Biochemistry	Construction, renovation, employment
Solar Installation	Rooftop or ground mounted solar installations; hands-on/apprentice experience	Physics, Engineering, Math (Geometry)	Renewable energy, employment opportunities
Green Roof	Rooftop/wall installations of vegetation (either for purposes of food production or xeriscaping)	Physics, Engineering, Math (Geometry)	Resource conservation, employment opportunities

Ensuring access to high quality jobs linked to sustainable ventures can provide meaningful work in an increasingly competitive workplace. A focus on green collar jobs

also works to incorporate underserved populations that have not traditionally been represented in sustainability.

Future PD Workshops

Ultimately, the goal of this research aims to develop a model for transformative participatory professional development where educators embed sustainability in their schools. Invariably this process will require ongoing efforts, not a single, one-off effort to bring a modicum of sustainability to the curriculum or school grounds. Ideally, future workshops will take place at participants' home institutions so as to make connections between the campus facilities and the curriculum more explicit. Using the Piedmont Project (Barlett, 2004) as an example, small groups of faculty members would engage in yearlong discussions and revisions of their course's syllabi. Past participants of this professional development would then serve as mentors to other faculty and staff interested in similar work. Additionally, future workshops would involve participants earlier than this research in an attempt to reflect their interests more closely. As noted, due to time and IRB constraints, the first two days of this workshop did not elicit feedback from participants prior to planning the schedule of events. However, with a small group, we maintained the flexibility to adapt on short notice. Providing focused professional development opportunities may not offer the operating efficiency of large scale "sit and get" PD schemes, but it allows for meaningful engagement with the process that gives participants a voice in the process, which more accurately reflects how people learn. Simultaneously, keeping the groups to a manageable size allows for scheduling follow up sessions to reengage the participants in an attempt to support them as they integrate sustainability in their school, classroom, or physical plant.

Table 7: Green collar job opportunities through high school programming

Green Collar Job Sectors
Bicycle repair and bike delivery services
Car and truck mechanic jobs, production jobs, and gas station jobs related to biodiesel
Energy retrofits to increase energy efficiency and conservation
Green building
Green waste composting on a large scale
Hauling and reuse of construction materials and debris
Hazardous materials clean up
Landscaping
Manufacturing jobs related to large scale production of appropriate technologies (i.e. solar panels, bike cargo systems, green waste bins, etc.)
Materials reuse
Non-toxic household cleaning in residential and commercial buildings
Parks and open space expansion and maintenance
Printing with non-toxic inks and dyes
Public transit jobs related to driving, maintenance, and repair
Recycling and reuse
Small business producing products from recycled materials
Solar installation
Tree cutting and pruning
Peri-urban and urban agriculture
Water retrofits to increase water efficiency and conservation
Whole home insulation including attic insulation, weatherization, etc

Table adapted from Pinderhughes (2006)

CHAPTER VII

CONCLUSION

> We are entering a period of human history that may provide an answer to the question of whether it is better to be smart than stupid. The most hopeful prospect is that the question will not be answered: if it receives a definite answer, that answer can only be that humans were a kind of 'biological error,' using their allotted 100,000 years to destroy themselves and, in the process, much else.
>
> The species has surely developed the capacity to do just that, and a hypothetical extraterrestrial observer might well conclude that humans have demonstrated that capacity throughout their history, dramatically in the past few hundred years, with an assault on the environment that sustains life . . . on the diversity of more complex organisms, and with cold and calculated savagery, on each other as well (Chomsky, 2003, p. 1-2)

Schools have an obligation to lead the way forward. In an era marked by political bickering, schools need to find common ground to move forward toward a more sustainable future. Starting with Gleason's (2012) argument that schools shape the future, educators have a mandate to incorporate sustainability into the curriculum. Regardless of the definition one ascribes to sustainability, it is about the future, namely the future survival of the human species. While teaching Lab Aids' Science Education for Public Understanding Program Science and Sustainability (SEPUP et. al, 2001) curriculum to eighth graders, students invariably defined sustainability – prior to the first lesson – as: surviving, continuing, keeping going. In order to ensure a future for our species, an admittedly anthropocentric view, sustainability must exist as a central tenant in education. Businesses will adopt sustainable practices when it suits their fiscal bottom line (Senge, 2008). Schools need to integrate sustainability as a matter of society's "strategic plan."

Despite the IPCC (2007) report, "Hope springs eternal in the human breast" (Pope, 1994, p. 48). Chip encountered frustration at nearly every turn – as he saw it. However, stepping back, he accomplished quite a bit at Valley Vista School and made a lasting

impact. Although he no longer works at VVS, the photovoltaic system, daylighting project, and zero waste initiatives he either spearheaded or collaborated on, have outlasted him. Matt on the other hand continues to push for sustainability, though more directly in the classroom. Working with teachers of younger students – those who express an interest, willingness, or the flexibility to integrate sustainability – Matt has continued to spread sustainability throughout Braeburn Day School. Rearing a generation, let alone a society, of "sustainability natives" (Libby, 2012) requires a thoughtful approach. While the stakes are daunting and possibly disheartening, clearly doing nothing is the worst option.

Practically speaking, developing measures, benchmarks, goals, a mission, and assorted ways to assess a school's sustainability can serve as a guidepost, especially during times of stress and strain. Institutionalizing sustainability requires a whole host of factors. Setting up a system that supports and reinforces sustainability, while making those measures available and transparent, will further these aims. Without being able to produce some sort of data to support their feelings of frustration, Chip and Matt merely voiced a sense of failure. However, as noted several times, Chip made several concrete improvements in terms of energy consumption and production at VVS. Matt's ability to integrate their LEED certified structure into the curriculum also serves as a testament to the fact that they made a positive impact. In the early stages Matt acknowledged barriers to Educating for Sustainability were virtually nonexistent at Braeburn – in his mind. Unfortunately, feelings of frustration arose regardless of successes. Producing a report similar to the one Chip suggested students generate, could help both verify their impact.

Knowledge holds the key to a sustainable future and schools act as society's *de facto* disseminator. Wohl (2009) offers the following consideration, "My only hope is that knowledge, once sufficiently widespread, will foster in all of us a sense of responsibility and a resolve to modify our society's destructive patterns of resource use" (p. 71). Indeed, knowledge will light the way, schools will provide the spark, and sustainability – as its definition implies – will keep the flame lit.

Delimitations

As with any study, particularly in qualitative research, numerous delimitations exist. The design of the workshop required participants to self-select and do so during the summer of 2012, when many individuals may have already chosen other opportunities, or to take a break from work and school related experiences. Additionally, professional development itself acts as an external impetus, despite the attempts to create a participant driven program. A condensed timeline created numerous pressures on scheduling, recruiting, and engaging participants and presenters.

Both Chip and Matt come from independent schools. While hardly representative of a larger sample of schools, their experiences can provide valuable insight. However, with the two participants involved in the study, and the third school acting as a supplementary example, their knowledge yields a set of ideas that has value in the arena of Educating for Sustainability. To draw wide conclusions from this study would be foolhardy. This by no means discounts the observations and inferences derived from Chip, Matt, and others who came into contact with them during this time. In the end, Chip and Matt hold rare positions in the field of education. I must caution against extrapolating from this pair beyond the admittedly insular group of sustainability-minded individuals.

Each school maintains a unique culture with distinct characters. While the roles remain the same (administration, faculty, staff, students, etc) the specifics will never be the same.

Life After the Workshop

For Chip, the work of Educating for Sustainability took on a different level of importance. By necessity Chip's nascent sustainability consulting career, which began with the two-year position at Valley Vista, became a focal point once his contract ended. In order to provide for his family, he needed gainful employment. In his post-Valley Vista career, Chip has reached out to organizations and individuals engaged in the field of EfS. He is part self-starter, part collaborator; often willing to work with others to find the balance between making sure he can scratch out a living and promoting sustainability in schools. "I am interested in helping schools 'do the right thing' *and* (by necessity) in the interesting business opportunities that are presented. We all need to be sustainable in our professional lives too" (C. Prentiss, personal communication, October 24, 2013). By acknowledging the need to find meaningful work that furthers sustainability, and thereby provide a self-sustaining work situation, Chip has immersed himself in the task of carving out a position that will serve his dual needs.

In partial contrast, Matt's focus understandably shifted to his family. As a first time father at age 43, Matt's priorities rested at home. While he continued to work at Braeburn in the multiple roles assigned to him, any extra time that had been potentially available to dedicate to BDS's sustainability work turned to the home front. Matt continues to work on sustainability initiatives at Braeburn, but as referenced earlier, in conjunction with coaching duties and teaching responsibilities, he has numerous demands for his time. As a direct connection to these demands, he must allocate time judiciously

and prioritize, which results in diminished opportunities to focus on sustainability away from BDS. Matt stepped back from the ongoing nature of the professional development experience to spend time on his prior (and emerging) commitments. On the other hand, Chip has reached out repeatedly via phone and email, keeping me abreast of developments in his meetings with others and his goals. Continued discussions have allowed both of us to further the efforts of bringing EfS to a wider audience. Multiple meetings in person in his hometown after the official end of the workshop have also demonstrated Chip's renewed commitment to making EfS, and consulting with schools, his mission. However, success has not come readily at this juncture. Despite setbacks, he continues to engage in the process.

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APPENDICES

Appendix A: Sample Interview Questions (Participants)

- Have you used the campus structure(s) in your classroom as a teaching tool/to enhance curriculum?
    - If yes, how have you? If no, why not?
- What role (if any) do the facilities play in your curriculum?
- Why do you (or don't you) use the facilities as a "living lab"?
- What barriers do you see to using the facilities in the curriculum?
- How would you recommend overcoming these barriers?
- Do you think it is worthwhile to use the facilities in the curriculum?
    - Why or why not?

Appendix B: Research Consent Form

Date: June 18, 2012 **Valid for Use Through:**

Study Title: Buildings as Teaching Tools: A Transformative Professional Development Experience

Principal Investigator: **Eric Wilson**
COMIRB No: **12-0824**
Version Date:
Version No:

You are being asked to be in a research study. This form provides you with information about the study. A member of the research team will describe this study to you and answer all of your questions. Please read the information below and ask questions about anything you don't understand before deciding whether or not to take part.

Why is this study being done?

You are being asked to be in this research study because science teachers are an essential component to teaching students about resource use and energy consumption. This study intends to develop a professional development workshop that helps teachers integrate the school buildings in the curriculum to provide students with a place-based educational experience.

Up to *12* people will participate in the study.

What happens if I join this study?

If you join the study, you will be enrolled in a professional development workshop that spans 2 days in the summer and three days throughout the 2012-13 school year. One day will be in on a Saturday in September, one on Friday, October 26th at the United States Green Building Council's (Colorado Chapter) Green Schools Summit, and one date on a Saturday in the spring. Participants will earn 3 Continuing Education Units (3 CEUs) through the University of Colorado Denver.

What are the possible discomforts or risks?

Discomforts you may experience while in this study may include an increased level of stress due to the workshop taking place on weekends and during vacation time. Since this is a new professional development experience, there may be other minimal risks to the participant, which are currently unforeseeable.

What are the possible benefits of the study?

Participants will earn CEUs and take part in a new professional development model.

Are there alternative treatments?

There are no alternative treatments.

Who is paying for this study?

This research is not funded. It is solely for the purpose of my doctoral research. It is my intention to offer this professional development to schools in the future with the aim of increasing the place-based and energy conservation aspects within school curricula.

Will I be paid for being in the study? Will I have to pay for anything?

You will not be paid to be in the study. You will need to pay for the continuing education units, which cost $32 per unit. The total costs will be $96 for 3 CEUs. Partial CEUs may be earned. For each 15 contact hours, 1 CEU will be earned.

You will be provided with a book from which readings will be selected. This will be at no cost to you.

Is my participation voluntary?

Taking part in this study is voluntary. You have the right to choose not to take part in this study. If you choose to take part, you have the right to stop at any time. If you refuse or decide to withdraw later, you will not lose any benefits or rights to which you are entitled.

Who do I call if I have questions?

The researcher carrying out this study is Eric Wilson. You may ask any questions you have now. If you have questions later, you may call Eric Wilson at 303.956.0865.

You may have questions about your rights as someone in this study. You can call Eric Wilson with questions. You can also call the Multiple Institutional Review Board (IRB). You can call them at 303-724-1055.

Who will see my research information?

We will do everything we can to keep your records a secret. It cannot be guaranteed.

Both the records that identify you and the consent form signed by you may be looked at by others.

- Federal agencies that monitor human subject research
- Human Subject Research Committee
- The group doing the study
- The group paying for the study
- Regulatory officials from the institution where the research is being conducted who want to make sure the research is safe

The results from the research may be shared at a meeting. The results from the research may be in published articles. Your name will be kept private when information is presented.

Photography, Video, and Audio Recordings

All recordings will be maintained on the investigator's home computer which is password protected. Digital copies may be made for transcription, but will be returned to the investigator and destroyed upon transcription. Any other hard copies (disks, transcriptions, etc) will be kept in a safe under lock and key. Data will be kept for 5 years, and then erased.

Agreement to be in this study

I have read this paper about the study or it was read to me. I understand the possible risks and benefits of this study. I know that being in this study is voluntary. I choose to be in this study: I will get a copy of this consent form.

Signature:_____ Date:_____

Print Name:_____

Consent form explained by:_____ Date:_____

Print Name: _____

Investigator:_____ Date:_____

Appendix C: Focus Group Interview

- What constitutes a green school in your mind?
    - What do you think of when you hear the term "green school"?
- What support would you like going forward?
    - Do you feel as though remaining in contact with this cohort will be beneficial? Why? Why not?
- What had you hoped to gain from this experience (but did not)?
- How would you improve the workshop?
- What barriers remain in using your facilities in the curriculum?
- Has this experience influenced your educational philosophy? (Hand out what they wrote). If so, how?

From "Pre-Workshop Questionnaire"

- What do you hope to gain from this experience?
- How do you define sustainability?
- What is the role of schools to educate for sustainability?

1. What do you see as the barriers to integrating school facilities into the curriculum?

- How would you define place-based education?

Appendix D: Professional Development Schedule

Tuesday, August 7th:
8:30 am: Bagels, Coffee, Introductions
9:30 am: USGBC speaker
11:00 am: Buildings as Teaching Tools
12:30 pm: Brown Bag Lunch round table
1:30 pm: Tour of the Alliance Center
3:00 pm: EfS and Place-Based Education
4:30 pm: Reflection, Lesson Planning

Wednesday, August 8th:
8:00 am: Bagels, Coffee, Debrief
9:00 am: Tour of UCD facilities
10:30 am: Lesson plan development
12:30pm: Brown Bag Lunch round table
1:30pm: Energy Audits
3:00 pm: Lesson plan development

4:00 pm: Debrief (30 min)
Optional: Tour of the Alliance Center
HW: Develop new unit, Journal reflection
Green School Audit Competition

Appendix E: Fact Sheet

Name:
# of years teaching
Main topics taught
# of years in current position (teaching current grade level/topic)

Appendix F: Pre-Workshop Questionnaire

Please submit a brief cover letter (1-3 paragraphs) explaining your interest in learning about using your campus/buildings as teaching tools.

Name:	
Number of years teaching	
Main topics taught	
Number of years in current position (teaching current grade level/topic)	

2. What do you hope to gain from this experience?
3. How do you define sustainability?
4. What is the role of schools to educate for sustainability?
5. What do you see as the barriers to integrating school facilities into the curriculum?
6. How would you define place-based education?

Appendix G: Agenda for September 21, 2012 Meeting

Location: Braeburn Day School

1. Introductions
2. Brief tour through Phillips Hall would be good as well as our renovated theater (it used concepts from LEED but isn't trying to get certified)
3. Past Rocky Mountain 3xE "Challenges"
4. New Agenda Items
    - Chip Prentiss's Green School's Questionnaire
    - Celebrate successes, real or perceived barriers to advancing sustainability at our schools.
        - if it's only a money thing, then we can strategize together (crowd funding?)
5. Moving Forward
    - Future E-Alliance "Challenges"

- New Ideas
- Colorado Green Schools Summit (October 26th)
- Next Meeting: ask for a commitment to meet at least twice a year in person?
    - Location
    - Date
    - Agenda

Appendix H: Collaboration Questionnaire

Dear Sustainability Partners,

Please take a moment to fill out this template as a basis for sharing what is happening at our schools.

Briefly describe what your school is doing as relates to these categories:

- Sustainability initiatives
- Student Services and Green Events
- Food
- Transportation
- Buildings and Grounds
- Waste Stream
- Energy
- Purchasing

Contact:

Appendix I: VVS's Completed Collaboration Questionnaire

Valley Vista School

1. **Sustainability initiatives**
    - **a.** Sustainability assessment, 2011;
    - **b.** sustainability coordinator hired, 2011;
    - **c.** sustainability written into school strategic plan, 2011;
    - **d.** partnerships with the city of Valley Vista
        - **i.** 10forChange program,
        - **ii.** Leave No Trace,
        - **iii.** Community Cycles,
        - **iv.** Ecocycle
2. **Student Services and Green Events**
    - **a.** High School Eco Club (elective class and club);
    - **b.** Sustainability Committee (parents, faculty, staff);
    - **c.** Earth Week (April);
    - **d.** participation in International Walk/Bike to School Days
3. **Food**
    a. No food service on campus.

4. **Transportation**
    a. Extensive bike racks on campus;
    b. Alternative transportation days (Thursdays);
    c. Participation in International Walk/Bike to School Days
5. **Buildings and Grounds**
    a. Water audit (2011);
    b. energy audit (2008);
    c. lighting retrofit planned for 2012;
    d. use ecological landscaping company for grounds;
    e. LEED and Living Building Challenge considered for upcoming campus build out
6. **Waste Stream**
    a. Green Star School certification, 2011;
    b. Contracted composting and recycling through Ecocycle;
    c. Reduced containers for landfill waste;
    d. Initiated a "Pack it in, Pack it out" campaign for waste reduction;
    e. School events festivals, auctions, etc.) are zero--‑waste events
7. **Energy**
    a. EPA's Portfolio Manager for building energy monitoring;
    b. 10kW photovoltaic system (with display) on High School;
    c. reduced electricity use by installing 56 Solatubes in classrooms;
8. **Purchasing**
    a. Energy Star appliances;
    b. Recycled content paper;
    c. Green cleaning supplies;
    d. Compostable plates, cups, bowls, and cutlery for events;
    e. Green carpets, paints, stains

Contact: Chip Prentiss, Sustainability Coordinator

Appendix J: MCCHS Proposal

2nd Green Revolution, LLC
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Mar Costa Charter High School Sustainability Initiative

Version 1.1
6/12/2013

Presented by:
Eric Wilson, President
2nd Green Revolution, LLC

Background

Overview

About 2nd Green Revolution, LLC: Founded in 2009 by Justin Manger and Eric Wilson, 2nd Green Revolution is a limited liability corporation dedicated to society's shift to clean energy and sustainability. 2nd Green Revolution is in the process of applying for its 501(c)3 status to undertake consulting work with schools. The nonprofit arm of 2nd Green Revolution, Center for Sustainable Initiatives, will work with schools and organizations to promote sustainability.

Justin Manger is a businessman passionate about using the private sector to bring about positive change, especially in our energy paradigms. He currently uses his strong political/economic research background and business development experience to help multi-national corporations gain valuable insight on new products and their viability in emerging markets. Justin has a Masters degree in International Trade Policy from Monterey Institute of International Studies. His undergraduate work focused on Economics and English at Emory University.

Eric Wilson is a doctoral candidate in science education at the University of Colorado Denver's School of Education and Human Development. Eric is driven to see fundamental changes in our energy consumption patterns. He has leveraged his gift of communication and understanding of technology to teach science and sustainability for the last several years. His doctoral dissertation looks at buildings as teaching tools to engage schools in Educating for Sustainability. Eric has a Masters degree in Teaching from New York University's Steinhardt School with a focus in secondary science education. His received a BS in Anthropology and Human Biology, with a secondary focus in Art History from Emory University.

Project Synopsis

2nd Green Revolution, LLC will provide 3 years of ongoing consulting to El Camino Real Charter High School as it expands and renovates its facilities in order to incorporate sustainable practices in operations and management (O&M), curriculum, and the wider community.

Statement of work

Scope

2nd Green Revolution, LLC (referred to as the Company) will provide three years of consulting services to Fountain Valley Charter High School (referred to as the Client). The first year will consist of an intensive yearlong effort to assess, plan, and implement sustainable practices. Subsequent years will involve capacity building and a hand-off to the sustainability committee, which will be formed over the course of the Company's work with the Client. This will include identifying champions and grooming a sustainability coordinator to chair the committee and take on the work of monitoring energy and cultural performance indicators, both of which will be benchmarked by the Company during the course of the three (3) year relationship with the Client.

<u>The first year will consist of the following:</u>

- Site Assessment to determine MCCHS's current sustainability strengths and areas of need
    - Build on programmatic and institutional assets
- Professional development (see Deliverables 1)

- Stakeholder meeting to develop goals for sustainability based on community surveys
- Goal setting and visioning
- Form sustainability committee and define committee charter
- Development of sustainability baselines:
    - Energy
    - Water
    - Transportation
    - School culture
- Co-construct areas of focus
- Identify and develop partnerships
- Regular meetings with administrative team
- Review meeting
    - Includes review of year's progress
    - Update goals for 2014-15
- Ongoing Consulting; The Company will
    - Provide guidance on achieving goals
        - Assist in formation of sustainability mission statement
        - Provide guidance on greening of existing and new buildings
        - Help develop sustainability master plan/as part of strategic plan

<u>The second year will consist of the following:</u>

- Providing professional development (see Deliverables 2)
- Assessing progress on goals against benchmarks/baselines
- Providing guidance on moving forward
- Meeting with sustainability committee

<u>The third year will consist of:</u>

- One (1) in person "handoff" meeting to ensure expectations for sustainability committee are clearly communicated
- Completion of surveys and website for sustainability report (See Deliverables 5)

By 6/15/14 – First of two (2) yearlong professional development (PD) opportunities for 6-8 faculty members. PD will comprise of three (3) in person workshops while the Company is on site, written feedback while the Company is not on site, and monthly video conferencing meetings to be set up with participants. The PD will engage faculty members in a yearlong process in which participants take part in discussions and work collaboratively to revamp their syllabi or create a new lesson, unit, or project to include sustainability. Additionally, the PD employs a participant driven model. The 6-8 members of the PD will be tasked with providing input and shaping the trajectory of the PD.

The final of the three (3) workshop engagements will take place by 6/15/14. The PD will follow the same format as the previous year with alterations based on feedback from first year participants, school needs, and effectiveness of program as determined by interviews with participants from previous year's program.

By 6/15/15 – Second of two (2) professional development (PD) opportunities for 6-8 faculty members with 1-2 attendees from previous year serving as mentors. The PD will follow the same outline as the first year.

By 6/15/16 – Client will receive one (1) physical copy of the sustainability report, which will include detailed notes of all meetings, next steps, the sustainability committee charter and structure, baselines for both culture and performance.

By 6/15/16 – Company will hand over electronic version of the sustainability report to maintain it as a living document. The electronic version will include detailed notes of all meetings, next steps, the sustainability committee charter and structure, baselines for both culture and performance.

Deliverables

The company will provide the client with the following deliverables:

- Facilitation of in person meetings amongst faculty, staff, students, administration, and stakeholders
- Client's administrative team will meet with the Company in person each time the Company is on site
- Stakeholder meeting will occur in the late summer of 2014. The Client will provide access to stakeholder contact information (email only) for the Company to initiate meeting. The Company will work with the Client to craft a survey with the goal of collecting data to determine baselines for school culture as pertains to sustainability
- Monthly Skype meetings during times when the Company is not on site
  Two (2) professional development workshops. One (1) each in 2013-14 and 2014-15 school years

Assumptions

Client will provide the Company with office space, travel expenses (including but not limited to flights and transportation), and access to stakeholders.

Engagement Duration:

This engagement is to last 3 years with a possibility of extension, as needed.

Start Date/End Date:

Consultant Name	*Role or Title*	*Start Date*	*End Date*
Eric Wilson	President	7/15/2013	6/15/2016
Justin Manger	CEO	7/15/2013	6/15/2015

Appendix K: Statement of Work

2nd Green Revolution, LLC
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Mar Costa Charter High School Sustainability Initiative: Statement of Work

Version 1.2
8/23/2013

Presented by:
Eric Wilson, President
2nd Green Revolution, LLC

Statement of work

Scope

2nd Green Revolution, LLC (referred to as the Consultant) will provide three years of consulting services to Mar Costa Charter High School (referred to as the Client). The first year will consist of an intensive yearlong effort to assess, plan, and implement sustainable practices with the eventual goal of applying for Green Ribbon School recognition via the United States Department of Education. Subsequent years will involve capacity building and a hand-off to the sustainability committee, which will be formed over the course of the Consultant's work with the Client. This will include identifying champions and grooming a sustainability coordinator to chair the committee and take on the work of monitoring energy and cultural performance

indicators, both of which will be benchmarked by the Consultant during the course of the three (3) year relationship with the Client.

Objective: The major outcome as decided by the administrative team and representatives from the Client's science department is to apply for Green Ribbon School recognition during the third and final year of this endeavor. In order to achieve this status, the Consultant and the Client have identified the following six (6) projects that will serve as the basis of the Consultant's scope of work over this three (3) year time period as the Client works towards Green Ribbon School recognition:

1. Integrating sustainability into curriculum via the Humanitas program.
2. Developing green jobs training program through the Alternative Education program.
3. Forming core sustainability committee, advisory committee, and creation of sustainability coordinator position.
4. Renovating future site of Alternative Education campus.
5. Creating and developing branding for the Client around their work in the area of sustainability.
6. Planning and construction of new science building and STEM projects.

<u>The first year will consist of the following:</u>

- Community wide survey with intent of determining sustainability knowledge, needs, and ideas for potential implementation
    - Analysis of the data
    - Stakeholder meeting to create goals for sustainability based on community surveys
- Site Assessment to determine ECRCHS's current sustainability strengths and areas of need
    - Build on programmatic and institutional assets
    - Human capital (including but not limited to faculty, staff, community members, students)
- Consultant will highlight the work they are undertaking with Client on their website and social media networks to help build the Client's brand in the arena of sustainability
- Goal setting and visioning
- Form sustainability committee and define committee charter
- Development of sustainability baselines:
    - Energy
    - Water
    - Transportation
    - School culture
- Co-construct areas of focus
- Assist Humanitas program with integration of sustainability into curriculum
- Identify and develop partnerships
- Regular meetings with administrative team

- Review meeting
    - Includes review of year's progress
    - Update goals for 2014-15
- Ongoing Consulting; The Consultant will
    - Provide guidance on achieving goals
        - Assist in formation of sustainability mission statement
        - Provide guidance on greening of existing and new buildings
        - Help develop sustainability master plan/as part of strategic plan

The second year will consist of the following:

- Consultant will continue to highlight the work they are undertaking with Client on their website and social media networks to help build the Client's brand in the arena of sustainability
- Assessing progress on goals against benchmarks/baselines
- Providing guidance on moving forward vis-à-vis sustainability goals
- Working in conjunction with the Alternative Education program to develop green jobs program
- Assistance with and feedback on Green Ribbon Schools application
- Feedback and guidance for new construction on science building. This includes, but is not limited to:
    - Integrating with curriculum
    - Potential LEED certification
    - Consulting with architect
- Meeting with sustainability committee

The third year will consist of the following:

- Consultant will continue highlighting the work they are undertaking with Client on their website and social media networks to help build the Client's brand in the arena of sustainability
- Completing the Green Ribbon Schools application
- One (1) in person "handoff" meeting to ensure expectations for sustainability committee are clearly communicated
- Completion of surveys and website for sustainability report (See Deliverables)

Timeline

By 6/15/14 – Consultant will finalize creation of sustainability committee and advisory committee, as well as crafting charter statement and identifying members. Consultant will provide feedback on renovation plans for Alternative Education's campus. Consultant will provide data analysis for surveys, collated in spreadsheet with key findings.

By 6/15/15 – Consultant will provide analysis of first and second year water and energy consumption including year to year changes, as well as comparison with previous consumption based on information provided by Client. Consultant will provide feedback on building plans for science department new construction.

By 6/15/16 – Client will receive one (1) physical copy of the sustainability report, which will include detailed notes of all meetings, next steps, the sustainability committee charter and structure, baselines for both culture and performance.

By 6/15/16 – Consultant will hand over electronic version of the sustainability report to maintain it as a living document. The electronic version will include detailed notes of all meetings, next steps, the sustainability committee charter and structure, baselines for both culture and performance.

Deliverables

The Consultant will provide the client with the following deliverables:

- The Consultant will work with the Client to craft a survey with the goal of collecting data to determine baselines for school culture as pertains to sustainability.
- The Consultant will facilitate in person meetings amongst faculty, staff, students, administration, and stakeholders.
- The Client's administrative team will meet with the Consultant in person each time the Consultant is on site.
- Stakeholder meeting will occur in the late summer of 2014. The Client will provide access to stakeholder contact information (email only) for the Consultant to initiate meeting.
- Monthly Skype meetings will occur during times when the Consultant is not on site.

Appendix L: MCCHS Survey

MCCHS is embarking on a 3-year sustainability initiative with 2nd Green Revolution, LLC. As part of the initial steps, we want to collect some background data to determine the state of the school in terms of sustainability. Please take a moment to answer these questions. Thank you for your time.

What is your role at MCCHS? (Select all that apply)

- Faculty
- Staff
- Administrator
- Parent
- Community member

If you are a faculty or staff member, what department do you work in?

1. What is your definition of sustainability?
2. On a scale of 1 to 10 (1 being not at all and 10 being the most important), how important is sustainability for MCCHS?

    a. Please explain why you chose this ranking.
3. What (if anything) interests you in sustainability?
4. What concerns (if any) do you have about MCCHS implementing a sustainability plan?
5. How is MCCHS already a sustainable community in your eyes?
6. Who/what are the biggest proponents of sustainability on campus, the "sustainability champions"? (Feel free to include your own name if you feel you fall into this category)
7. What barriers do you see to implementing sustainable solutions at MCCHS?
8. What would you like to see in terms of sustainability goal at MCCHS?
9. Please rank the following, starting with the most important in terms of sustainability at MCCHS and ending with the least:
    - Waste (including recycling and composting)
    - Transportation (buses, walkability, access, air pollution, etc)
    - Social Justice
    - Food (including healthy food, organic, school garden, etc)
    - Buildings (daylighting, renovations, green building, etc)
    - Curriculum
    - Energy and Water (conservation, efficiency, consumption/usage, etc)
    - Any others not on this list but that you feel are important (please explain why below)
10. Are you willing to serve on a sustainability committee? (This includes either a core committee meeting 1-2 times/month or an advisory committee that meets 1-2 times/semester).

- Yes, I am primarily interested in the core committee
- Yes, I am primarily interested in the advisory committee
- I am interested, but not sure which is the best fit for me
- No, I am not interested at this time