DIPR: Holistic Education

Integrating Sustainability and Ecoliteracy into K-12 education in the US

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By

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ABSTRACT

This thesis explores the problems with the current state of education as it pertains to ecoliteracy and sustainability, and the methods of transitioning from an outdated teaching model to a holistic and student centered curriculum.

The first part of this thesis addresses sustainability current role in the US education system on a federal, state, and grassroots level. It then transitions into what could happen if education continues on the same path. The last part of the paper provides a holistic solution to introducing and creating ecoliterate students, schools, and communities through a network of supported systems. Those solutions are a lesson template titled DIPR, which uses focuses on inquiry and project based learning, and a professional development workshop based on a design charrette model.
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INTRODUCTION

“We need to change metaphors. We have to move from an industrial model of education, a manufacturing model which is based on linearity, conformity and batching... We need to move to a model that is based on the principles of agriculture. We have to recognize that human flourishing is not a mechanical process, it’s an organic process. You cannot predict the outcomes of human development. All you can do, like a farmer, is create the conditions under which they will begin to flourish...”

- Ken Robinson -

Schools are not separate from the communities in which they operate, and to recognize this fact is the beginning of ecoliteracy and sustainability (Capra, Speaking Nature's Language: Principles for Sustainability, 2005). The use of community as a resource and higher order thinking has positive effects on a student’s ability to learn (Kimonen & Nevalainen, 2013). For the US to compete on a global scale and combat the rising issues facing our nation and planet in terms of globalization and climate change, the education system is going to need a transformation. While the world has become increasingly connected (Friedman T. L., 2005), schools in the US are continuing to teach an outdated model (Brady, 2011). A solution to this obstacle is not based solely in one area or one discipline, but rather a connected network of community support, interdisciplinary learning/teaching, and thought provoking inquiry and project based learning (Stone, Michael K., 2009).
This thesis highlights three connected solutions that can impact how we educate our students here in the US. The first solution is a curriculum template designed to integrate sustainability into the existing curriculum, while making room to expand in the future. This model is called DIPR (Discussion, Inquiry, Project, and Reflection). Lessons are based around the DIPR model and fit into a larger unit. There are six large units designed around a central theme to sustainability. Those six areas are water, energy, agriculture, economics, ecosystem services, and material reuse & upcycling.

The DIPR model is not a one size fits all approach, but a multi-level approach, termed Little DIPR and Big DIPR. Little DIPR is taught in grades K-6 and focuses on local issues in the students communities and states. The idea is that to understand the larger issues affecting our planet, one must first understand their own community. Big DIPR is taught in grades 7-12 and focuses on national and global issues related to sustainability. Big DIPR is using the local knowledge gained in Little DIPR to find solutions to larger issues. Students should have knowledge of the how their local ecosystem works, so as to apply to a larger global issue, like rain forest deforestation (Louv, 2008).

The second solution is in the form of professional development. The DIPR method will not be understood or taught correctly without workshops and an understanding of the principles of sustainability and ecoliteracy. The idea of the workshop is to be run like a charrette, which is a fast paced idea generating exercise (The National Charrette Institute, 2014). The ideas are brought from within, so issues that individual schools and teachers want to address are then worked into the DIPR
template. Each workshop is designed to accommodate individual schools and teachers with custom lessons and support.

The last solution is to transition from teacher to facilitator. The idea of DIPR and the professional development is to challenge the students to achieve higher order thinking and possess 21st century skills like problem solving, team work, and critical thinking. This is not easily done, since the overall education process today is still, sit quietly, listen, and repeat, in other words, lower order thinking (Kimonen & Nevalainen, 2013). The DIPR model encourages students to become 21st century learners and citizens. These deliverables don’t work unless they are tied together. Just like the rest of the world, it revolves around systems and making a connection between multiple disciplines (Stone, Michael K., 2009). To summarize, by using ecoliteracy as a foundation to teach sustainability topics in a holistic model called DIPR, will produce a higher quality education that prepares our students for the 21st century challenges that await them.
CHAPTER 1: The Sustainability Stew

Sustainability is a household term that most Americans are familiar with. It is used to sell everything from cleaning supplies to tourism. The language that most Americans are familiar with was coined in the Brundtland Commissions report, *Our Common Future* in 1987. Here is the definition of sustainability according to that document, "Development which meets the needs of current generations without compromising the ability of future generations to meet their own needs" (Brundtland, 1989). This statement, although very concise doesn’t outline how to go about following its stated case. It generally states the outcome of sustainable behavior, but lacks the process of obtaining its objective.

Instead, the Triple Bottom Line is commonly used in sustainability. The Triple Bottom Line (TBL), was conceived by John Elkington in his 1998 book, *Cannibals with Forks*.

Figure 1.1: Triple Bottom Line (TBL)

Source: John Elkington's TBL adaption by Author
TBL defines sustainability as the meeting point between three categories; economic, environmental, and social (equity) awareness, also known as People, Planet, and Profit (Elkington, 1998) (see Figure 1.1). For something to be sustainable it needs to not only be good for the planet, but ultimately the people and animals on it as well. TBL, takes what Our Common Future states, and provides insight into how to obtain a workable version of sustainability (Fleming, 2013). Although neither the Brundtland report, nor TBL apply to specific scenarios, there is a need for practical day-to-day application that needs to be addressed.

TBL offers a template to help topics or issues into certain categories. Education is a topic that has mostly fit into the environmental aspect of sustainability, and until recently, hasn’t seen any legislative policy. Education is a broad topic, like sustainability and cannot be molded to fit one area. TBL shows that there are two more areas for holistic sustainability, the social and economic aspects. Most educators would know or would have heard of “environmental education”, but few have heard of the terms “education for sustainability, or ecoliteracy” (Tursi, 2015).

An addition to TBL was coined by MSSD graduate Anne Sherman, in what she coined in her thesis, the Quadruple Bottom Line (QBL). The fourth element of QBL being “Experiential”. In her own words she states, “Experience is a necessary component to “authentic” sustainability, and represents the Fourth Bottom Line of the framework. Authentic sustainability can be described as “Consciousness integrated,” where sustainability is not an objective thing, externally conceived, but becomes an expression of the way in which humans exist in the world. The QBL methodology uses a model of
causation and integration as a means to understand the process of consciousness development through experience and action.” (Sherman, 2012).

QLB as was designed by Sherman, was made to fit into a metric for business, but one could make the case that it aligns perfectly with education. An experience can be a great teachable moment and often comes in the context of something new. Her case for QBL is that sustainability is not something on the outside, but a way in which one lives and experience the world. Below in Figure 1.2 is a graphic showing a shift from the traditional TBL to Sherman’s QBL.

Figure 1.2: Adding the forth bottom line, Experiential

Source: John Elkington’s TBL and Anne Sherman’s QBL adaption by Author.
EfS on the Federal Level

Sustainability in education is not a new idea. It has been around in some form legislation since 1970 when the first national environmental education act (NEEA) was established. The goal of NEEA was to begin introducing environmental education in K-12 schools across the country. Like the current trend, it was poorly funded and lacked support from school administrators and was dropped in 1975 (Feinstein & Carlton, Education for Sustainability in the K-12 Educational System of the United States, 2013). Since this time there has been a resurgence from a bottom up approach. Mostly NGOs and individual schools and teachers introducing sustainability into K-12 education, with a few States going above and beyond by introducing EfS standards.

As of today, there are zero federal standards for ecoliteracy or sustainability in public education (Feinstein & Carlton, Education for Sustainability in the K-12 Educational System of the United States, 2013). The Federal government has taken a back seat in sustainable education reform, but that hasn’t always been the case. President Clinton enacted the U. S. President’s Council on Sustainable Development, which ran from 1993 to 1999. During it’s time, the council created a document called Education for Sustainability: An Agenda for Action (PCSD, 1996). This document laid out a plan to incorporate sustainability in formal and informal education, as well as teacher development to ensure successful integration. This council ultimately came to an end in 1999, due to poor integration policy making bodies and common arguing over partisanship and other government groups. However there were bright sides to this
council. The original council had 25 members and was enacted to run for only two years. It eventually grew to 35 members and took on many more issues besides education, and lasted six years. The recommendations put forth by the council are still considered the "high water mark" for EfS on a federal level (Maurer, 1999).

There was another federal action put in place from 1970 – 1975 called the National Environmental Education Act (NEEA). Its purpose was to integrate EE into K-12 public education. The Act eventually fell apart in 1975 due to lack of funding and support from school officials and administrators. This was the first time that legislation on a Federal level was put forth for EE (Feinstein & Carlton, Education for Sustainability in the K-12 Educational System of the United States, 2013).

These two accounts are the closest the American people have come to some form of national policy on EfS or EE. In the 45 years since the first plans went into action, only two councils and acts have emerged from a federal level. A different view of EfS is starting to appear at the State level. As of this writing, two states, Vermont and Washington, have passed state legislation for EfS (Feinstein, Education for Sustainable Development (ESD) in the United States of America, 2009).

**EfS on the State Level**

EfS or Ecoliteracy has not taken a hold on a federal level mostly because the states themselves have yet to embrace EfS standards. Two states; Vermont and Washington have both created an EfS standard with the help of local NGOs and individuals, but that leaves 48 other states lagging behind. These facts can be
somewhat deceiving though. It is true that only two states have standards, but every state has teachers and schools that are incorporating EfS into their education model (Church & Skelton, 2010; Feinstein, 2009). These units or curriculum that are used in other states beyond Washington and Vermont are not wide spread nor used throughout their teaching standards, but they are starting to get recognized as being important to cultivating a 21st century citizen (Feinstein, 2009).

Pennsylvania does not have EfS standards, but it did just create state standards for Environment and Ecology in 2013 with five focus areas (Education P. D., 2015). These five focus areas are ecology, watersheds and wetlands, natural resources, agriculture and society, and humans and the environment. These standards are a sign that Pennsylvania is moving towards EE, but the state still lacks the holistic view of EfS.

Oregon is another state that has not yet adopted EfS standards, although, they seem to be closer than some. Sustainable Oregon Schools Initiative or SOSI (“so-see”) is a plan to bring EfS to state legislation. It is comprehensive like Washington’s plan (as discussed later), but is completely voluntary and not adopted into law. The organization that is responsible for creating SOSI is the Sustainable Schools Collaborative (SSC). In 2010, members of SSC worked with educators, school representatives, and superintendents from across the state to create regional ESD (education sustainable development) teams (SSC, 2015). These teams were created to develop their own regional action plans, which vary according to the needs of the schools and participants in that region. SSC created steps that should be implemented for integrating EfS into
schools (SSC, 2015). These steps were the view of the 71 members that went to workshops put on by SSC.

Those four steps are:

1. Build ESDs into regional information and resource centers. Use SOSI’s website as a central access point.

2. ESDs provide EfS training / professional development / assistance for ESD & district staff.

3. ESDs identify and share successful sustainability examples in schools and districts.

4. ESDs themselves become models of sustainability.

Although Oregon doesn’t have a legislation for EfS, they do provide resources and support for school districts, and individual schools/teachers to implement EfS into existing curriculum (SSC, 2015). The two states that do have legislation will be discussed in a later chapter.

**From the Bottom Up: NGOs and Grassroots Initiatives**

The bulk of work that is being done in the US to promote EfS has come from NGOs and individual schools/teachers (Feinstein & Carlton, 2013). Both legislations for EfS in Washington and Vermont came from NGOs that collaborated with community members and schools to create a working plan to incorporate EfS (Feinstein, 2009). Every state in the US is teaching EfS in some form or another (Church & Skelton, 2010). The 48 other states in the US are not required to teach it, but the topic is still being
integrated into curriculum. Groups like Facing the Future and the US Partnership for Education for Sustainable Development helped usher in the bill for EfS in Washington State, while Shelburne Farms worked to bring about institutionalized change in Vermont (Feinstein, 2009). NGOs like The Cloud Institute have helped bring EfS to multiple schools in the New York area and EcoRise in Austin, Texas has seen exponential growth in the amount of schools they are helping (Cloud Institute, 2015; EcoRise, 2015). PhillyEarth and The Save Alliance are two NGOs in the Philadelphia region that are working to bring EfS education to K-12 public and private schools around the city (PhillyEarth, 2015; Save Alliance, 2015). These are a few examples of organizations that are making progress promoting EfS.

Figure 1.3 on page 12 shows the structure of EfS as it pertains to Federal, State policy, as well as NGOs and grass-root organizations that are working independently on EfS projects. What is commonly seen is a “bottom up” approach to enacting legislation for EfS. NGOs and individual schools/teachers put in the majority of the effort, which can turn into state policy, as in Vermont and Washington. From there the federal government can view how the state policy for EfS works and can begin drafting a national framework for EfS. An analogy to help think about the structure of EfS is the US is: if EfS is a train, then the federal government is the caboose, the states are the cars, and NGOs are the engine.
Figure 1.3: Tiered Structure of EfS on a Federal, State, NGO/Grassroots Level

Source: Author
CHAPTER 2: Understanding Ecoliteracy

“An ecologically literate person has a basic comprehension of ecology, human ecology and the concepts of sustainability”

David Orr

The above quote from David Orr says that ecoliteracy is the understanding of man-made and natural systems that are at work in the world (Orr, 1992). It is also the desired outcome for EfS. Students that graduate through an EfS system should be considered ecoliterate if performed well. In the above section the term EfS was analyzed from multiple levels of government and non-government organizations. The idea of ecoliteracy is not to integrate a style of educating, but rather to view what a person knows in terms of sustainability. EfS is a means to an end, and that end is ecoliteracy.

Students today are plugged into electronics more than any other generation. Children between the ages of 8-18 spend around 45 hours a week plugged in to some electronic device (Louv, 2008). There is a pattern emerging in the US that shows disconnect with nature from all ages at a time when effects of climate change are becoming more obvious. Students are losing that connection to nature, and by doing so, are failing to see the connectedness of the world. Baby boomers, or those born between the years 1946-1964 may be the last generation to have a true connection to nature, where playing freely outside was the norm (Louv, 2008). This may not seem like a big deal, but the lack of connection with the natural surroundings is to close off the
natural systems that are continuously happening. Those connections, or systems are crucial knowledge for understanding sustainability and ultimately ecoliteracy. The human and planet connection offer valuable insight into how those two systems are connected to one another. For example, to understanding flooding and storm surges in Louisiana and Florida, a correlation with the loss of the mangrove forests to industrial farming would be seen. Natural and man-made systems are all around us, happening on many different levels. Some are systems within our bodies, like the flow of blood cells and the pumping of the heart, while other systems are on a larger scale, and not as easy to detect. The use of industrial chemicals and high levels of nitrogen used in farming enters streams, rivers, and lakes due to runoff. When this happens algae blooms appear which can kill animal and plant life in those water bodies. This process is call eutrophication, and is a happening all over the planet.

Ecoliteracy can be a difficult problem to understand. In its most basic form, it is an understanding of systems and connections. This definition tends to be quite broad, and can encapsulate many different meanings. The book Eco Literate by author Daniel Goleman explains five practices of socially and emotionally engaged ecoliteracy, and perhaps a more defined meaning for ecoliteracy (Goleman, Bennett, & Barlow, 2012).

1. **Developing empathy for all forms of life.**

This is an understanding that human beings are part of the same web of life as all the other creatures on this planet. By understanding this simple concept humans will begin to show empathy for other creatures and each other.
2. *Embracing sustainability as a community practice.*

Nature revolves around the connections of one species to the other. If we are to believe that humans are connected to the same web of life as other creatures is to view that working together as a community is for the betterment of society.

3. *Making the invisible visible.*

There are times when a person can see the direct result of an action, and this is usually meant for a short outcome, but for one like climate change, not all people are seeing the whole effects. There are places in the world that are feeling the effects of climate change, but for the most part Americans are sitting in a pot of slowly boiling water. (Quinn, 1996)

4. *Anticipating the unintended consequences*

"Two fold challenge of predicting the potential implications of our behaviors as best we can, while at the same time accepting that we cannot foresee all possible cause-and-effect associations."

5. *Understanding how nature sustains life*

"By examining the Earths processes, we learn strategies that are applicable to designing human endeavors."

These five practices give a rough guideline to becoming an ecoliterate person, and some of the processes to go about accomplishing them. To go further with those five practices, there are three basic tenants. The first being that humans are part of a diverse web of life in our communities and beyond. People are part of ecosystem that
relies on what nature provides, whether that is food to grow, or the climate to grow it. Fritjof Capra a noted systems thinker and author states that “Sustainability is not an individual property, but a property of entire web of relationships; it always involves a whole community” (Capra, 1996).

The second tenants expresses that systems and connections happen at all levels and scales. Fritjof Capra lays out a framework in his essay “Speaking Nature’s Language: Principles for Sustainability”. In this framework he notes a several different systems types: Nested Systems, which are systems of different sizes inside one another; Cycles, a system that could look like evaporation and rain; Networks, a connection with other living organisms; Flows, a system that uses energy to stay alive; Development, or evolution of a system overtime; and Dynamic Balance, which is a check and balance system in nature. Each of these systems add to the web of life, or as Capra puts it, “These concepts, the starting point for designing sustainable communities, may be called principles of ecology, principles of sustainability, principles of community, or even the basic facts of life” (Capra, 2005).

The third tenant is the basic understanding of sustainability, to use what you have without damaging prospects for the future. There are many concepts, competencies, elements, etc. that can apply to ecoliteracy and sustainability. To an extent they are conveying the same message and understanding. Ecoliteracy fundamentally is establishing a connection with the natural ebb and flows on this planet, while considering the long term effects of our actions.
Connecting Ecoliteracy and Sustainability to Standards

As noted above, there is a lack of integrated EfS in standard education. Only Vermont and Washington State have legislation that requires teaching of EfS subject material. There are overlaps in traditional standards and EfS outcomes, such as in critical thinking, systems thinking, and more specific subject areas (NSES, 1996). The National Science Education Standard (NSES) is the closest we are seeing to EfS standards on a federal level. NSES are a national high school assessment that highlight areas like “personal and community health; natural resources; environmental quality; and natural and human-induced hazards (Church & Skelton, 2010). Pennsylvania’s Environment and Ecology standards address similar issues, but are not tested at the moment (Education P. D., 2015).

Some NGOs like The Cloud Institute and Facing the Future have aligned national standards to their own lessons and curriculum. The Cloud Institute has outlined their core EfS standards and aligned them with the 2013-2014 Common Core Anchor Standards for Literacy and Capacities of a Literate Individual, which was created by Learning Systems Associates and Dr. Marie Alcock (Cloud, Jamie P.; The Cloud Institute for Sustainable Education, 2015).
CHAPTER 3: A miscommunication between EE and EFS

Ask educators today if they have heard of Environmental Education (EE), and most will say they have. Ask those same educators if they have heard of Education for Sustainability (EfS), and that number quickly drops off. On a recent survey given to 46 educators in public and private schools, nearly 70% said that they had heard of EE, but only 17% had heard of EfS (Tursi, 2015). Figures 3.1, and 3.2 are from that survey.

Figure 3.1 Teachers that have heard of the term EE.

Have you heard of the term Environmental Education (EE)?

Answered: 46  Skipped: 0

Source: Survey Monkey Inc.

Figure 3.2: Teachers who have heard of the term EfS.

Have you heard of the term Education for Sustainability (EfS)?

Source: Survey Monkey Inc.
One reason why EE is better known among educators, is that the term has been around longer. In US public education, EE can be traced back to the 1920-30s when soil erosion was becoming a problem across the US. The federal government founded the Soil Conservation Service to teach agricultural practices in an educational setting and through project demonstrations (NRCS, 1995). Most, if not all states in the US have some form of Environmental Education being taught. National and state parks, environmental centers, zoos, schools, etc. are all contributors to EE. Most of these institutions focus on conservation of environment and planet rather than on the social or economic issues of the day. To be fair, it is not the in the scope of EE to cover those topics. Articles like the Belgrade charter and Tbilisi document which came from multinational meetings set clear intentions for environmental concentrations for EE. Only when the Agenda 21 article was published after the Rio Summit, was EfS established (UNESCO, 1978; Development, 1992).

There are few resources for educators that would prefer to teach EfS. Most come from NGOs like Facing the Future or the Cloud Institute. The term sustainability that Americans are most familiar with came about in the 1980s with the Brundtland report, while EE was at least heard of by the 1970s National Environmental Education Act, Belgrade charter, and Tbilisi document (UNESCO, 1978). Before this, if EfS was being taught, it was under the nomenclature of EE, then came the UN’s conference on environment and development in Rio De Janeiro in June of 1992. From this conference came a document titled Agenda 21 which focused on sustainable development from
multiple fronts including education (Development, 1992). This was the first step in bringing holistic sustainable education to the global stage.

The biggest difference between the two forms of educating are the aspect of the triple bottom line (TBL). As stated above, EE fits one sphere of the three delineated spheres in TBL, the environmental side, while not addressing the other social or economic issues. Although there has been equitable results to society through EE from an informational standpoint, EfS tends to lend itself to a holistic solutions based standpoint (McKeown & Hopkins, 2003). EE falls short of holistic sustainability in this regard. If ecoliteracy is the end result of successful EfS, then a connection between systems thinking would need to take place.

EfS and EE are not the same, nor interchangeable. Similar pedagogy and outcomes surface when examining EfS and EE, but some researchers and practitioners of both state that there is a difference between the two topics. EE has had much more notable success in mainstream America, but like EfS, has not been translated into a national standard or policy (McKeown & Hopkins, 2003). EE education advocates claim that EE deals with environmental and ecological issues, while EfS is seen as a larger umbrella that covers large swathes of issues and concerns, mainly from a human perspective (Church & Skelton, 2010).

As was noted earlier, EfS does include environmental issues, but one could argue that two thirds of EfS is developed for the benefit of man with the economic, and social aspects of sustainability. There is a need for traditional EE, and that can still be accomplished with the inclusion of EfS, for what EE cannot address EfS should
The goal of both EE and EfS is to then work together to support one another and ultimately collaborate towards a similar, if not, same goal. Just as there is an economics class and sociology class, there too is an environmental class. What EfS sets out to do is re-focus on the real connection between all three, while at the same time making those connections in a learning environment (McKeown & Hopkins, 2003; Stapp, 1969).

Below (Figure 3.3) is a graphic showing how EE, EfS and Ecoliteracy fit within one another. As you can see from the graphic, EE is only a part of EfS, and that EfS is a means to an end, and in this case, the end is ecoliteracy. This example is taking the notion that although EE and EfS are two different pedagogies, EE can still fit into EfS.

Figure 3.3: EE, EfS and Ecoliteracy Relation
CHAPTER 4: Sustainable Education more than an “add-on”

Noah Feinstein of the University of Wisconsin-Madison School of Education says that there are three main reasons why EfS has not made more of an impact in K-12 US education. Those three reasons are, audience, institutionalization, and goals (Feinstein & Carlton, 2013). There is another reason that is not in the list, but needs to be addressed is “add-on work”.

To address the audience reason, one must ask the question, who is EfS designed and built for. EfS is on the verge of becoming a luxury to privileged groups of Americans. This is not the intention nor the aim of EfS educators, but it is slowly becoming a reality (Feinstein & Carlton, 2013). Since there aren’t standards that apply directly to EfS in most states, parents that look for that type of learning usually have to search in the private or charter schools. Finances then become an issue which forces many parents and students who could benefit from EfS to settle for underserved schools within their district. Schools that are rich in resources and performance, tend to face fewer obstacles incorporating EfS. Low-income, and poor performing schools don’t have the resources and are usually forced to cut EfS education from their curriculum if it does not align with standardized testing. That applies not only to EfS, but to art and music as well. High-stakes assessment on a uniform level would be a way to engage underserved youths with EfS. Testing and advancement are key to ensuring that EfS gets into mainstream education (Feinstein & Carlton, 2013).
Assessment on a state or federal level would go a long way in ensuring comprehensive EfS coverage, but that is alone represents obstacles that wouldn’t be easy to overcome.

Institutionalization is the second proposed problem. Absence of space in the curriculum, time in the day, and subject knowledge decrease the chances that an educator will go out of their way to introduce it in the classroom (Nolet, 2009). These are not separate problems, but connected to the fate of each other. If a teacher is not taught about sustainability or even environmental education, then they will most likely look at a very tight curriculum and schedule and choose not to teach it. Resources for educators are not easily accessible, relying on the teacher to seek them out. This becomes burdensome on an already busy schedule. “We are lucky if we get an hour a week for prep during school hours” said an 8th grade ELA teacher at a middle school in Philadelphia. With such little time, EfS begins to look like an add-on that cannot be taught.

Even if time and room in the curriculum were available and basic knowledge of EfS was readily accessible, there would still be the larger issue of scope and goals of EfS. Growth of EfS will raise questions that have not yet been asked about the scale of implementation and institutionalization. As shown above, measures and actions taken by NGOs have created state policy in two progressive states. Those states now have specific goals and standards in place to prepare future citizens with the behavior and tools for 21st century problems. Now it comes to more states following suit and working with local NGOs to create a framework that could be passed into legislation. What
comes from that framework should not only include long term goals, but also short

terms goals with long term benefits. This might be creating an action team that begins

addressing key individuals or problem areas throughout the school district. Whether

through individual NGOs or at the state level, clear and realistic goals should be

considered to ensure a successful undertaking (Stone, Michael K., 2009).

One could argue that another factor not addressed in those reasons is “add-on

work”. This was scattered throughout the three previous problems, but deserves to

stand alone as an issue worth taking the time to address. Teachers face increasing

pressure to have students perform well on state standardize tests (Tucker, 2014). Teachers and schools that do not perform to level required confront possible budget cuts or losses of jobs. This pressure to have students perform well on testing hinders exploration of other topics or to sway far from the core subjects. Teachers are lacking in prep time for classes, and asking them to teach a whole other topic seems to some to be piling on the load (Tucker, 2014).

As of now, there are no assessments on a national scale or level. That means for most teachers, EfS can seem like an add-on. But what has not been taken into consideration is that EfS is not a stand-alone class or subject. EfS is unique in that it combines multiple subjects into an integrated teaching template. Using an EfS framework, educators can apply multiple subjects to individual lessons, which in turn can save time and have the ability to engage students. Studies have shown that students that are more engaged in subjects tend to perform better on standardized
testing (Church & Skelton, 2010). EfS should be viewed not from an “add-on” perspective, but from an engagement tool.

**Industrialization of US schools: Teaching Subjects not Students**

For the most part, schools in the US are not engaging students nor asking teachers to work together on lesson planning. This low level of integration is a result of an outdated teaching model that is based more on the industrialization of education (Brady, 2011). Public education in the US has not changed drastically in style from its first beginnings. The model is still based on a lower order thinking style that is geared towards performing well on standardize tests. A sit down and listen to the teacher type of model was designed for an age of producing a student that was well rounded, but lacked any specialization. The globalization of today’s economy and challenges that arise from climate change need students that graduate with a better grasp on working across disciplines and cultures (Friedman T. L., 2008). If the US is going to stay competitive with the growing economic powers of the world, it will need to produce a 21st century student, not a 20th century student. Unfortunately the US public school system is not equipped to handle the needed changes due to many factors including, but not limited to; stringent federal and state testing, and a refusal to change an outdated system (Tucker, 2014). As Chris Lehman from the Science Leadership Academy in Philadelphia, PA has said, “There is the industrial model of education that hinders authentic learning...we are teaching subjects not students”.
Charter schools and technical schools can, and do, address these issues and tend to have a progressive outlook on education. The problem, as stated above, is a financial one. Where help is needed the most are in the more neglected areas of our cities and communities. The families there statistically don’t have the resources to send their children to schools that offer an EfS education. The schools that they attend are ill-funded and often neglected, which turns into a “catch-22” scenario. These schools are chastised and/or closed due to low test scores and graduation rates, and are usually not given the resources to turn around (Keane & Keane, 2010; Tucker, 2014).
CHAPTER 5: 21st Century Student

“Public education and the programs and agencies which serve it must be reinvented, not merely reformed, in order to meet the new challenges of all kids, new skills, and a new global reality.”
Schoolchange.org

There is much information available that states what a 21st century student looks like in and out of the classroom. Dr. Fred Newmann and Gary G. Wehlage, noted experts in authentic teaching instruction have identified five standards for authentic instruction that are needed to produce a 21st century student. Those five standards are higher order thinking, depth of knowledge, connectedness to the world beyond the classroom, substantive conversation, and social support for student achievement. Unfortunately these standards are not always adhered to, due to time constraints, resources, and support. There is much effort that goes into curriculum and lesson assessment, but rarely does personal instruction assessment take place. Asking whether or not a student will meet the assessments for a certain unit or lesson should be only half of the solution. Evaluating instruction quality over quantity is the other half (Newmann & Wehlage, 1993).

The challenge then is to create a holistic educational experience that applies the five standards while not trying to reinvent the wheel. One way to do this is step back and identify consistent problems with the average instruction today in the US.
Newmann and Wehlage recognize two common problems (Newmann & Wehlage, 1993).

1. Often the work students do does not allow them to use their minds well.

2. The work has no intrinsic meaning or value to students beyond achieving success in school.

The first problem points to low order thinking (LOT). This is basically memorize and repeat. Depth of knowledge extends as deep as repetitive steps. Understanding of why 2+3=5 is not as important as remembering that it is. Problem solving, analyzing, and synthesizing are considered higher order thinking (HOT), and are rarely used. Although there is a need for HOT learning, LOT style learning should not be ignored all together. If one is to look at the revised Blooms Taxonomy model it shows, “Remembering, Understanding, and Applying” as the foundation for the other levels “analyzing, evaluating, and creating”. What the Blooms taxonomy is showing here is that once the initial levels of LOT are achieved, learners can then apply the HOT which leads to a more authentic and holistic style of learning (Anderson, Krathwohl, & Bloom, 2001; Newmann & Wehlage, 1993).
The second problem demonstrates a lack of connection with the community and with “real world” skills. A 2007 National Essential Skills Study (NESS) was given to more than 20,000 educators, parents, business professionals, and other stakeholders to determine what they felt were important skills to graduates after they left high school. The survey asked all stakeholders to rank 20 to 30 topics they felt were the most important in ELA, math, and science (ICLE, 2009). One of the ELA topics was, “write clear and concise directions or procedures.” ELA teachers ranked that 25th among skills that graduates should have, other teachers ranked that 8th, while business and industry leaders ranked it 2nd on level of importance. Overall the groups polled the average number came to 9th. “Apply the Pythagorean theorem to right triangles” was a math topic, with math teachers ranking that 4th in terms of importance. Business and industry
leaders ranked that topic 29th, with an average of 20th for all stakeholder groups. Lastly, a social studies skill (economics): Investigate how a cost/benefit analysis can influence decisions based on profits and losses. Business and industry leaders ranked this as 3rd most important to graduates, while social studies teachers ranked this 57th in terms of importance (ICLE, 2009).

The most discouraging aspect of the study is the disparity between what the business and industry leaders are looking for in graduates and what the teachers feel are important skills. This is not a criticism on educators, but an accusation on the system itself. Assessment for instruction and a reconnection with the world outside of the classroom is crucial for our students and economy.
Chapter 6: If the Current Trends Continue

As stated in the previous chapter, EfS is unique in that it encapsulates multiple disciplines and engages community involvement. It also addresses key issues related to climate change, like water conservation, fossil fuels and greenhouse gases, rising sea levels and human health. EfS has also been successful in engaging students to seek out their own learning. This chapter will look at the effects of EfS on student performance and how creating ecoliterate students could reconnect a disconnected generation to nature and their community.

As climate change reshapes our coastlines and creates more devastating storms like Hurricanes Sandy and Katrina, it will become more difficult to harvest natural resources like petroleum and natural gas. Fossil Fuel companies are now having to go further out, and deeper, to find oil (Mouawad, 2004). This raises the risk of accidents, and puts not only human lives in danger, but also much of the animal and plant life in the area (NRDC, 2009). Beyond ecological damage there are economic and health risks associated with these types of disasters. When BP’s Deep Horizon well exploded, there were ripple effects felt throughout the gulf coast. 17 workers on board the well were injured and 11 lost their lives (Ingersoll, Locke, & Reavis, 2012). After nearly 3 months, and 5 million barrels of oil gushing into the Gulf of Mexico, the well was capped. It became the largest oil spill in US history (Ingersoll, Locke, & Reavis, 2012). The effects of explosion and damage to the well not only lost lives, but also put thousands out of
work. Commercial fishing in the Gulf of Mexico was hit hard and many had to look for work elsewhere. People near the coast lines became sick due to contaminated food and water (Ingersoll, Locke, & Reavis, 2012). This was a devastating disaster, and one that could possibly happen again. The combination of severe storms and the hunt for hard to reach oil fields offer a grim outcome for coastal communities and the plant. The world economy runs on oil in one way or another, but it is becoming more apparent that a change is needed. Solar and wind power are becoming more prevalent, and swaths of the population are making the smarter choices in terms of energy and transportation. Educating the youth will make the biggest impact in the fight against climate change, although there is a tie delay in seeing its effect.

Cigarette smoking is one example how education can change a generation and ultimately the future. In 1964 the Surgeon General produced a report linking smoking and human health. Anti-smoking campaigns soon followed, blanketing schools across the nation spewing facts about the harmful effects of smoking (Holford, PhD, 2014). “Surgeon General Luther Terry’s landmark report on smoking and health in 1964 called unprecedented attention to the deadly consequences of tobacco use and represented a turning point in tobacco control in this country,” said John R. Seffrin, PhD, CEO of the American Cancer Society. “Since then, public education campaigns and efforts to enact proven tobacco control policies have helped to reduce the smoking rate from 42% to 19%, and with it the nation’s most preventable cause of death.” (Holford, PhD, 2014). In a relatively short time, a shift in thinking happened and rates of individuals smoking dropped dramatically.
As seen in cigarette smoking use, a shift in perspectives can happen in a short relatively short period of time. In the case of EFS and ecoliteracy, implementation can’t only happen in selected schools, cities, or states. This implementation has to happen across the nation, especially in the most underserved areas of the US. As was stated above, underserved communities in the US face financial constraints that make them reliant on money provided by the federal government, which means “teaching to a test”. Other programs like EFS are pushed aside for higher concentration on a few subjects that don’t hold as much relevancy to skills needed outside of the classroom (Feinstein & Carlton, 2013; Feinstein, 2009). Not only is funding an issue, but these underserved communities are also the least educated and fastest growing demographic in the country (National Center for Public Policy and Higher Education, 2010).

The US education system is in need of reform, and the attention paid as of recently in STEM education is just one example of the needed reform. Studies show that STEM education in the US has fallen in recent years compared to other developed nations. According to the World Economic Forum’s Global Competitive report, the US has fallen to 51st in terms of quality math and science education, and 26th for overall quality education (Schwab, 2011). It seems likely that those numbers will continue to rise unless something is changed. For a nation that considers itself a top power and influencer in the world, the education system is underwhelming at best. EFS is needed more than ever as quality declines and mounting economic and global pressure builds. EFS has been proven to engage students and encompasses the 21st century skills like teamwork, critical thinking, and problem solving that employers are looking for.
One of the most encouraging signs of EfS is its ability to engage students. When students are engaged in their learning process, test scores have risen (Church & Skelton, 2010). Studies and case studies show that when taught in an engaging teaching model students perform better across the board, including standardized tests which reinforces the need for EfS (Feinstein, 2009).

The main complaint from educators is the time it takes to implement EfS. Most educators aren’t trained to teach about issues outside of their discipline, and cross curricular units are seen by some as an add-on that comes out of their spare time and money. These complaints are rightly founded, and it would be presumptuous to hand a teacher an integrated EfS lesson and expect them to know what to do. Because this is complex and requires understanding relationships between the parts of the educational system, a systems thinking perspective is helpful to consider when implementing EfS units. Teacher preparation, either through workshops or university degree programs needs to be done, and support from qualified and experienced individuals could take some of the pressure off of an over-burdened educator. If these two key elements are missing in EfS, then the success rate would drop dramatically.

Lost Connection with Nature

As stated earlier, EfS education can lead to an ecologically literate student. An ecologically literate student is one that can recognize the connected systems within nature and the man-made environment. This is a crucial element in our “re-connection” with nature.
Teenagers are connected to electronics more today than at any time in history (Louv, 2008). This can lead to what one scientist called “Ecophobia”, or a fear of nature. Ecophobia can stem from two different directions. Youth in the US are not as connected to nature as they used to be. From a study by Sandra Hofferth at the University of Maryland, between 1997 to 2003 there was a 50% drop in children aged 9 to 12 who spent time doing outdoor activities like hiking, gardening, and fishing. The average teenager in the US spends nearly 45 hours a week connected to some form of electronic device, with little to no connection to the outside world (Louv, 2008). This can lead to an unknown viewpoint of the natural world, and one tends to fear what they don’t either understand, or don’t know.

The reverse side to the unknown version of Ecophobia is the bombardment of information coming from the news and school. Students are hearing about devastating super storms like Hurricanes Sandy and Katrina, and also how the effects of global warming are damaging the planet and endangering all types of species on the planet. This can lead to a student wanting to view nature from far away, because either they may view nature as something they could hurt, or that could hurt them. Students are mostly learning the negative effects that climate change can have, while not getting the practical knowledge on how to make a positive effect (Louv, 2008).

Another correlation can be seen in the health of US youth. From a 2003 study done by the journal Psychiatric Services, showed that in the five years prior to 2003 that the amount of anti-depressant sales doubled, with the largest increase, 66% in preschool children. The Center for Disease Control data has other alarming signs. The
obesity rate from 1989-1999 for children 2 - 5 was four times higher than that reported in the late 1960’s, and that obesity rates in children 2-9 have tripled in thirty years (Louv, 2008). A recent report showed that a boy born in the year 2000 had a 1 in 3 chance of getting diabetes by the time he is fifty. A girl of African American or Hispanic descent has a 1 in 2 chance of getting diabetes by the age of fifty (Stone, Michael K., 2009). While it isn’t possible to directly relate a lost connection with the natural environment for these problems, there are other contributing factors that point to a causal relationship. There are hundreds of studies that show nature has a calming effect on the human psyche, and with relieving symptoms of ADHD and depression in children and adults (Louv, 2008). It is also common knowledge that physical activity like hiking and biking are ways to stay in shape and live a healthy life style. There are multiple studies and case studies that show how this lost connection with nature is effecting the lives of our youths in terms of health (Faber, Wiley, Kuo, & Sullivan, 1998; Goldman & Koduru, 2000; Pastor, Sadd, & Morello-Frosch, 2002; Peacock, Pretty, Sellens, & Griffin, 2005).

Besides health impacts, institutionalization of education is another threat that children in the US face. Carrol Quigly wrote in his 1961 book *The Evolution of Civilizations*, a process in which institutionalization happens in a general developmental context. There are 5 stages to this process. The first stage addresses the basic challenges of finding food, caring for the sick, and providing basic services fundamental to a civilized society. The second stage sees a shift in social change and the problems that the original organizations were meant to solve are now of a different variety, which
makes those organizations or policies created in stage one less efficient or out of date. Stage three, these problems if not handled correctly in stage two, become too large to ignore. When this happens blame gets passed around to those in the problem-solving areas. Stricter measures are put in place and the rules and procedure books become larger. This is when harsher penalties are introduced.

Stage 4 is one of desperation and increased scapegoating. Authorities in power begin to punish and increase the rules to the extent that they are creating a more hostile environment. Another way of putting this stage into context is to imagine a Catch-22 philosophy of the beatings will continue until moral improves. The last stage, stage five sees the original organizations or policies erode into irrelevance. The original problem-solving policies and procedures that were successful for the first stage never evolved to match the ever changing problems and now are either completely dissolved, or are seen as a helpless ritual (Quigley, 1979).

These five stages were not written for the US educational system, but can be easily applied to it today. Marion Brady who wrote the book What’s Worth Learning?, believes that the US education system is in stage four at the moment, and is dangerously close to entering stage five (Brady, 2011). There are sections of stages three and four that sound familiar to education is the US, which would make the case for action more important than ever. At the beginning of this chapter climate change was discussed and health issues from distancing ourselves from nature. These new threats if not addressed with a new perspective and with different problem-solving solutions could very well be the straws that break the elephants back so to speak.
Chapter 7: Integrating EfS

“One of the major advantages of project work is that it makes school more like real life. It’s an in-depth investigation of a real-world topic worthy of children’s attention and effort.”

EDUCATION RESEARCHER SYLVIA CHARD

All over the US, EfS is being implemented and taught in private and public schools (Stone, Michael K., 2009; Goleman, Bennett, & Barlow, 2012). Different techniques and approaches are taking place, all with varying effects. Some schools are focus on the building and the “green” efficiencies installed, while some others are using student driven groups and campaigns to instill school wide EfS standards. The Willow School in Gladstone, NJ focuses on the building as a teaching tool. Lessons and curriculum are designed around the sustainable features of the buildings, whether those features are mechanical or natural. The Northfield Mount Hermon School in Mount Hermon Massachusetts created an energy competition at its school that soon included neighboring schools. This competition was created by help of an eco-team and a sustainability coordinator. The coined the competition the Green Cup and have collected saved over 1,200 pounds of CO2 in four weeks during the 2009 school year (Stone, Michael K., 2009). These are just a few examples of schools and groups in schools that are successfully introducing EfS into their learning environment.

Earlier it was shown that EfS has the ability to engage students in their learning, which in turn has shown results in higher test scores. It is also way for the school to reach out to the community or visa-versa. Building a connection to the community is a way for students to build relationships with potential future employers as well as
incorporate multi-discipline problem solving techniques. As noted systems thinker Fritjof Capra has stated, “Sustainability is not an individual property, but a property of entire web of relationships; it always involves a whole community” (Capra, 2005).

It takes time and patience to create a working EfS model and a sustainable ecoliteracy program. Support is needed from the principle down, with an action group made up of administrators, teachers, parents, students, and community members. With a strong action team in place, a foundation and roots will be in place for successful EfS and ecoliteracy (Goleman, Bennett, & Barlow, 2012; Stone, Michael K., 2009).

The DIPR Model

It is easy to see the benefits of teaching EfS, but more difficult to see the process and preparation involved to implement a successful plan. Here is a template that works in a nested system that touches on a student’s analytic and synthesis capabilities, while also taking the time to understand and reflect on key issues. This template is called DIPR (Discussion, Inquiry, Project, and Reflection). To understand this template better, one must first break down DIPR to each of its elements. Figure 7.1 illustrates the connection between each phase of the DIPR lesson.
The discussion part of the lesson is first. This is where the students and educators begin to discuss a certain topic. This topic would fit into a larger category, which will be explained later in the paper. For example, a category could be water conservation, and the topic would be a local watershed. This is also the part of the lesson that the educator would introduce a problem or objective that the lesson is meant to either solve, or address. In the case of the example above, it may be pollution levels in the watershed. The discussion part of DIPR is not meant lecture entirely about a certain issue, but to include a guided discussion with students and possible community partners that are directly engaged or affected by the issue. This tends to be a lower order thinking (LOT) exercise to help build initial knowledge, while allowing for meandering conversation about the issue. The discussion section doesn’t require students to start...
working on a project, but to begin asking questions. This is meant to build inspiration in students and encourage a sense of wonder or excitement about a certain issue.

The inquiry section follows up on the inspiration of the discussion stage by then asking students to begin researching the questions and main objectives that were either raised in the discussion section. This is the analytical section that tests the students' ability to work in groups, problem solve and begin align important information. These skills, which have been referred to as 21st century skills are important attributes that future employers are looking for in graduates (Bureau of Labor Statistics, 2015). The inquiry phase is based on a student driven model, where students are in responsible for their own learning and research. This doesn’t mean that an educator is not on hand to assist, in fact quite the opposite. The educator’s role is to serve as a facilitator that can guide students in the right direction, rather than standing at the front of the classroom and lecturing. This style of learning is engaging to students and educators, and requires less work on the educator’s part for organizing lecture’s or busy work (Kimonen & Nevalainen, 2013).

After the inquiry section has been completed students then get a chance to either test the information gathered in the inquiry phase, or build a project using the information gathered. This section looks at a student’s ability to multi-task and use synthesis style learning. This process of applying and creating is considered higher order thinking (HOT) (Newmann & Wehlage, 1993). Students continue to work in teams and individually to apply the knowledge gained and gathered in the first two phases. This will most likely require time out of the classroom in the form of homework. Both the
inquiry and project phase should employ some form of individual work that can be done outside of the classroom. This is not meant to be busy work, but work that is need to accomplish the tasks in the two phases. For example, perhaps a persuasive argument piece is needed, which could be done on an individual level. Students could then bring their own writings together, and piece the best parts to make one coherent document. This applies HOT and LOT style of learning. Projects are going to differ in terms of size and time allotted, by the general layout is the same.

The last section of the lesson, reflection, is meant to see what the students took away from the lesson. This is similar to the discussion section, but asks questions like, “what did we like about the lesson; what could we do differently; and how could we go further with this in the future.” These questions will help in structuring future lessons and let the students feel a sense that they are designing and driving their own learning. This is also the phase where students will present their final work. In some cases it will be in the classroom, while other large scale projects should take place in the community where the project took place. The goal of DIPR is to bridge the gap between the school and the surrounding community. This connection is a crucial component to EfS and ecoliteracy (Capra, 1996; Stone, Michael K., 2009).

The DIPR model is designed for grades K-12 and can be applied to private and public schools alike. The biggest change to the DIPR model is what is taught between grades. For elementary grades K-6, the model of Little DIPR (LD) is used. This uses the same concepts as above, but with shorter projects and a focus on local issues and ecology. LD’s focus is based around what students see in their school yard, backyards,
cities, towns, and states. This is meant to give a base knowledge and connect students with what they can see and touch. By teaching local content, students begin to build a platform to jump into the 7-12 grades, which is called Big DIPR (BD). Below in Table 1.1 shows what LD and BD encompass.

Table 1.1: Little DIPR and Big DIPR breakdown.

<table>
<thead>
<tr>
<th>Little DIPR</th>
<th>Big DIPR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local ecology and issues (schoolyard, backyard, city, town, and state).</td>
<td>Larger issues and multi-ecological habitats (region, country, global)</td>
</tr>
<tr>
<td>One week lessons</td>
<td>Multiple month lessons</td>
</tr>
<tr>
<td>Platform to DIPR (base knowledge).</td>
<td>Projects involve outreach to the surrounding community and build partnerships with community organizations.</td>
</tr>
</tbody>
</table>

Source: Author

After a student completes the LD, they move on to the BD. This will most likely be at grade 7, and continue to grade 12. The LD model is a stepping stone for BD instruction. Too often today students are learning about issues they can’t relate to at a younger age, i.e. rain forest destruction, and the plight of the orangutan. By building an understanding of the local ecology and issues they can see either in their backyard or state, it will give them the tools to see and understand larger global topics (Louv, 2008).

LD lessons are based on a one week model. This takes into account the students abilities at a certain age, and allows for the educators to cover a wider array of topics. The inquiry phase of LD lessons should also be more guided in terms of what and how to look for information. Leaving students in the younger grades to self-guide themselves through the inquiry phase could end in frustration, and disinterest. BD lessons should
be more self-driven since these students have learned the tools in the LD model. They are also expected to handle more responsibility and information at this age to begin compete for life after school (Kimonen & Nevalainen, 2013). BD lessons use the information garnered in the LD stage and build upon them. Projects in the BD model are geared to be longer and more inclusive with the surrounding community. For example a lesson may revolve around water conservation, with a central problem of a polluted stream in the community. Students and faculty would have access to local organizations that could help in all phases of the DIPR lesson. This connection with the community builds a relationship with possible future employers and strengthens the schools connection to the community it serves.

Figure 7.2: Six Large Unit Topics

Source: Author
To provide extra support for the individual lessons, a series of six general topics were created to help frame where each lesson would fall. Those six topics are, as seen in Figure 7.2 are, sustainable energy solutions, water conservation, sustainable agriculture, waste reduction & material upcycling, sustainable economics, and ecosystem services.

Figure 7.3 demonstrates how lessons fit into each of the above main topics in the LD model. The reason for this is that the average American elementary school year is thirty-six weeks long (US Department of Education, 2015). If an educator was so inclined, they could conceivably teach a new lesson every week for the entire school year.

Figure 7.3: An example of how LD lessons fit in to a larger unit.
The six general topics were sourced from The Village of Arts and Humanities’ PhillyEarth program. They teach project based lesson around topics agriculture, water, energy, waste, construction techniques, and material upcycling (PhillyEarth, 2015). These six topics were the inspiration behind the large unit topics above. The only change being a focus on more economic drivers and a systems thinking approach when it comes to EfS. If DIPR is to fall into the category of true EfS, it needs to align its lessons and topics not only with environmental causes, but also social, and economic ones as well.

From a systems thinking approach, all of the units can, and should be tied together and provide a series of feedback loops that would minimize rework and miscommunication (Meadows, 2008). For example if students are working on the polluted creek from the example above, that lesson could technically fall into not only water conservation, but ecosystem services as well. Depending on how the lessons were taught they could also fit into other categories too. The large topics above are not an absolute standard. It should be encouraged through the professional development stage to pursue topics that the school feels represents their interests and needs. The layout of the large units and DIPR lessons allow for customization and in theory, work more efficiently if designed from within a school’s scope.

Integration of disciplines is another key to DIPRs success. Like most of, if not all, of the lessons that could be applied to the main topics can be worked into many different classes, and should. The careers that await future graduates are not built in one discipline, but cover many different areas and work with many different
professions. Take for example an architect. This job doesn’t just ask someone to draw buildings, but to use math to measure; language to describe what is being designed and how it will work; and knowledge of earth sciences. These jobs ask that a single project would require multiple skills from a variety of different disciplines. It would also be required to work with many different people from engineers, electricians, plumbers, builders, developers, etc. This means being able to collaborate as a team or to communicate on shared goals.

A green house is a project that could be done at the school or in the community. This would not only cover many different topics in the six main units that were outlined earlier, but would also require the use of different classes. A math class could use geometry to measure angles and find the required spatial requirements. Language Arts classes could practice grant writing, and a proposal for the greenhouse. A science class discuss and analyze the soil used, or what would be grown in the greenhouse. An art class could paint or design the structure. What is needed though are teachers willing to work together and support one another to complete these larger projects. It is not an easy task and one that should not be undertaken without full consent by the participating classroom teachers and staff.

Once the units are agreed upon and lesson idea generation has begun, lessons can then be assembled. Figure 7.4 on page 49 is a template on what an ideal lesson layout might look like. At the top of the lesson is the category or unit that the lesson falls into, followed by the lesson title and standards. Here is where connection to common core standards on either a state or federal level can be shown. The following
section are the Learning objectives. The ideal DIPR lesson would include objectives for a multitude of classes, and would be created by all participating teachers together. After the objectives section comes the DIPR layout. Typically there are one or two objectives in each of the DIPR categories, and each should use words found in the Blooms Taxonomy (Anderson, Krathwohl, & Bloom, 2001). The discussion section should state a problem or challenge the lesson can look to solve. From the DIPR part of the lesson layout comes the materials, procedures, and homework sections. Most of these projects will require materials, and possibly homework in the inquiry and project stages of the lesson. The procedure area gives a quick overview of the time allotted during the week for each of the DIPR sections and a summary of the steps in each section. The last two sections of the lesson are Accomodations & Modifications, and Learning Outcomes. The learning outcomes would allign with a rubric the students would be shown before hand, stating what the teacher is looking for. The accomodations & modifications section would highlight key organizations or individuals in the community that would help see this lesson through. It would also make note of any barriers with either language or physical ability. In this section, a space should be left for teachers to give feedback on how the lesson went and any changes that should be made for future use.

The lesson plan shown below is a blank model of what this might look like (see figure 7.4). This example plan was made with the Common Curriculum’s template, which is a cloud-based template that allows groups of teachers to edit and add lessons on an annual group schedule (Common Curriculum, 2015).
Water Conservation - Wednesday, February 25th 2015

Lesson Title

Standards

Learning Objective's
ELA:
Math:
History:
Geography:
Science:

Discussion (Inspire + Understand)
1-2 bullet points for objectives. Use terms like understand, discuss, express, identify, discover, explain, etc.
- What is the problem that this unit will be solving or looking to solve?

Inquiry (Research + Analysis)
1-2 bullet points for objectives. Use terms like analyze, knowledge, research, connect, deduce, calculate, classify, define, identify, describe, examine, etc.
- Guided inquiry for week long lessons (Little DIPR), Self-guided inquiry for longer units (Big DIPR). Guided for solutions towards problem proposed in Discussion.

Project (Synthesis)
1-2 bullet points for objectives. Use terms like construct, produce, articulate, show, design, role-play, assemble, develop, etc.
- Project becomes authentic application of previous sections (Discussion + Inquiry).

Reflection (Evaluate)
1-2 bullet points for objectives. Use terms like recommend, summarize, conclude, support, assess, defend, convince, etc.
- This is the final stage where students present findings or projects.

Materials

Procedures
For Little DIPR model (1 week)
Discussion: 1-2 hours
Inquiry: 4-6 hours
Project: 4-6 hours
Reflection: 1-2 hours

Homework

Accommodations & Modifications
Possible community partners and organizations that can help with the lesson. Perhaps modification for ESL, hearing, or sight impaired students.

Learning Outcomes (Assessment)
Rubric for lesson. See separate Rubric(s)

Source: Author, created at http://www.commoncurriculum.com/
Professional Development

The LD and BD models will be unsuccessful without the professional development of the educators and administrators who will administer the lessons. They are tied to the success of each other, for without either piece it is only part of the puzzle. Without proper professional development, the DIPR model fails, and without a well developed DIPR model, the professional development piece becomes just another exercise. This can also be attributed to Fritjof Capra’s Networks, and Dynamic Balance systems, which is the view of all pieces connected and using feedback loops to keep all properties in balance (Stone, Michael K., 2009).

The DIPR lessons are based around integration and collaboration. They’re set up to include different classes participating on a single lesson. The professional development piece should mimic those same attributes. The template given here is a two day charrette workshop. In the workshop groups of teachers, parents, students, consultants, and administrators work in a fast paced idea generating environment which has proven results in the fields of business and the built environment. To begin, one must first understand what a charrette is, before seeing how it can be applied.

A charrette, as defined by the National Charrette Institute (NCI), is a collaborative design and planning workshop that occurs over four to seven consecutive days (The National Charrette Institute, 2014). NCI goes on to say, “they are highly creative, energetic, and interactive community events.” (The National Charrette Institute, 2014, p. 3) However, charrettes can be productive in much shorter time
frames too (Goleman, Bennett, & Barlow, 2012). An example of a typical charrette may be used with a developer looking to build a new building in a pre-existing neighborhood. A charrette team would get together a few months before and begin to piece together the stakeholders who need to be involved. This would most likely include architects, engineers, interior architects, community members, neighbors, the developer, and contractor, among others. Once the plan is in place, and all the prep work leading up to the charrette is complete, the charrette begins. Groups are formed and work to generate ideas and drawings begins. The process relies on a series of feedback loops to ensure coordination and evolution of ideas (The National Charrette Institute, 2014). This again is a systems thinking perspective that keeps a dynamic balance in place.

To apply this model to education requires some revision. The idea of designing a building and designing curriculum are two different things, but share certain attributes. For example, multiple stakeholders need to be involved. In the case for education, not only teachers, but administrators, parents, students, community members and organizations should be included. As was stated earlier, sustainability is a community practice, and the school and community can provide each other with essential insights.

Another important aspect to consider is the creation of a new set of curriculum and education methods that comes with DIPR. DIPR and EfS education are a holistic approach that takes TBL into account. It is not just an environmental component, but also a social and economic one. This could be tied together with Experience, as Anne Sherman argues is the fourth piece to TBL. In her research, she proposes going beyond TBL to the Quadruple Bottom Line (QBL) (Sherman, 2012). This take on an existing
framework is quite interesting and fits in the education model. Students and community alike should be able to experience what true EfS education is and how it can benefit them.

**Charrette Workshop**

The workshop proposed here is a two day event. Each day will run for three hours, and have different outcomes. The first day is similar to DIPR as it is a time to inspire the participants. This is done through a presentation that lasts for an hour, with the option of a site visit. The presentation will begin by explaining what EfS and ecoliteracy are, followed by inspirational stories of schools, teachers, and administrators that are integrating EfS and ecoliteracy into their schools identity. This is also the area where the DIPR model is first brought up next to examples of integrated lessons from other schools or institutions. This first day could also take place at a school that has implemented EfS style curriculum if available in the area.

There will be a break after the first section and before the second. The second section of the day is also the last. It will last approximately an hour and a half, and will pick up where the first section left off. Participants and stakeholders will begin identifying opportunities at their school and in their community that EfS could address. This will be done in partners where questions like, *What does EfS mean to me, to my school, to my community? What are some key issues that need to be addressed in the community we live in?* This is exercise allows participants and stakeholders to speak freely about what they feel is important to them, without the added pressure of having
to design a lesson or create something. The first day of the workshop is a creativity builder meant to inspire the following days workshop.

At the end of the last session on day one, an action team of motivated individuals will be assembled. The objective of the action team is to maintain the momentum beyond the workshop. These individuals should be made up of the more energetic and motivated people willing to champion the cause. This group should also be made up of an array of different people and professions. Ideally an educator, administrator, parent, student, community partner would make up the action team. This ensures that all view points from the school and community are still being heard.

The second day follows directly after the first. This is important not only logistically, but also to keep up the momentum that was garnered the day before. The second day builds off the motivation and creates an active plan for moving forward. It is also three hours long, but broken into multiple segments. The first part is a recap of the events from the day before and some of the issues that the partners listed. Groups will then be formed, and the first fast paced session begins. This session will generate guiding principles, or key issues that the school will adopt as a mission statement(s). For example, if the key issue is water conservation, perhaps one guiding principle would be, understanding the local water systems and habitats they contain. After the time is up, all the groups gather together and present their guiding principles.

The next section is described as a “vetting session” where the entire group discusses the “optimisms and cautions” of the ideas. These words are chosen specifically for their neutrality. To say that someone is cautious about an idea is
confrontational than someone saying they don’t like an idea or hate it. In a situation like a charrette, time is of the essence, and the more time spent arguing about a single idea could derail a productive session. The first part of the vetting is a group presentation of their ideas followed by clarifying questions. These questions pertain specifically to how something works, as these questions can quickly turn into cautions and optomisms. After the clarifying questions comes optomisms. Only positive comments can be said during this time. After the optomisms come the cautions. Here is the chance for the group to say what they are cautious about when it comes to the presenting groups ideas. The presenting group is not allowed to respond to these cautions, but to have a recorder writing down everything that is being said.

After each group has finished presenting they repeat the process for idea generation, this time coming up with ideas on how to incorporate the feedback into lesson ideas. This is again followed by another vetting session. This is the last stage for the day, and the end of the workshop. From here, the action team and the charrette team work together to bring the ideas together and start developing units and lessons. Page 55 shows Figure 7.5, which is an infographic displaying the layout of the workshop and an information section at the top highlighting the importance of EfS and ecoliteracy.
Figure 7.5: 2 Day Professional Development Charrette Style Workshop.

Source: Author, Created at http://www.easel.ly/
Most of the work for the workshop happens before and after the charrette. The charrette team completes all of the “before” work and works in collaboration with the action team afterwards to maintain the guiding principles and to ensure that work is being done. Most schools that have incorporated EFS and ecoliteracy into curriculum stress patients. This will take time and not everyone will buy into this method. This may sound discouraging at first, but as John Sole from Gurrilla Educators says, “Identify the nuts, and let them have a ball” (Sole, John, personal communication, Feb. 9, 2015). What he is saying is to find the ones who have bought into the idea and are willing to go above and beyond to bring about EFS at their school. These are the champions of the system and in turn motivate others around them.

Below in Figure 7.6 is an estimated time frame for beginning the EFS process. This model was created based on the National Charrette Institutes (NCI) “Charrette Ready Model”. NCI stresses that the success of a charrette depends on the charrette ready model, and the pre-work that happens before a charrette. The same logic applies to the professional development component of DIPR. The workshop is a quick two day event, so it is necessary to be well organized and prepared before hand, so as to run smoothly (The National Charrette Institute, 2014).

Figure 7.6: Professional Development Timeline

Source: Author
Continuing education credits (CEC) are another motivating factor for attending a workshop as an educator. All educators are required in some form to obtain CECs throughout their teaching career. As an incentive for participating in the charrette workshop, it is proposed that CECs for the workshop be offered through Philadelphia University’s Masters of Science in Sustainable Design Program. This would provide attendees with graduate level credits, which are required for some teachers. This has not been finalized but, is in the process of becoming a reality.

This model of lessons and professional development exists throughout the US. Although, not many are incorporating both for EfS and/or ecoliteracy. EcoRise in Austin Texas is a company that is working with schools to incorporate EfS lessons and provide professional development and classroom support. They started in the 2008/2009 academic year in just one classroom with 20 students. Their model has been embraced by the communities they serve, and have since expanded to 60 schools with over 5,500 students. Their model brings in experienced educators and community members to incorporate sustainability lessons. Jonathan Stott from EcoRise has said that partnerships with community partners has led to funding which has allowed the company to expand as it has (EcoRise, 2015).

EcoRise is not the only company that has pursued professional development and lessons. Ecology in the Classroom and Outdoors (ECO) in Portland, OR has been working with elementary schools in the Portland area since 2005. Bethany Thomas, Co-founder of ECO said, “We have offered a couple workshops in the past, but it’s not our primary focus presently. Once we’re able to get our materials to a place where we can sell them
to teachers/districts, we plan to offer Trainings” (Thomas, Bethany, personal communication, Nov. 26, 2014). They are currently in the process of building a set of curriculum that educators can purchase and use on their own time. They have decided to focus solely on elementary students since in her words, “Portland is a great city for Environmental Ed., and there are a lot of fabulous programs for middle and high schoolers, while not much exists for elementary” (Thomas, Bethany, personal communication, Nov. 26, 2014).

ECO and EcoRise are not alone in bringing EfS and ecoliteracy from outside the educational system. Other companies around the nation are introducing a mixture of predesigned lessons and professional development. The Center for Ecoliteracy in California, and The Cloud Institute in New York are two institutions that have had success at both and are leading the way for more NGOs and individuals interested in doing the same.

From Teacher to Facilitator

The combination of the DIPR framework and professional development requires educators to work across curricula and in some case outside of the traditional school system. Beyond professional development, most teachers are not taught an integrated teaching style (Kimonen & Nevalainen, 2013). This isn’t to surprising, since it never was part of the US education system, and with more focus on standardized tests, teachers have even less time and incentive to experiment. The traditional model of teaching is
the default style that is used, and new topics are fit into this framework, resulting in more content squeezed into limited time. This can best be described as what many other nations consider the US education system to be, “a mile wide, and an inch thick” (Schmidt, 2015). What the DIPR model and the professional development workshop offer instead is a way to include multiple subjects into a student centered learning model. That reimagines the role of the instructor, turning the teacher into a facilitator.

As stated above, time is one of the main constraints of a teacher. With pressure on test scores and standards, EfS and ecoliteracy can easily be viewed as “add-on” work. The DIPR model, with the combined professional development workshop is designed to integrate into what little time is available to the educator, while still covering essential goals and outcomes. The style of teaching that is presented in the DIPR model also lends to a facilitator role for the educator, where the students are the drivers of their own learning.

The intent of going from a teacher to a facilitator is to focus on student centered learning, and to provide an optimal learning environment (Clapper, 2009). The traditional method of teaching with an educator at the front of the class and lecturing is still the norm in many classrooms around the US, although some have started to change. This new style of learning transfers the teacher from the front of the classroom, to around the classroom, engaging students in their own learning and providing tools and environments that support student centered learning (Clapper, 2009). Tim Clapper states that a learning plan is needed before a lesson plan can be developed. He says what must be addressed is “What are those things that my students need to know and
what activities can I use that will create real understanding for them?“ as well as, “What will it take for them to be successful on the standardized test coming up while also preparing them for their future?” (Clapper, 2009, p. 2). Asking those questions first can lead to a higher order thinking (HOT) plan. The learning plan questions above are what Tomlinson and McTighe would refer to as the “big ideas” of what the lesson is really about. They will then help to pilot the lesson from start to finish (Tomlinson & McTighe, 2006).

The DIPR model is a good example of how an educator can work through a lesson as a facilitator. The DIPR model is similar in many aspects to the four-phase lesson plan outlined by Williams and Dunn. The four parts Williams and Dunn define are Inquiry, Gather, Process, and Apply. All of these phases end with a reflection stage before moving on to the next (Williams & Dunn, 2008).

The Inquiry phase is the opening stage where the facilitator helps build a base knowledge of the topic. Brooks and Brooks observe that personal meaning and relevance to the topic or lesson will begin here. They suggest the possibility of using a K-W-H-L chart. This begins by questioning what the students currently know (K) about the topic, what they want (W) to learn, how (H) they would go about finding the information they need, and later, what they learned (L) about the lesson (Brooks & Brooks, 1999). It is stressed that during this phase of the lesson the facilitator is to guide the students to the desired objective. This helps the students get on the path of student centered learning, rather than letting them flounder at first with a “sink or swim” method. This also helps keep the lesson on track with the learning plan that the
facilitator designed before the lesson began. This phase is similar to the discussion phase in the DIPR model. The goal for a facilitator is to use the “big idea” questions to drive interest and inspire the students to begin asking more questions about a topic.

The second phase is to gather the previous knowledge and meaning to be constructed by the students. This is an analytical phase of researching a topic and compiling useful information. Collaboration is encouraged, and the process of facilitator guidance takes a further step back. This is also similar to the second phase of DIPR, which is Inquiry. In the DIPR Inquiry phase, students build off of the momentum in the discussion phase to begin deep research. Collaboration between students and community organizations outside of the classroom are encouraged, with the facilitators helping students bridge the gaps and make sure they are asking the right questions.

The third phase for Williams and Dunn is the Process phase. This is where the students will take the previously gathered knowledge and begin to apply it. Some examples of this could include presenting to the class, building a project of some sort, or performing a skit that ties the previous phases together. This phase allows the students to synthesize the information. Like the third phase in the DIPR model, Project, students are encouraged to take the knowledge gathered and put it into use. The key role for the facilitator in both of these models is to allow the students to construct and apply the knowledge on their own without micro-managing the process. This allows for problem solving and collaborative skills to be developed and honed. The facilitator is encouraged to help students choose which projects and processes to follow, and to allow for guidance and clarification of mis-information and misconceptions about the lesson.
Apply is the fourth and final phase in the model. In this phase, the facilitator helps students recap the process they just went through and to begin exploring how this knowledge can be placed into other applications and subjects. This is similar to the last section of the DIPR model, Reflection, in that it allows the class and facilitator to recap what was just learned and to ask questions about moving forward into new areas or application. The main difference between the two models is the type of integration. DIPR is designed to be cross-curricular and to use the skills and standards from other subjects within the lesson itself. The Williams and Dunn model instead is geared for a specific class or subject, and uses the last phase to see how this application can be used in other areas.

From a facilitator standpoint, the DIPR model requires the collaborative effort of other educators and outside organizations or individuals. Both models have the facilitator involved early on, and stepping back at each step to focus the learning not from the front of the classroom, but from within it.

Assessment is another point of interest in both models, along with how a facilitator may perform assessments in lieu of tests or memorization. This step measures whether an exercise or lesson was learned, and successfully taught. Including feedback loops, is a way to evaluate the lesson. Williams and Dunn state that a formative assessment that comprises feedback to both the facilitator and students is key to ensuring the material was engaging, understood, and relevant. Having feedback loops in place will help facilitators identify areas that need more attention. Feedback loops are an effective way of assessing whether or not important information and content was
absorbed. This is attractive to those concerned about standardized testing, since the assessment is on going throughout the lesson, rather than a quiz at the end when it is too late to adjust to learning styles.

The DIPR model lesson layout as seen about in Figure 7.4 shows outcomes per discipline, for example math, ELA, science, etc. These help guide the “big idea” questions that pertain to each class or discipline. If, for example, the lesson was about designing a greenhouse, this could include the understanding of right angles and triangles in a geometry class, and local plant types in science class. The bottom of the DIPR lesson has a section for assessment. This is where the rubric assessing student performance for the lesson is located. If the outcomes are the goal, the assessment and rubric are the means to it. Facilitators should use the rubric as a guide to the lesson itself. As an example, to obtain a top grade, a student would be able to work well with team-mates, maximize time by obtaining useful data, and explain thoroughly through example his/her grasp of the lesson. This may or may not be in the rubric, but one can see how it is the process of evolving through and understanding the material as a means to success (Williams & Dunn, 2008).

Facilitators should be able to use this rubric as a guide for themselves, as well. For example, how relevant was the material to the standards and outcomes desired, and/or were the community resources successfully used during the lesson. Rubrics are helpful in future lesson planning as they give an outlined report of how the lesson worked in multiple areas, not just how students scored on a test.
Asking teachers to switch teaching styles abruptly is not recommended, as it could be seen as added work to learn a different style of educating on the fly. This style of teaching would be taught through professional development workshops and would be completely voluntary. To begin facilitating the DIPR model, one needs to go through the professional development section. During this time an action team would be created from those individuals willing and able to go above and beyond to bring EfS and ecoliteracy into the school. These individuals would work with each other and other members of the school to provide a support system to implement DIPR lessons. As seen from many other schools that employed this style of learning, a patient growing period is needed to ensure success (Stone, Michael K., 2009).

It is recommended that a Director of EfS or ecoliteracy be in place to continue where the professional development workshop ends. Ideally, this individual could devote all efforts to this cause. A position should be created either at the school, or through an outside organization running the workshop to make sure that the efforts made in the workshop continue. This person’s job would be to oversee all efforts in the implementation of DIPR models and to coordinate with the action team. In Figure 7.7 is a graphic showing the support structure of the action team and the reinforced work load to be completed at the end of the workshop.
Some common complaints from educators are that a workshop can be quite engaging and leave the participants with a lot of excitement, but as Dennis Barnebey, a retired high school teacher from Philadelphia noted, once the workshop is over and the people who run the workshop are gone, the plan seems to fall apart (Barnebey, Dennis, personal communication, April 20, 2015). No one is held accountable for keeping up the excitement or making sure all the work accomplished at the workshop actually gets done.
A director would also be available to assist educators to transition to a facilitator type of role. The director and action team would be helpful in creating lessons that bring multiple disciplines together through constant communication and outreach to participating educators. This model has worked for the Marin Academy in San Rafael, California. A member of the diverse group called the Eco-Council took on the task of championing the sustainability initiatives at the school and became the Sustainability Director. This person’s job was to coordinate between faculty, students, and community, as well as coordinate integration of sustainability into the curriculum (Stone, Michael K., 2009). Another school in Lawrenceville, NJ called the Lawrenceville School appointed a Sustainability Director to handle the day to day sustainability operations on campus. This person was a full time staff member in charge of overseeing all of Lawrenceville School’s sustainability initiatives, as well promoting ecoliteracy and EfS into the curriculum. The director is part of another diverse group on the Board of Trustees Committee on Sustainability. This group is made up of students, faculty, and community members (Stone, Michael K., 2009).

These are just a few examples of schools incorporating EfS and ecoliteracy through a collaborative and diverse group of individuals. There is almost always a single individual that is tasked with ensuring that ideas and motivations continue to grow. Incorporating EfS and ecoliteracy into a school’s identity and even into a few classes takes time, something that teachers are lacking. Asking them to shoulder more of the weight to bring EfS and ecoliteracy is unjust and may lead to failure. Instead, a support team of motivated and diverse individuals, for example, students, teachers, parents, and
community members that are willing to start and be apart of an action team is encouraged. This team can be then be fortified by one or two full time individuals to direct all the operations. Having this support in place will give educators and school staff the time they need to do their job, while also bolstering sustainable actions (Stone, Michael K., 2009; Goleman, Bennett, & Barlow, 2012).
CHAPTER 8: Conclusion

Shown above are examples of schools around the country that are introducing EfS and ecoliteracy into education. These were not easy tasks, nor ones that happened over night. Most of these efforts to incorporate EfS and ecoliteracy took years and groups of people in and out of the school to make it a reality. The Center for Ecoliteracy has outlined five steps that give a general idea of what it takes to transform conventional education into what they call “schooling for sustainability”.

The first step is to organize, and find the champions of the cause, or the individuals who are willing to go the extra step to bring in EfS and ecoliteracy. Fritjof Capra has shown that sustainability is a community practice that is held together by a web systems (Capra, 1996). Look for members in the school and the community to create a team of these motivated individuals. Having support from the faculty and staff are crucial if any real change is going to happen. It is important to express will not be done only by the teachers, nor without sufficient support for their efforts.

The second step is to envision. This requires a clear notion of what sustainability and ecoliteracy mean to each school. Every school is different, and there isn’t a cookie cutter version of EfS or ecoliteracy. A vision can and should be created in the first professional development workshop. The workshop provides a space and time for individuals from both the school and community to get together and create a shared vision. This will strengthen the bond between the community members and
organizations with the school, which could allow for future partnerships in lessons and units.

Taking stock is the third part, and is where the difficult work takes place. It is recommended to start by examining the existing curricula and policies in the school. This can be achieved through energy and water audits of different parts of the building. Those audits provide baseline data that will allow the EfS team to design lessons based on improving the baseline information. These audits could come in the form of a lesson, where students are asked to perform an energy audit of their school. By engaging the students in the process, they will feel a closer connection to the material, and get a sense that their work has relevance. A key to taking stock is to look beyond the science and environmental classes, but into all corners of the curriculum to see where connections can take place.

The fourth step is to plan. This step may seem obvious, but it can be the root of many failures if not executed correctly. Too often goals are set high, and the bottom falls out from underneath. This happens for a few reasons, but the most common is not having manageable steps in place. It is important to set high goals for the school, but it is equally important to set up incremental steps that achieve those goals. Building on the achievements of a lot of smaller goals will make the higher goals easier to obtain.

Use the building and community as a teaching tool. The world outside of the classroom is the real laboratory, and offers the best examples of sustainable and non-sustainable behavior. Use the teacher as a facilitator method to engage members and
organizations in the community to incorporate real world actions in the classroom and outdoors.

The fifth and final step is to reflect. Use feedback loops to inform future decisions. Find what worked and what didn’t and build off them. Some of the visions may change over time as the school evolves. The plan and vision should be referred to often to ensure that the school is staying true to their beliefs. Honesty is the best policy, and it is true here as well. If some part of the plan isn’t working, don’t mask the problem by continuing the same steps, but rather step back and look at why this may be the case and don’t be afraid to change directions. Documentation of steps and processes is important to keep, as people come and go. As long as the core concepts, goals, and plans are in place and well documented, the school can go through different hands while still holding true to their message.

These are just five steps general steps in an otherwise long process. Each of these are connected to each other and should be viewed in such a way. A proper plan requires a unified vision, and the initial work of taking stock is essential to this. It is important to be honest about the process and the amount of work that needs to be involved. This also means being patient and persistent towards making strides. Action is not going to happen over night, and could take years to fully recognize the goals of the school. Having a Sustainability Director in place full time with the support of an action team will be crucial to the success of any plan.

It is important to remember that there is not a one size fits all approach to EfS and ecoliteracy. Some schools and communities are tied together from the beginning
like in the Lopez Island Farm Education on Lopez Island, WA. This happened to be the only school on the island, so the community was already involved in the school. Reciprocity between the community and the school took place in the form of equipment, soil, money, etc (Stone, Michael K., 2009). Other schools have grown there ideas from a single teacher, and in some cases a single student. At the Head-Royce School in Oakland, CA, a sophomore walked into the head of the schools office and asked to bring an executive director from the Green Schools Initiative to their school to help them “go green”. Later that year a junior running on the platform of sustainability and environmental action won class president. These little steps of action created a snowball effect that took over the school. The Head of the school received permission from the board to install his green mission goals, and asked faculty to find their own personal connection to the goals. This school is leading the way in many of the EfS and ecoliteracy standards, and it was all started by a sophomore asking a question (Stone, Michael K., 2009).

One has the right to question whether or not EfS and ecoliteracy play any significant role in the daily lives of Americans from a QBL point of view. What can-not be argued is the fact that EfS and ecoliteracy is engaging to students and faculty alike, and that engagement in curriculum increases a student’s ability on standardize testing (Church & Skelton, 2010; Feinstein, 2009). For those that question its merit in education, one needs to look no further than the studies that show positive results from tests scores, attendance, and connection to 21st century skills essential to future employers (Stone, Michael K., 2009; ICLE, 2009; Newmann & Wehlage, 1993).
There are positive signs of progress from around the nation in the form of individuals and organizations heeding the call to action. There are plenty of examples for other groups looking to pick up in new areas of the country. Facing the Future and The Cloud Institute both offer free lessons that individual teachers or schools can use. Non-profits like the Center for Ecoliteracy and Shelburne farms are educating teachers and working to spread their mission globally. EfS and ecoliteracy add a breath of fresh air to the education system and reconnect our communities at the same time for truly authentic sustainability.
Bibliography


