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Exploring the Impacts of Teton Science Schools’ Field Education Programs onVisiting Teachers’ Beliefs and Practices about Place-Based Education

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Exploring the Impacts of Teton Science Schools’ Field Education Programs on Visiting Teachers’ Beliefs and Practices about Place-Based Education

By

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Plan B Project
Submitted in partial fulfillment of the requirements for the degree of Masters in Science in Natural Science in the Science and Mathematics Teaching Center of the University of Wyoming, 2016

Laramie, Wyoming

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Abstract

This study was conducted to explore the impacts of Teton Science Schools’ field education programs on visiting teachers. It was conducted to specifically investigate the impacts on teachers’ beliefs and practices about place-based education. A review of the literature indicates that there is a gap in current research about the effects of residential education programs on visiting teachers. Qualitative and quantitative data were gathered to enhance the understanding of how Teton Science Schools’ field education programs impact visiting teachers. The data suggest that participants demonstrated increased use of several place-based education practices with increasing visits to Teton Science Schools. A greater appreciation and understanding of place-based education was also emphasized by participants as an outcome of their visit. In addition, the study discusses teachers’ challenges and limitations of implementing place-based education practices in their classrooms. Recommendations for how Teton Science Schools can support visiting teachers’ future implementation of place-based education practices are discussed.
This research is inspired by and dedicated to the many teachers who have, over the years, instilled in me a love for learning.
Acknowledgments

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Chapter 1
INTRODUCTION

“From the standpoint of the child, the great waste in the school comes from his inability to utilize the experiences he gets outside the school in any complete and free way within the school itself; while, on the other hand, he is unable to apply in daily life what he is learning at school. That is the isolation of the school—its isolation from life.”

Statement of the Problem

John Dewey, a philosopher and educational reformer, believed learning should be experiential and directly connected to students’ lives. Although, not coined by Dewey, place-based education finds its roots in his early 20th century ideals. Despite its connections to older philosophies, place-based education is a newly coined term. Place-based education connects learning to students’ local, ecological and historical contexts (Elfer, 2011). Place-based education attempts to address similar issues that Dewey highlighted over 100 years ago. It is increasingly recognized that place-based lessons can be a powerful way to engage students in the sciences (Aikenhead, Calabrese, & Chinn, 2006). However, place-based education is not common practice in schools. Fewer teachers are taking their students out on field trip, which is a key aspect of place-based education, due to lack of funding, lack of time, lack of training, and systematic pressures for student assessment (DeWitt & Storksdieck, 2008). This decline could be attributed to the No Child Left behind Act, which has put an emphasis on standardized tests over best teaching practices that develop the whole child (Rushton & Juola-Rushton, 2008).
Residential education programs are identified as important sources of place-based education and environmental education. Residential environmental education programs are defined as “centers that have environmental education and natural science as the primary program components in an outdoor setting and where students stay at the site at least one night” (Bourke & Buskist, 2014 p. 84). However, due to the fact that content and practices of informal educational experiences are not explicitly incorporated into standardized testing, administrators see a lesser value in sending their students to such programs.

The literature highlighting the impacts of place-based education and environmental education programs is generally more qualitative than quantitative and therefore is not taken as seriously by administrators, as the No Child Left Behind Act has quantified success based solely on numbers and statistics from testing (Bourke & Buskist, 2014). Research shows environmental education programs enhance students’ understanding and awareness of the natural world, foster positive attitudes towards wildlife, create connections with nature as well as promote stewardship behavior (Dettmann-Easler & Pease, 1996; Stern, Powell, & Ardoin, 2008). Additionally, residential education programs offer opportunities for personal growth through teamwork, collaboration, and leadership skills (Dettmann-Easler & Pease, 1996; Kruse & Card, 2004).

The primary focus of residential education programs are the students who come to the programs. Even still, a recent meta-analysis only found five-peer reviewed evaluations of environmental education programs on student outcomes between 1991 and 2000 (Schneider & Cheslock, 2003). This highlights a lack of
published literature regarding the impacts of environmental education on students. Even less literature is available on the impacts of place-based education programs. In order for environmental education and place-based education to be incorporated into curriculum more extensive evaluations are needed. Carelton-Hug and Hug (2010) argue “the field is ripe for opportunities in evaluation” to increase the knowledge base (p.163).

In addition to students, teachers, whom bring their students to residential education programs, may also benefit from the experience. Teachers are often chaperones and offer student behavioral support at these centers, but may also participate in lessons, activities, and games. Regardless of their participation levels, teachers are observers of place-based and hands-on practices of residential education. Visiting students are the focal participants at residential education centers; however, visiting teachers are also present and engaged during programming. The impacts of residential education programs on visiting teachers and their own teaching practices is even more unknown in the literature than the impacts on students. There is a gap within the already limited field of literature on the impacts of residential education programs on visiting teachers.

**Purpose**

The purpose of this study is to investigate the impacts of Teton Science Schools’ field education programs on visiting teachers’ teaching beliefs, attitudes and practices. This research could help to elucidate what the peripheral impacts of residential education programs are on visiting teachers. There is the opportunity for
the multiplier effect, if teachers’ beliefs and practices change and are brought back to their own classrooms.

According to the National Science Teacher Association (NSTA) (2015) there is a national shortage of science teachers in both private and public schools. Teachers often feel discouraged from teaching science due to a lack of confidence, lack of funding, and a lack of time (Abell & Roth, 1992; Plourde, 2002). Therefore it is imperative that alternative supports and programs be provided for teachers. It has been found that hands-on professional development programs give teachers the subject knowledge, tools and reflection time necessary to build their confidence in teaching science in their own classrooms (Meichtry & Smith, 2007; Rivera, Manning & Krupp, 2013). The question then arises whether residential education programs are might act as a form of professional development, offering similar experiences for visiting teachers to gain understanding and confidence to enhance their own teaching.

**Research Questions**

The two primary questions that this summative research will address are 1) what are the impacts of Teton Science Schools’ field education programs on visiting teachers’ beliefs and practices about place-based education?, and 2) what are visiting teachers’ major outcomes from Teton Science Schools’ field education programs? The research is being approached through a discovery mindset looking at teachers’ use of place-based practices within their own teaching prior to and after their visit to TSS.
Teton Science Schools (TSS) is a non-profit organization with an overarching mission to connect people, nature and place through education, science and stewardship. Since 1967 TSS has been teaching students about the natural world and the Greater Yellowstone Ecosystem. Field education is one of the seven branches within the organization. Field education is primarily residential and takes place both on the Jackson and Kelly Campuses in northwest Wyoming with visiting schools staying for 3 to 8 days. Students range in age from Pre-K to college and come from schools throughout the United States. TSS does not identify themselves as environmental education, but instead as field education with a foundation in place-based philosophies. Field education is a TSS-centric word and is used since programming most often takes place outside, in the field. The field education programs at TSS were used in this study in order to help answer the research question. The design of this study was based off of other evaluative studies that looked at the impacts of residential education programs on students.

Pre- and post-tests are a common method for looking at the changes in attitude, knowledge and perception of students attending residential education programs (Smith-Sebasto & Cavern, 2006; Stern et al. 2008). Additionally, pre- and post-tests are commonly used at professional development programs to look at changes in teacher understanding, knowledge and confidence (Meichtry & Smith, 2007; Rivera et al. 2013). Therefore this study will use a pre- and post-test methodology in order to uncover the impacts of residential education programs on visiting teachers.
This research study addresses the above research questions. The second chapter is an extensive literature review that looks at the benefits and challenges of environmental education programs, and discusses the emergence of place-based education and its connection to environmental education. The literature review provides evidence of effective teacher professional development programs and highlights what research exists in the field. The third chapter includes the design and methodology of this study, where a mixed methods approach of using both survey and interview data is explored closely. The fourth chapter provides an analysis of the quantitative and qualitative data. The fifth chapter includes a discussion of the findings, suggestions for residential education programs and recommendations for future studies.
Chapter 2

LITERATURE REVIEW

The gaps in the literature about the impacts of environmental education and place-based education on visiting teachers at residential programs give purpose to this study. For this chapter, the peer-reviewed literature about environmental education, place-based education, and professional development are investigated. Arguments are presented for the benefits provided to students through environmental education, place-based education and inquiry-based learning. The benefits of professional development programs on teacher confidence, beliefs and practice are also discussed. The challenges of effective evaluation in environmental education and place-based education programs are discussed and give purpose to this study that looks to evaluate the impacts of place-based education programs on visiting teachers.

Environmental Education

The origins of environmental education root back to the early 18th century with philosopher Jean-Jacques Rousseau and were further expanded upon by Louis Agassiz, and John Dewey in the 19th and 20th centuries. However, modern environmental education was ultimately established in the early 1970’s. William Stapp created the first definition of environmental education in which he stated, “environmental education is aimed at producing a citizenry that in knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution” (p. 34). In 1971 The National Association for Environmental Education was founded. It is now known as the North American
Association for Environmental Education (NAAEE). NAAEE currently defines environmental education as,

Environmental education (EE) is a process that helps individuals, communities, and organizations learn more about the environment, develop skills and understanding about how to address global challenges. It has the power to transform lives and society. It informs and inspires. It influences attitudes. And it motivates action. And it’s a key tool in expanding the constituency for the environmental movement and creating healthier and more civically-engaged communities (NAAEE, 2015).

The root of both definitions highlights the need to create personal connections with nature in order to find solutions to environmental problems; however, the current definition sees environmental education as a holistic approach to both community and global issues. David Orr (1992) adds to this definition and argues that environmental education is important in order to create ecologically literate humans. Without citizens who understand their own impacts on the world people will not be able to live within natural limits. In order to create ecologically literate humans, Palmer (2002) argues that it is essential to incorporate action research, community problem solving, empowerment, and capacity building into education.

Research has been done to investigate the impacts of environmental education programs on students and their perceptions of the environment. Powers (2004) found that environmental education programs can enhance student motivation and engagement in learning. Additionally, environmental education programs generally increase student connection and respect for nature and stewardship (Smith-Sebasto & Cavern, 2006; Stern, Powell & Ardin 2008). Other scholars have found that when the environment is used as an integrating context student achievement and in-school behavior improves (Lieberman & Hoody, 1998). It is hard to quantify the benefits of residential
environmental education programs, but teachers have seen great differences in their students’ interpersonal relationships, self-confidence and motivation to learn (Dettmann-Easler & Pease, 1996).

Environmental education primarily operates in non-formal educational settings, meaning outside the academic classroom or confines of schools (Heimlich, 1993). Although environmental education is sometimes present within middle and high school curricula, it is most commonly found at environmental education centers or residential environmental education centers (Crohn & Birnbaum, 2010). Environmental education is on the fringe of school curricula since it is not included in standardized tests (Schlottmann, 2012). Despite the many benefits associated with environmental education, it has not been incorporated into the mainstream science curriculum. Orr argued in 1992 that environmental education “must be woven throughout the entire curriculum and through all operations of the institution, and not confined to a few scattered courses” (p. 152). Since Orr stated that in 1992, very little has changed in regards to the integration of environmental education into schools, which leads into the challenges of environmental education.

**Challenges and Limitations of Environmental Education**

Although there is significant supporting literature on the benefits of residential environmental education, Carleton-Hug and Hug (2010) claim that because environmental education is interdisciplinary the knowledge is not concentrated into the literature base and therefore it is hard for educators and evaluators to learn from. It is suggested that evaluations occur at environmental education centers, but are often not published or shared, so there is no significant body of literature for others to refer to
One of the major challenges for environmental education programs is the fact that there is limited evaluation of the impacts of the programs. In order to be seen as a legitimate educational practice, greater evaluation of the impacts of environmental education programming needs to be done. Keene and Blumstein (2010) argue that environmental education needs to embrace the evidence-based movement that is well established in other disciplines. Without doing so it is impossible to know which environmental education practices are most effective in promoting ecological literacy and behavioral changes of participants.

In order to understand if programs have met their objectives, more effective evaluation than currently exists needs to be implemented. Clavijo, Fleming, Hoerman, Toal and Johnson (2005) describe three main challenges that non-formal education programs encounter when evaluating their programs. Often times, non-formal education settings do not have the infrastructure or understanding to interpret evaluations that formal education systems have (Clavijo et al. 2005). Secondly, evaluations are often done by staff members who tend to be seasonal or temporary. Therefore, evaluations lack consistency through time. Lastly, environmental education centers often rely on outside funding, so evaluations are often created to persuade funders and therefore might not be completely objective (Clavijo et al., 2005). Bourke and Buskist (2014) added to these challenges in a study that interviewed directors of environmental education programs. Bourke and Buskist (2014) found that limited access to students before or after programming, time constraints, and the variety of programming are additional challenges that residential environmental education programs face in their evaluation process.
There is evidence that there is an increasing understanding of the need for consistent evaluation within environmental education programs. The North American Association for Environmental Education (NAAEE) released guidelines to help non-formal education centers assess the effectiveness of their programming. In 2005 the National Environmental Education Advisory Council (NEEAC) released a report to congress on the status of environmental education. NEEAC highlighted a need for an established framework for assessment of environmental education programs in order to know which programs are working and which are not working (National Environmental Education Advisory Council, 2005). Additionally, the need for longitudinal research is necessary in order to understand the greater impacts of environmental education programs (National Environmental Education Advisory Council, 2005). Although this was a step in the right direction, it did not provide concrete or tangible strategies for enhancing assessment. Carelton-Hug and Hug (2010) argue more consistent evaluation approaches are needed and most importantly the results of the evaluations need to be shared in order to inform other environmental education practitioners.

Another critique of environmental education is that as an educational philosophy it is too narrow minded. Environmental education has been criticized for being only science focused, and in order to understand today’s complex issues it is essential to have a more holistic understanding (Bourke & Buskist, 2014). There are arguments that in order for environmental education to be recognized as a legitimate educational philosophy it needs to broaden its scope to include the cultural, social and economic aspects of the environment (Cole, 2007). This is where other educational philosophies such as place-based education have come into the conversation. It is relevant to note that
Teton Science Schools once referred to their programs as environmental education, but now due to the stigmas and challenges environmental education centers face they prefer to refer to their programs as field education that utilize place-based practices.

**Place-Based Education**

Although place-based education established its roots in environmental education, it differs in its inclusion of the social, cultural, political and economic aspects in addition to the natural aspects of the environment. Place-based education is a relatively newer field of study, yet ideals of focusing on local learning can be traced back to education philosopher John Dewey. Dewey believed “there is an intimate and necessary relation between experience and education” (Dewey, 1938 p. 20). Sobel (2004) provides the following formal definition of place-based education.

Place-based education is the process of using the local community and environment as a starting point to teach concepts in language arts, mathematics, social studies, science, and other subjects across the curriculum. Emphasizing hands-on, real-world learning experiences, this approach to education increases academic achievement, helps students develop stronger ties to their community, enhances students’ appreciation for the natural world, and creates a heightened commitment to serving as active, contributing citizens. Community vitality and environmental quality are improved through the active engagement of local citizens, community organizations, and environmental resources in the life of the school” (p. 6).

This definition of place-based education has links to environmental education, with a similar goal of creating knowledgeable and proactive citizens of the world who can think critically in order to solve problems. Place-based education, unlike environmental education, incorporates the social and cultural aspects of our communities instead of just the ecological aspects. Place-based education provides a more holistic approach to education by allowing students to investigate their real world surroundings through multiple lenses.
Smith (2007) articulates the diversity of projects included within place-based education as offering, “cultural and historical investigations, environmental monitoring and advocacy, real world problem solving, entrepreneurialism, and involvement in public processes” (p. 191). Demarest (2015) states that place-based education pulls from many other successful educational practices such as the individual nature of learning, identifying outcomes for intended goals, examining student work to ground teacher practice, learning in a community context and creating authentic partnerships between students, teachers and the community. Place-based education is spreading across the country and taking place in urban, suburban and rural schools.

Benefits of Place-Based Education

In addition to breaking down barriers between schools and their surrounding community, place-based education offers a wide array of benefits to students. By using local questions as the foundation of curriculum design student learning is grounded in relevant and tangible experiences. Dewey believed students’ learning becomes more meaningful when it is grounded in reality, and that is the primary aim of place-based education (Dewey, 1938).

The power relationship between students and teachers changes in place-based education (Demarest, 2015). Learning therefore becomes highly student-centered as opposed to lecture based. Students are the drivers of their own investigations. Teachers are no longer dictating the direction of each lesson or unit (Smith, 2002). This allows students to act more independently, and responsibly. Demarest (2015) claims, students display a great deal of pride and ownership in their accomplishments due to the greater independence they are given than in a regular classroom. It has also been found that
improved discipline and self-control is found in students partaking in local learning (Smith, 2007). Lastly, these students have been shown to academically outperform other students (Lieberman & Hoody 1998). One of the most profound benefits of place-based education is that it “holds out to students the promise that they can become valued members of a community” and therefore empowers them to take ownership of their actions and their impacts on the world in which they live (Smith, 2002, p. 33).

Despite the many benefits of place-based education it is not implemented as commonly as one might hope due to the many challenges teachers face in regards to standards, time, and confidence in relinquishing control to students (Smith, 2007). There are teachers who are actively pursuing incorporating place-based practices into their curriculum, however, it is important to acknowledge that the challenges they face are “deeply rooted in the practices, structures and philosophical premises commonly encountered in American schools” (Smith, 2002, p. 593). Smith (2007) and Demarest (2015) provide examples of teachers and schools that are implementing place-based education practices within their classrooms, despite the constraints of the school systems. Although there are teachers accomplishing this task it is not necessarily common place within schools due to the above challenges.

Teton Science Schools plays a beneficial role for teachers by simply exposing their students to place-based education during residential field education programs. Although Teton Science Schools cannot help address all of these challenges for teachers, at the very least, it may help to highlight the benefits of place-based education enough to inspire changes in teachers’ practices. This is where this research study finds its value. It is a preliminary exploratory look at the potential impacts Teton Science School’s field
education programs may have on teachers’ practices and beliefs about place-based education.

**Place-Based Education Practices**

For this study, six place-based education practices were chosen from a rubric created by Teton Science Schools and adapted from the Annenberg Rural School and Community Trust. (The Rural School and Community Trust, 2003; Teton Science Schools, 2015). The rubric is a place-based education curriculum framework, which includes 12 place-based education practices. Six were chosen in order to make the data collection and analysis manageable. The six chosen practices are as follows: connection to local community, use of local partnerships, use of community and place, student-centered learning, interdisciplinary learning, and inquiry-based learning.

Connection to local community refers to teachers’ incorporation of local communities (human and natural) into their teaching and curriculum. This concept ties back to John Dewey’s beliefs that student learning should be grounded in their reality (Dewey, 1928). In order to best connect the environmental and cultural communities that make up a place, Theobald and Nachitgal (1995) state,

> The curriculum must grow out of real issues important to the students and the people in a particular community. Activities that connect with one’s own experience, that require the use of skills from various disciplines, that are carried out in cooperation with others, and that result in a useful product give students the most powerful kinds of learning experiences (p. 27).

A teachers’ use of local partnerships entails bringing in experts, specialists, and community members to teach to or talk about a specific topic. This practice is interconnected with the previous practice, but helps to enhance student understanding of the local community by integrating the community into the classroom. Partnering with
scientists provide authentic experiences and scientific benefits for both students and teachers’ learning (Houseal, Abd-El-Khalick & Destefano, 2014).

Use of the community and place is closely tied to the first and second practices, connection to local community and use of local partnerships. However, instead of simply learning about the local community this practice implies leaving the classroom and physically going out into the community. Woodhouse (2001) states that by using, “the immediate environment of the school grounds and community as learning laboratories” students develop a better understanding of their surroundings and their lives (p.1).

Student-centered learning is a teaching method that substitutes lectures for active-learning. Students are able to pursue their own interests and questions (Felder & Brent, 1996). This type of learning allows the students to be challenged at an individual level while strengthening their critical thinking skills (Zmuda, 2009). Students become the drivers of their own learning, and teachers act as guides as opposed to the primary source of knowledge and authority (Bell, 2010).

The goal of interdisciplinary learning is an integrative approach of connecting several perspectives in order to address a topic holistically. Interdisciplinary learning focuses on problems that are too complex to be sufficiently answered through a single discipline (Andersson et al. 2010). Teaching through an interdisciplinary approach enhances students’ ability to transfer and apply their understandings to new situations and problems (Ranaweera, 1990).

It is recognized that place-based inquiry activities are an effective way to engage students in science (Aikenhead, Calabrese & Chinn, 2006). Inquiry-based learning is most often used in the sciences, but can be utilized across disciplines. Inquiry-based
learning is student centered and focuses on questioning, critical thinking, and problem-solving skills (Savery, 2006). The National Research Council (NRC) highlights the following inquiry within the Next Generation Science Standards science and engineering practices: asking questions and defining problems, planning and carrying out investigations, analyzing and interpreting data, constructing explanations, and communicating information (NRC, 2012).

The Inquiry Synthesis Project was a long-term study conducted by Bredderman (1983) to investigate the impacts of inquiry-based science in K-12 classrooms. The study was later expanded upon and looked at long term impacts of inquiry-based learning between 1983 and 2002. The results of the study showed increased student achievement and conceptual understanding when increased inquiry based practices were incorporated into the instruction (Minner, Levy, & Century, 2010). Inquiry teaching strategies that actively engaged students in the learning process were more likely to increase conceptual understandings (Minner, et al. 2010).

**Professional Development**

Teton Science Schools is beginning to offer place-based education professional development workshops for teachers across the country. Field education programs at Teton Science Schools are not considered professional development opportunities for classroom teachers since the focus of the programs is primarily on the visiting students, and there is no programming explicitly for the educators. The specific programs provided by Teton Science Schools are coordinated and a collaborative effort between the visiting teacher and Teton Science School’s Faculty. During programing, visiting teachers have daily meetings with Teton Science School staff to discuss daily logistics, goals, and
challenges. Teachers are considered chaperones during programming at Teton Science Schools, so they normally do not take on any teaching responsibilities, but do participate in daily programming by going out in the field with students and Teton Science School staff. Teachers take on various levels of participation depending on their own interests. Teachers may be fully engaged in lessons, activities and games or they might simply observe and provide emotional or physical support to students.

Given the variation in teacher participation and despite the fact the field education programs are specifically for students this study was conducted to investigate if there are any benefits to teachers derived from TSS field education programs that resemble benefits of effective professional development programs. The literature highlights has several consistent patterns that make place-based education and science professional development programs most effective for teachers. Heimlich and Daudi (2002) found that when professional development programs use experiential practices to teach a science concept it provides teachers with tangible approaches for bringing their learnings back to their own teaching practices. Professional development programs that utilized expertise from community members and expert scientists were most effective (Ciffone, Morelock, Turner, Sivek, & Daudi, 2002; Rivera, Manning, & Krupp, 2013). In a study done by Rivera et al. (2013), teachers reported that learning both the science content and scientific process from practicing scientific researchers was highly beneficial in increasing the teacher's comfort level with scientific content and practices. Additionally, providing time for participants to reflect on their experiences as well as establishing ongoing support allowed for longer term impacts (Meichtry, & Smith, 2013; Powers, 2004, Rivera et al. 2013).
Few place-based education professional development programs have used pre and post surveys to look at beliefs, practices and confidence levels, but those that have, show significant improvements in teacher confidence in teaching content as well as incorporating standards into curriculum due to their professional development programs (Turley, Powers, & Nakai, 2006). This study will utilize a pre and post-assessment to look at the impacts of the field education programs on teachers’ beliefs and practices about place-based education.
Chapter 3

METHODS

This study was conducted to explore the impacts of Teton Science Schools’ field education programs on visiting teachers’ beliefs and practices about place-based education. Quantitative and qualitative data were gathered in order to assess participant experiences as classroom teachers whom accompany their students during field education programs. A combination of surveys, interviews and program evaluations were used as the three sources of data in order to strengthen and verify the data.

Setting

Teton Science Schools (TSS) is a non-profit organization located in northwest Wyoming and Idaho and is comprised of seven program areas sharing a common vision of education. The mission of TSS is to connect people, nature and place through education, science and stewardship. In 1967 Ted Major, founder of TSS, began educating students about the Greater Yellowstone Ecosystem. TSS now teaches more than 12,000 students annually and is a nationally and internationally recognized leader in place-based education (Teton Science Schools, 2016). Students range in age from 4-years-old to senior citizens as TSS promotes and encourages lifelong learning. TSS draws students from the local community as well as from international countries as far away as Bhutan. This study investigates the impacts of field education programs on visiting teachers. TSS utilizes Grand Teton National Park, Yellowstone, National Park, Bridger-Teton National Forest, and the National Elk Refuge as its classroom. TSS field education offers both day and residential programs and provides place-based, experiential education for all ages throughout the year.
Sample Population

The study sample for this research project were teachers who brought their students to TSS’s field education programs between November 2015 and March 2016. Teachers visited either the Jackson or Kelly Campus of Teton Science Schools from elementary, middle and high schools from Connecticut, Illinois, Iowa, Maryland, Montana, Oregon, Pennsylvania, Utah, Wisconsin, and Wyoming. Urban schools made up 27% of the participant population, rural schools made up 15%, and suburban schools made up 58% of the population. From the study sample 56% of teachers worked at private schools and 44% work at public schools. Teaching experience ranged from 1 to 36 years. Teacher participants range in age from 29 to 64. There were 41 participants for the initial survey and 29% were male and 71% were female. For 41% of the participants the year of this study was their first time visiting TSS, while 59% had visited TSS before. Program length for participants at TSS ranged from 3 to 7 days.

Data Collection

Online surveys were conducted before and after teachers’ visit to TSS and program evaluations were completed at the end of their visit at TSS. Interviews with lead teachers were conducted over the phone as participants were from across the country.

Surveys were emailed to visiting teachers a week before their arrival at TSS (see Appendix A). Survey questions were developed based on a place-based education rubric created by TSS, which was adapted from the Annenberg Rural Schools and Community Trust (Teton Science School, 2015). The rubric is an educational curriculum framework that identifies 12 place-based education practices. Six of these practices were selected for the survey including: connection to local community, use of local partnerships, use of
community and place, student centered learning, interdisciplinary learning and inquiry learning. These 6 practices were chosen since they are the most essential practices at the core of place-based education. The first 3 practices ask about the curriculums connection to place through people and the environment. The last 3 practices are teaching strategies that are utilized in place-based education. The use of these practices was indicated by selecting one of five options that were ranked from lowest use to highest use (Table 1).

Table 1
Survey Questions for the Six Place-Based Education Practices.

<table>
<thead>
<tr>
<th>Place-based education practice</th>
<th>Corresponding question on the survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection to local community</td>
<td>How is learning in your classroom connected to the local community (both human and natural)?</td>
</tr>
<tr>
<td></td>
<td>1. Focus is on content with no formal connection to local community</td>
</tr>
<tr>
<td></td>
<td>2. Occasional connections to local community</td>
</tr>
<tr>
<td></td>
<td>3. Learning about the local community is a regular practice</td>
</tr>
<tr>
<td></td>
<td>4. Connections to local community are embedded in the curriculum and investigate students’ relationship to place</td>
</tr>
<tr>
<td></td>
<td>5. Connections to local community are the entire curriculum and students feel a strong connection to place</td>
</tr>
<tr>
<td>Use of local partnerships</td>
<td>Which statement below best describes the local partnerships of your classroom/curriculum?</td>
</tr>
<tr>
<td></td>
<td>1. No attempt to develop relationships; focus on schooling of students</td>
</tr>
<tr>
<td></td>
<td>2. Guest Speakers are invited to the classroom</td>
</tr>
<tr>
<td></td>
<td>3. Students learn about local issues by interacting inside and outside the classroom with local partners</td>
</tr>
<tr>
<td></td>
<td>4. Students study local issues and report findings to local stakeholders or experts</td>
</tr>
<tr>
<td></td>
<td>5. Community members, elders, local experts and students work together, learn from each other and build new relationships.</td>
</tr>
<tr>
<td>Use of community and place</td>
<td>Which statement below describes how you utilize the community and place outside your classroom for teaching?</td>
</tr>
<tr>
<td></td>
<td>1. Learning is always inside the classroom</td>
</tr>
<tr>
<td></td>
<td>2. Learning occurs outside the classroom for 1-5 days/year</td>
</tr>
<tr>
<td></td>
<td>3. Learning occurs outside the classroom for 6-10 days/year</td>
</tr>
<tr>
<td></td>
<td>4. Learning occurs outside the classroom for &gt;10 days/year</td>
</tr>
<tr>
<td></td>
<td>5. Learning occurs outside the classroom at least one day a week</td>
</tr>
<tr>
<td>Student centered learning</td>
<td>Which statement below best describes how students are engaged in your classroom?</td>
</tr>
<tr>
<td></td>
<td>1. Instruction provides few opportunities for students to engage in inquiry or investigation</td>
</tr>
</tbody>
</table>
2. Instruction provides two to three opportunities for students to engage in inquiry or investigation
3. Instruction provides numerous learning opportunities that engage students in problem solving, direct investigation, inquiry and analysis of data
4. Instruction provides numerous learning opportunities that engage students in problem solving, direct investigation, inquiry and analysis of data. Students have multiple opportunities to make their learning visible through debate, on-going refinement of ideas, demonstrations, and presentations
5. Problem-posing and problem solving, direct investigation, inquiry, and data analysis are seamlessly interwoven into the activities and curriculum

<table>
<thead>
<tr>
<th>Interdisciplinary learning</th>
<th>Which statement below best describes the nature of interdisciplinary learning in your classroom?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Content is presented as discrete disciplines</td>
</tr>
<tr>
<td></td>
<td>2. Content is presented with links to other disciplines but they are not made explicit</td>
</tr>
<tr>
<td></td>
<td>3. Students begin to explore interdisciplinary connections of content</td>
</tr>
<tr>
<td></td>
<td>4. Interdisciplinary connections are emphasized</td>
</tr>
<tr>
<td></td>
<td>5. Content is multidisciplinary and fully integrated (often involving collaboration between teachers)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Inquiry learning</th>
<th>Which statement below best describes the use of inquiry in your classroom?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. No inquiry present in class</td>
</tr>
<tr>
<td></td>
<td>2. Inquiry is introduced but is not related to local place</td>
</tr>
<tr>
<td></td>
<td>3. Students can describe how to use the inquiry process to investigate a place</td>
</tr>
<tr>
<td></td>
<td>4. Students use the inquiry process to investigate a place</td>
</tr>
<tr>
<td></td>
<td>5. Students demonstrate how to use the inquiry process to comprehensively analyze the ecological, social, and economic components of a place</td>
</tr>
</tbody>
</table>

The submitted survey responses were assigned a coded combination of letters and numbers to remove participant identity from their response. The data were populated into a google spreadsheet. After three months from the time of their visit, teachers who had visited TSS for the first time were emailed again and asked to partake in a follow-up post survey (see Appendix B). Teachers who had visited TSS at least once before this visit were not emailed a post survey since the initial survey accounted for the impacts from previous trips to TSS.
The post survey contained the same questions about place-based education practices, to see if their teaching practices changed after their visit to TSS. The post survey also helped the researcher investigate whether teachers’ professional goals were met. This study used a pre- and post survey method, as it is an effective tool to look at the impacts of a particular event or program. This method has been readily used in the past to look at impacts of environmental education programs on visiting students (Powers, 2004; Smith-Sebasto, & Cavern, 2006) and effectiveness of professional development programs (Rivera et al., 2013). Again, once their survey responses were submitted their data was populated into a Google spreadsheet.

Lead teachers who had visited Teton Science Schools more than one time and had taken the pre-survey were contacted over email to partake in a phone-interview. Only 2 out of the 10 lead teachers responded to the interview request. New consent forms were signed and returned to the principal investigator (PI). Upon agreement to participate in the study, the PI and participant scheduled a time for a 30-minute phone interview. Interviews were recorded over the phone in order to capture precise language of participants and in order to avoid misinterpretation or bias.

Interviews are a method used to collect qualitative data. This method provides depth to the study reveals new knowledge and empowers participants to share their personal stories as it relates to the research questions (Gubrium & Holstein, 2002). Interview questions were created following Smith’s (1995) semi-structured interview guide. Semi-structured interviews are the most commonly used form of qualitative interviews and allows for the conversation to be flexible (Braun & Clarke 2013).
Interview questions were developed by looking at survey responses and identify gaps in the responses (see Appendix C). The questions were created with the intention of providing supplemental information to the surveys about participant experiences at TSS and the impacts on their own teaching practices.

In order to supplement the survey and interview data, Teton Science Schools’ program evaluations were collected and used as a source of data for this study. After field education programming visiting teachers filled out a general evaluation form prior to their departure from Teton Science Schools (see Appendix D.). At the Jackson campus of TSS, the evaluations were filled out by hand and at the Kelly Campus evaluations were filled out on computers. The program evaluations asked questions such as whether goals were met, what went well and what could be improved in the future. The program evaluations were helpful supplemental source of data for this study.

**Data Analysis**

Survey questions were primarily analyzed quantitatively. Open-ended questions from the surveys, interviews, and program evaluations were the sources for the qualitative data. The surveys were analyzed using Excel’s Data Analysis Tool-Pak. The pre-tests were used to compare many independent variables such as number of visits to TSS, number of years as a classroom teacher, type of school, location of school with the dependent variables, the six chosen place-based education practices. Statistical tests were not run for the pre- and post-tests since there was a sample size of 2.

Since this is an exploratory study, complete coding was used for the open-ended responses in the survey. Complete coding was used to code all data relevant to the research question from the interviews, survey responses, and TSS’s program evaluation
forms (Braun & Clarke, 2013). Codes were created across the entire data set for items related to the research question. Emergent themes were described and recorded.

Interviews were transcribed verbatim and then coded. The interview coding also followed a complete coding method. This method allowed the researchers to see what themes arose without predetermining what they were looking for (Creswell, 2013). The qualitative data was broken down into two major themes: (a) teachers’ professional goals, and (b) unexpected outcomes from programming at TSS. Themes were further broken down into subthemes and will be revealed in the results and discussion chapters. This methodology allowed the researchers to make discoveries about common and unique experiences that occurred amongst participants (Creswell, 2013).

Once both qualitative and quantitative data were gathered and examined, correlations between interview questions, survey responses and program evaluations were identified. This mixed method approach helps to combine qualitative and quantitative methods. The mixed method approach can provide a more complete understanding of a research question (Creswell, 2013).
Chapter 4

RESULTS

The results from data collection and analysis focused on both the quantitative and qualitative sources. The quantitative data helped the researcher look at independent variables and the use of the six place-based education practices in teachers’ classrooms as well as the change in practices before and after visiting Teton Science Schools (TSS). The qualitative data has been broken down into two major themes: (a) teachers’ professional goals, and (b) unexpected outcomes from programming at Teton Science Schools. Within these two broad themes, subthemes are discussed. This presentation of the study’s results begins with a summary of the survey results followed by the qualitative results from the surveys, interviews and program evaluations.

Survey Results

The quantitative data from the survey indicated that the number of times a teacher visited TSS for field education programs was positively correlated with increased use of several place-based education practices. Table 2 shows the p-values and $R^2$ values for the regressions for number of visits to TSS and each of the six place-based education Practices. Although only connection to local community and use of local partnerships were significant (P-value <0.05), all showed slightly positive correlations. The place-based education practice, inquiry learning, was approaching significance. Student-centered learning shows the weakest correlation.
Table 2

*Teachers’ use of six place-based education practices in relation to number of visits to Teton Science Schools.*Indicates statistical significance (p-value <0.05).

<table>
<thead>
<tr>
<th>Place-based Education Practices</th>
<th>P-Value</th>
<th>R² Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection to local community</td>
<td>0.00128*</td>
<td>0.236067</td>
</tr>
<tr>
<td>Use of local partnerships</td>
<td>0.03277*</td>
<td>0.111622</td>
</tr>
<tr>
<td>Use of community and place</td>
<td>0.09323</td>
<td>0.070573</td>
</tr>
<tr>
<td>Student centered learning</td>
<td>0.102515</td>
<td>0.066893</td>
</tr>
<tr>
<td>Interdisciplinary learning</td>
<td>0.089628</td>
<td>0.072089</td>
</tr>
<tr>
<td>Inquiry learning</td>
<td>0.070869</td>
<td>0.081242</td>
</tr>
</tbody>
</table>

Figures for the regressions with significance were created. The positive and statistically significant relationship between number of times a teacher visited TSS and their use of the place-based education practice - connection to local learning is shown in Figure 1. The figure shows that with increasing visits to TSS teachers’ connection to local learning in their curriculum also increases.

![Figure 1](image)

*Figure 1. Number of times teachers visited Teton Science Schools in relation to the curriculum connection to the local community. P-value = 0.00128* R² value = 0.2361. N=41.*
The positive and statistically significant relationship between number of times a teacher visited TSS and their use of place-based education local partnerships is shown in Figure 2. The figure shows that with increasing visits to TSS Teachers’ incorporate more local partnerships into their curriculum.

Figure 2. Number of times teachers visited Teton Science Schools in relation to the use of local partnerships within their curriculum P-value =0.03277* R²=0.116, N=41.

The data from the surveys also indicated that there was a difference in the use of the place-based education practices from teachers whom never visited TSS and those who visited at least once (see Table 3). Two-sample t-tests assuming unequal variances were run to compare teachers who never visited TSS and teachers who visited TSS at least once. For all six practices the mean score on a scale from 1 to 5 was higher for teachers who had visited TSS previously. However, only the place-based education practice - use of local partnerships, was statistically significant. The practices, connection to local community and interdisciplinary learning were approaching statistical significance.
Table 3

A comparison of teachers who never visited TSS and teachers who had visited TSS and their mean use of the six place-based education practices. Use of the practices ranged on a scale from 1-5. *Indicates statistical significance (p-value < 0.05).

<table>
<thead>
<tr>
<th>Place-based Education Practices</th>
<th>Teachers who had never been to TSS</th>
<th>Teachers who had been to TSS at least 1 time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (n=17)</td>
<td>Mean (n=24)</td>
<td>P-Value</td>
</tr>
<tr>
<td>Connection to local community</td>
<td>2.18</td>
<td>2.71</td>
</tr>
<tr>
<td>Use of local partnerships</td>
<td>1.88</td>
<td>2.75</td>
</tr>
<tr>
<td>Use of the community and place</td>
<td>2.29</td>
<td>2.79</td>
</tr>
<tr>
<td>Student centered learning</td>
<td>3.17</td>
<td>3.58</td>
</tr>
<tr>
<td>Interdisciplinary learning</td>
<td>2.94</td>
<td>3.58</td>
</tr>
<tr>
<td>Inquiry learning</td>
<td>2.71</td>
<td>3</td>
</tr>
</tbody>
</table>

Another finding from the quantitative data was that on average the teachers’ who had previously taught at environmental education centers had a higher use of the place-based education practices in comparison to teachers whom had not taught at environmental education centers (see Table 4). The use of the place-based education practice, connection to local community, was significantly higher for teachers who had taught at environmental education centers than those who had not. The level of place-based education practice, student-centered learning, was approaching statistical significance, but was not statistically significant.
Table 4

A comparison of teachers who have and have not taught at environmental education (EE) centers and their use of the six place-based education practices. Use of the practices ranged on a scale from 1-5. *Indicates significance (p-value <0.05).

<table>
<thead>
<tr>
<th>Place-based Education Practices</th>
<th>Teachers who have taught at EE centers</th>
<th>Teacher who have not taught at EE centers</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (n=9)</td>
<td>Mean (n=32)</td>
<td></td>
</tr>
<tr>
<td>Connection to local community</td>
<td>3.33</td>
<td>2.25</td>
<td>0.021*</td>
</tr>
<tr>
<td>Use of local partnerships</td>
<td>2.77</td>
<td>2.28</td>
<td>0.258</td>
</tr>
<tr>
<td>Use of the community and place</td>
<td>3.22</td>
<td>2.41</td>
<td>0.127</td>
</tr>
<tr>
<td>Student centered learning</td>
<td>4.00</td>
<td>3.25</td>
<td>0.065</td>
</tr>
<tr>
<td>Interdisciplinary learning</td>
<td>3.78</td>
<td>3.19</td>
<td>0.289</td>
</tr>
<tr>
<td>Inquiry learning</td>
<td>3.44</td>
<td>2.72</td>
<td>0.208</td>
</tr>
</tbody>
</table>

Pre- and post-survey results. The level of use of the six place-based education practices was compared for the two participants who filled out both pre and post surveys. Primarily teachers’ indication of the use of practices remained the same before and after their visit to TSS. However, both participants indicated an increase in the use of local partnerships in the classroom and one of the participants indicated an increase in student centered learning after visiting TSS. Due to the extremely small sample size, statistical tests could not be run. When asked directly if their understanding or use of place-based education had changed since their time at TSS, both participants said no.

Emergent Themes and Subthemes

Qualitative data were gathered using the open ended questions from the surveys, the interviews, and the program evaluations. The qualitative data primarily addressed the
second question, what are visiting teachers’ major outcomes from Teton Science Schools’ field education programs? In order to answer this question, the data were broken down into two emergent themes: (a) teachers’ professional goals, and (b) unexpected outcomes. The themes are further separated into subthemes.

Teachers’ professional goals were broken down into three categories, building professional relationships, improving and learning new teaching techniques, and learning science content (see Figure 3). Teachers’ professional goals were stated in the survey through open-ended responses, but were not asked about in the program evaluation. The two interviewees elaborated that their professional goals had been met during their time at Teton Science Schools.

![Teachers’ professional goals diagram](image)

**Figure 3. Teachers’ professional goals during their experience at Teton Science Schools’ field education program.**

Unexpected outcomes were organized into four categories: created independent students, enhanced student-teacher relationships, developed an appreciation for place-based education, and an increased awareness of the challenges and limitations of implementing place-based education (see Figure 4). The unexpected outcomes arose through teachers responses to the open-ended survey questions, the interviews, and the program evaluations.
Challenges and limitations for teachers became a frequently discussed topic and therefore was further broken down into three categories: time, resources and structures and systems (see Figure 5). This section of the qualitative data was amassed to look at the challenges and limitations that participant teachers’ voiced in implementing place-based education practices into their classrooms after returning from Teton Science Schools.
Through discussions of these challenges and limitations also came suggestions and ideas for helping teachers be successful at utilizing place-based education practices beyond TSS. Further exploration of these emergent themes and how they connect to the existing literature are discussed in Chapter 5.
In analyzing the data from the surveys, interviews, and program evaluations several new findings emerged in regards to this study’s research questions. The research questions were: 1) what are the impacts of Teton Science Schools’ field education programs on visiting teachers’ beliefs and practices about place-based education?, and 2) what are visiting teachers’ major outcomes from Teton Science Schools’ field education programs? This discussion provides commentary on how the findings fit into the existing field of literature as well as explain why the results are important. Recommendations for Teton Science Schools (TSS) are provided as well as suggestions for future research.

**Beliefs and Practices about Place-Based Education**

The place-based education practices, connection of learning to the local community and use of local partnerships, showed statistically significant increases with the number of visits to TSS. Inquiry learning was approaching significance, and student-centered learning had the weakest relationship with number of visits to TSS. Although these tests did not control for other factors, it is evident that teachers who attended TSS field education programs were significantly more likely to use several, but not all, place-based education practices in their classrooms. These findings help to answer the first research question, indicating a correlation between visiting TSS and an increased use of place-based education practices. This study is only the second study designed to investigate impacts of residential education programs on visiting teachers. The first was done over 10 years ago, but since it is the only other study similar to this research it is cited here. The findings to this study are similar to Powers (2004) findings who saw six
consistent impacts on teachers after visiting a residential education center. The impacts found were use of local places and resources, interdisciplinary teaching, collaboration with other teachers, teacher leadership and personal growth, stronger curriculum planning skills, and greater use of service-learning in the curriculum. By utilizing these place-based education practices, it is possible that teachers’ are enhancing their students’ learning. Through these practices teachers are “imparting to children they influence the capacity to observe, analyze, and act in ways that are now - not in the future - altering their communities for the better” (Smith, 2007 p. 205).

When asked directly if their understanding or use of place-based education had changed since their time at TSS, post-survey participants said no. However, both interviewees claimed that TSS impacted their understanding of place-based education, and one claimed TSS also changed her teaching practices. An interviewee stated, “[Teton Science Schools] gave me a window into a much more fulfilling and much more well-rounded idea of what place-based education is. It gave me a much clearer idea of what the ideal would be” (interview question #7). It is clear from the survey data and the few interviews that TSS impacted teachers’ beliefs and practices about place-based education to varying degrees.

**Teachers’ Professional Goals**

In order to understand teachers’ major outcomes from their visits to TSS it is important to know what their goals were initially. One of the emergent themes was teachers’ professional goals, which helps answer this study’s second research question. Teachers’ professional goals were identified in the survey through open-ended responses. Since professional goals were not asked about in the program evaluations, there were no
survey data to support whether or not the teachers’ goals were met. The two interviewees however, elaborated that their professional goals had been met during their time at TSS. The most frequently occurring professional goals were to build professional relationships, improve and learn new teaching techniques, and learn science content.

The goal of wanting to build professional relationships reoccurred in survey responses. For some teachers this meant strengthening relationships and collaborating with co-teachers, and for other teachers it meant working closely with the staff and faculty at TSS to learn from them, but also to ensure that the program was as effective as possible. Both interviewees felt that this goal was met, yet they emphasized that even more collaboration could occur between TSS staff and the teachers. One participant stated, “talking to adults who are passionate about teaching science and using the world as a classroom is uplifting and energizing.”

The most frequently occurring professional goal was categorized as to improve and learn new teaching techniques. Some participants directly stated that they wanted to learn place-based education practices, while others simply said they wanted to observe a new teaching style. One survey participant wrote the desire was to, “learn new ways to combine outdoor experiences and classroom academics.” Another participant hoped to “forge stronger connections to the school’s curriculum.” Although the focus of Teton Science Schools’ field education programs are on the students, it is interesting to note that many teachers come to TSS with their own goals of observing and learning about a different way of teaching. Having these professional goals supports this study’s findings that TSS positively impacts teachers understanding and practice of place-based
education. TSS is set up well for impacting teachers in this way due to the fact that teachers already come to TSS with the intention of learning about place-based education.

The goal of wanting to learn science content is closely connected with wanting to improve and learn new teaching techniques. Teachers claimed they wanted to deepen their knowledge and understanding of science content in order to better teach the content in their own classrooms. It is interesting to note that learning new science content is not one of the major outcomes that teachers highlighted when reflecting back on past trips to TSS. However, learning new teaching styles and techniques was a major outcome.

**Major Outcomes for Visiting Teachers**

The major unexpected outcomes from visiting TSS for teachers were observations of more independent and responsible students, strengthened student-teacher relationships, a greater appreciation and understanding of place-based education, and an awareness of the challenges and limitations of place-based education.

Although creating independent and responsible students was not a goal for teachers, it was a frequently occurring outcome. Five participants explicitly stated that TSS pushed students, “outside their comfort zones”, which allowed them to thrive and grow as independent and responsible individuals. According to teachers, students were proud of themselves and their personal accomplishments after their time at TSS. One participant wrote, “[students] became more self-reliant, being able to work through challenges on their own or with others supporting them.” It is important to note this is self-reported by the teacher and there is no hard evidence to support the statement. This finding is congruent with the literature. Sibthorp and Jostad (2014) claim outdoor experiences require individuals to work together, which can strengthen individual
confidence as well as create a sense of community. “Learning by doing” is argued to be an influential approach to developing students’ leadership, judgment and communication skills (Paisley, Furman, Sibthorp, and Gookin, 2008).

The development and enhancement of student-teacher relationships was the most frequently occurring unexpected outcome in this study. Both interviewees spoke in depth about how TSS helped improve their relationships with their students. Participants mentioned that by having the opportunity to observe students in a different environment allowed for a better understanding of their students as whole individuals and not just as students. A participant wrote their biggest learning outcome was, “as a teacher, [Teton Science Schools] allows me to interact with my students outside of a classroom, further strengthening the interpersonal connections so essential to learning.” In addition, an interviewee claimed,

[Students] get to see me as a nurturer. Since I am not teaching, I’m just there to make sure they are happy and healthy...I think that is a little shift and makes them feel differently. I think prior to Teton I am more of an authority figure than a mom, and then after Teton it is a little more balanced and not just the didactic side of teaching.

These findings relate to the literature that shows students’ interpersonal relationships are enhanced at residential education centers (Stern, Powell, & Ardoin, 2008). This study refers to student-student relationships, but this study highlights the benefits residential education programs have on student-teacher relationships as well. It is also interesting to note that Smith (2002) explains that the power dynamic changes between students and teachers in classrooms that use place-based education practices. Teachers are no longer the central authority figure as they relinquish decision making and planning tasks to students. It is clear from the findings that there are glimpses of this
shifting relationship between students and teachers even within field education programs at TSS.

Another major outcome for teachers visiting TSS was a new appreciation and/or understanding of the benefits of place-based education. Over 65% of participants stated that a major learning theme from their experience at TSS was the effectiveness of the place-based education lessons. Although participants’ anecdotes do not go into depth or detail the following are quotes from teachers about their experiences at TSS: “learning in the field is so impactful for students”, “taking classroom lessons and concepts beyond four walls is so important”, “the learning that takes place happens with ease because they are fully immersed. This type of education is so effective” (pre-survey question #4). In conversations with interviewees answers were more in depth and highlight not only an appreciation for place-based education, but also a deeper understanding of it. An interviewee stated, “I now know it’s better to try and find even more hands-on experiences to help strengthen their understandings of concepts, versus, just sort of getting in the monotony of the same format of lesson planning and transitions” (interview question #7). Even if teachers are not implementing these practices at the very least they are exposed to the ideals and practices of place-based education. Not all participants articulated why they were or were not applying these practices, yet they emphasized that a major outcome was seeing this different philosophy of education and approach to teaching in action. While teachers highlighted new learnings of what place-based education can and should be a discussion of limitations and challenges also arose.
Challenges of Implementing Place-Based Education

The final major outcome for teachers was an awareness and acknowledgement of the challenges and limitations of implementing place-based education in their classrooms. Teachers in this study spoke of time, resources and the structure of the school and curriculum as the three largest limitations. These limitations and challenges articulated by teachers align with the existing literature. Time, money, resources and the pressures of standardized testing are the largest hurdles for teachers to implement place-based education lessons in their own classrooms (Smith, 2007).

Interviewees continually referred to time as a major limiting factor for implementing place-based education in their classrooms. They meant having both limited planning time as well as limited blocks of time with students to actually do the lessons. They emphasized that TSS is so valuable because they have the ability to use the entire day and are not restricted by time.

Similar to time, resources were another commonly referred to limiting factor for implementing place-based education. Participants referred to the limiting resources as equipment, facilities, money as well as partnerships, and people within their communities. Interviewees stated without these resources it becomes extremely challenging to do place-based education well. In order to maintain these limiting resources requires time, which connects to the previous limitation.

Another interesting challenge that came up in both the survey responses and interviews was the structure of the schools and whether or not they lent themselves well to this style of teaching and learning. For example, several participants when asked to give examples of place-based practices in their classroom simply stated, “It is the mission
and vision of our school!” and therefore it is easier to implement than if it was not incorporated into the school mission. An interviewee stated that since she works at a private school there is more flexibility and freedom to teach desired topics. However, there are still limitations to the amount of time teachers get with students and of course there are still standards that need to be met. When one interviewee was asked if she was interested in incorporating more place-based education into your classroom, “I would love to. I would also love to do year round school and have it go until 5pm. Place-based education to me feels like a whole hog sort of deal. I think it is challenging to do a little of it. I feel like it needs to be done in big chunks, feet first. Diving all the way in.” One interviewee argued that TSS can do place-based education so effectively because it is structurally set up for it, whereas a typical school is not set up for it. It appears that amongst participants there is a misconception of what place-based education is. Teachers are not aware that place-based education can happen in smaller pieces, and it is not only places such as Teton Science Schools that are able to do so successfully.

Additionally, the need to reach standards and have students pass testing requirements appears to be an obstacle for implementing place-based education practices. Gruenewald (2003) states, “with standards and testing dominating today’s educational discourse, the suggestion that educators should create curricula to foster empathy and allow for exploration of local places challenges current policy and practice” (p. 8). Although these challenges may seem overwhelming to teachers on an individual level, there are resources and supports that could be helpful for teachers. I believe TSS has the opportunity and understanding to develop a supportive community for teachers interested in utilizing place-based education practices in their classrooms.
The place-based education practice, use of local partnerships was used more often by teachers who had visited Teton Science Schools. A possible explanation for this increased use could be that the use of local partnerships is the most straightforward practice to apply especially given the challenges highlighted by the participants and existing literature. Using local partnerships does not necessarily require the time, resources and structures that other practices require.

**Recommendations for Teton Science Schools**

Through the analysis of the data it is clear that teachers were impacted in varying degrees by their experiences at TSS. While the primary focus of programming is on the students there may be opportunities to have a greater impact on visiting teachers as well. On the survey 78% of the participants indicated an interest in place-based education professional development programs, and both interviewees said they would be interested in place-based education training during their visit to TSS.

Teton Science Schools strongly emphasizes the importance of collaboration between visiting teachers and TSS staff in order to create the best possible experiences for students. Daily conversations are held between faculty, staff and visiting teachers to discuss the schedule, logistics, and curriculum plans for the day. While timing is of course limited, there may be opportunity to engage visiting teachers in a brief place-based education professional development training while at TSS. Interviewees were both interested in this idea, as long as they did not miss out on full field days or meaningful experiences with their students.

It seems it would be possible to facilitate sessions with visiting teachers during meals or during one of the evening programs. Interviewees stated they would be
interested in learning what the graduate student training looks like at TSS. Interviewees were also interested in looking at examples of how other schools are implementing place-based education. There is curiosity both from interviewees and survey participants about what place-based education looks like at a typical school other than at TSS. Teachers want to know if and how place-based education works in shorter blocks within a traditional school setting. The desire for these resources is consistent with Powers (2004) study where the teachers expressed interest in acquiring publications, examples of curricula and project models as well as training in tangible place-based education skills. I believe the time teachers have at TSS could be used to educate teachers on how place-based education works in other contexts beyond Teton Science Schools’ field education programs. Giving teachers tools and resources when they leave may provide them with the understanding to eliminate the misconceptions that place-based education cannot occur in traditional schools in smaller pieces. Additionally, TSS could give teachers the confidence to at least try and apply place-based education practices in their classrooms in order to overcome the challenges previously discussed.

Limitations

Limitations of this study include having a small sample size, unknown survey reliability and validity, and thin qualitative data. Due to the limited survey responses the sample size for the pre-survey was 41 and the sample size for the post-survey was 2. Therefore the quantitative data are not easily generalizable due to the limited sample size. Two interviews were conducted, and while this is a small number, qualitative data are used to gain a deeper understanding as opposed to generalizing responses to the greater population. The qualitative aspect of this study gives a sense for what impacts might be
occurring within Teton Science School’s field education programs. Multiple interviews with the same participants and classroom observations would have been advantageous for deepening and triangulating the qualitative data. Additionally, the survey developed from this study was loosely based from previously created rubrics, so the reliability and validity of the surveys is unknown.

The data gathered was entirely self-reported and at a perceptual level. Teachers provided their opinions and beliefs about their experiences at TSS and their own teaching practices. Self-reported data is a limitation of this study due to the fact that it relies on the honesty and accuracy of participants answers. Even if participants are trying to be honest they may lack the introspective ability to provide accurate responses. Self-reported data especially in surveys, also raises the issue of participants understanding and interpretation of the questions. Additionally, biases may arise since participants may have long standing relationships with Teton Science Schools, which could potentially impact the ways in which they answer questions. It would be beneficial to look at students’ learning outcomes or satisfaction to gain a better understanding of the impacts on teachers.

**Areas for Future Research**

Though this study has met the primary objective of understanding the impact of TSS’s field education programs on teachers’ beliefs and practices about place-based education there are areas that could be further explored. This study could be expanded to include a larger sample size of teachers as well as look at the impacts of other residential education centers to get a more holistic understanding of the impacts. Additionally, for this study six place-based education practices were chosen, but it would be interesting to look at other practices as well. It would be beneficial also to conduct a long term study
that includes post surveys at three months, six months and a year from visits to Teton Science Schools. It is possible that three months, which included holiday breaks is not enough time for teachers to implement new practices within their own teaching. Another interesting area of study would be to survey students to see if their opinion of their teachers’ teaching or their teacher as an individual had changed before and after their visit to TSS. It would also be advantageous to look into each outcome more closely. For example, further investigating the impacts on student-teacher relationships at TSS would be interesting.

**Conclusion**

Residential education programs primarily focus on the visiting students and research shows that they are highly beneficial to students’ connection to nature, understanding of content, social-emotional development, and leadership skills (Dettmann-Easler & Pease, 1999; Kruse & Card, 2004; Stern et al., 2008). The goal of this research study was to investigate a gap in the literature and identify what the impacts of residential education programs are on visiting teachers. It is evident from this study that Teton Science Schools’ field education programs positively impact teachers’ understanding and use of place-based education practices in their own classrooms. Although teachers perceive challenges and constraints that limit their ability to fully implement place-based education practices it is possible that TSS could provide visiting teachers with tools and resources to feel better prepared to take on this task. This topic should be further investigated at other residential education centers through more in depth qualitative research. This study adds to the literature that highlights the benefits of residential education programs on students by expanding the beneficial impacts of these
programs to visiting teachers as well. Therefore, there is an added incentive for administrators to seek out residential education centers in an effort to enhance student and teacher learning, which could in turn benefit the school community.
REFERENCES


www.epa.gov/enviroed/advisory


APPENDIX A

VISITING TEACHER SURVEY

Visiting Teacher Survey - Field Education (Survey was taken through a Google form)

Please take time to answer the following questions. Your answers are important to the Field Education Program of the Teton Science Schools. This survey is intended to help us better understand your motivation and goals for participating in our programs as well as the impact of our programs on students and teachers.

1. Have you brought your students to Teton Science Schools (TSS) as a teacher before?
   If no, please skip the next three questions.
   a. Yes
   b. No

2. If you have been here before, how many years have you come with students?

3. If you have been here before, how many days on average, was your program?

4. If you have been here before, please describe any major lessons learned as a teacher in your time at TSS.

5. What is your role on this trip to TSS?
   a. Lead Teacher
   b. Teacher/ chaperone
   c. Other: ___________

6. What are your goals for your students’ time at TSS?

7. What are your own professional goals for your time at TSS?

8. Please choose your agreement level for the following statement:
   I am a leader within the teaching community at my school

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<th>2</th>
<th>3</th>
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<tr>
<td>Strongly disagree</td>
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<tr>
<td>Strongly agree</td>
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Assessing placed-based practices in your classroom
Please select the response for each item below that best describes the activities, curriculum, and teaching practices of your classroom.

9. How is learning in your classroom connected to the local community (both human and natural)?
   a. Focus is on content with no formal connection to local community
   b. Occasional connections to local community
   c. Learning about the local community is a regular practice
   d. Connections to local community are embedded in the curriculum and investigate students’ relationship to place
   e. Connections to local community are the entire curriculum and students feel a strong connection to place

10. Please feel free to share any examples or anecdotes from your teaching about connections to local community.

11. Which statement below best describes the local partnerships of your classroom/curriculum?
   a. No attempt to develop relationships; focus on schooling of students
   b. Guest Speakers are invited to the classroom
   c. Students learn about local issues by interacting inside and outside the classroom with local partners
   d. Students study local issues and report findings to local stakeholders or experts
   e. Community members, elders, local experts and students work together, learn from each other and build new relationships.

12. Please feel free to share any examples or anecdotes about how you utilize local partnerships.

13. Which statement below describes how you utilize the community and place outside your classroom for teaching?
   a. Learning is always inside the classroom
   b. Learning occurs outside the classroom for 1-5 days/ year
   c. Learning occurs outside the classroom for 6-10 days/ year
d. Learning occurs outside the classroom for >10 days/year  
e. Learning occurs outside the classroom at least one day a week

14. Please feel free to share any examples or anecdotes about how you utilize your outside community or place for learning.

15. Which statement below best describes how students are engaged in your classroom?
   a. Instruction provides few opportunities for students to engage in inquiry or investigation  
b. Instruction provides two to three opportunities for students to engage in inquiry or investigation  
c. Instruction provides numerous learning opportunities that engage students in problem solving, direct investigation, inquiry and analysis of data  
d. Instruction provides numerous learning opportunities that engage students in problem solving, direct investigation, inquiry and analysis of data. Students have multiple opportunities to make their learning visible through debate, on-going refinement of ideas, demonstrations, and presentations  
e. Problem-posing and problem solving, direct investigation, inquiry, and data analysis are seamlessly interwoven into the activities and curriculum

16. Please feel free to share any examples or anecdotes of how students are engaged in your classroom.

17. Which statement below best describes the nature of interdisciplinary learning in your classroom?
   a. Content is presented as discrete disciplines  
b. Content is presented with links to other disciplines but they are not made explicit  
c. Students begin to explore interdisciplinary connections of content  
d. Interdisciplinary connections are emphasized  
e. Content is multidisciplinary and fully integrated (often involving collaboration between teachers)

18. Please feel free to share any examples or anecdotes about interdisciplinary learning in your classroom.

19. Which statement below best describes the use of inquiry in your classroom?
   a. No inquiry present in class  
b. Inquiry is introduced but is not related to local place  
c. Students can describe how to use the inquiry process to investigate a place  
d. Students use the inquiry process to investigate a place  
e. Students demonstrate how to use the inquiry process to comprehensively analyze the ecological, social, and economic components of a place
20. Please feel free to share any examples or anecdotes about inquiry learning in your classroom.

**Demographic Information**

21. With which school are you visiting TSS?
22. What grade level do you teach?
23. What subject(s) do you teach?
24. In what type of school do you teach?
   a. Public
   b. Independent
   c. Public Charter
   d. Other: ______
25. In what setting is your school?
   a. Urban
   b. Suburban
   c. Rural
   d. Other: ______
26. What is a typical class size for you?
   a. <10 students
   b. 10-20 students
   c. 21-30 students
   d. >30 students
27. How many years have you been a classroom teacher?
28. How long have you lived in your current town or city?
29. How long have you been in your current teaching position?
30. What is your birthdate?
31. Do you have experience teaching at environmental education programs?
   If you have taught at an environmental education program before, how many years did you teach there?
32. As a teacher, with students, have you visited any other residential environmental education programs?
   If not, skip the next two questions
   a. Yes
   b. No
33. If you have visited another environmental education program, where was it?
34. If you have visited another environmental education program, for how many years did you attend?
35. Have you ever participated in any kind of place-based education professional development?
   If not, please skip the next 3 questions
36. If you have participated in any kind of place-based education professional development, where was it?
37. If you have participated in any kind of place-based education professional development, how many days was the training?
38. If you have participated in any kind of place-based education professional development, who facilitated the training?
39. Would you have interest in participating in place-based professional development designed for teachers?
   a. Yes
   b. No
APPENDIX B

VISITING TEACHER POST SURVEY

Visiting Teacher Post Survey (Survey was taken through a Google form)

1. Were your goals for your students met during your time at Teton Science Schools?

   1  2  3  4  5
   Strongly disagree  |  |  |  |  |  Strongly agree

2. Were your professional goals met during your time at Teton Science Schools?

   1  2  3  4  5
   Strongly disagree  |  |  |  |  |  Strongly agree

3. Do you think you will bring students back to Teton Science Schools?
   a. Yes
   b. No

4. Why or why not?

5. Please choose your agreement level with the following statement:
   I am a leader within the teaching community at my school.

   1  2  3  4  5
   Strongly disagree  |  |  |  |  |  Strongly agree

Assessing placed-based practices in your classroom

Please select the response for each item below that best describes the activities, curriculum, and teaching practices of your classroom.

6. How is learning in your classroom connected to the local community (both human and natural)?
   a. Focus is on content with no formal connection to local community
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   c. Students learn about local issues by interacting inside and outside the classroom with local partners
   d. Students study local issues and report findings to local stakeholders or experts
   e. Community members, elders, local experts and students work together, learn from each other and build new relationships.

9. Please feel free to share any examples or anecdotes about how you utilize local partnerships.

10. Which statement below describes how you utilize the community and place outside your classroom for teaching?
    a. Learning is always inside the classroom
    b. Learning occurs outside the classroom for 1-5 days/year
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d. Instruction provides numerous learning opportunities that engage students in problem solving, direct investigation, inquiry and analysis of data. Students have multiple opportunities to make their learning visible through debate, on-going refinement of ideas, demonstrations, and presentations.

e. Problem-posing and problem solving, direct investigation, inquiry, and data analysis are seamlessly interwoven into the activities and curriculum.

f. Please feel free to share any examples or anecdotes of how students are engaged in your classroom.

13. Which statement below best describes the nature of interdisciplinary learning in your classroom?
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   c. Students can describe how to use the inquiry process to investigate a place
   d. Students use the inquiry process to investigate a place
   e. Students demonstrate how to use the inquiry process to comprehensively analyze the ecological, social, and economic components of a place

16. Please feel free to share any examples or anecdotes about inquiry learning in your classroom.

17. Since your time visiting TSS has your understanding about place-based education changed?
   a. Yes
   b. No

   If yes to the above question, how so?
18. Since your time at TSS do you use more place-based education practices in your own classroom?
   a. Yes
   b. No

19. Please feel free to elaborate on either your ‘yes’ or ‘no’ answer to the above question.

20. Since your time visiting TSS has your understanding about inquiry learning changed?
    a. Yes
    b. No

   If yes to the above question, how so?

21. Since your time at TSS do you use more inquiry learning in your classroom?
    a. Yes
    b. No

22. Please feel free to elaborate on either your ‘yes’ or ‘no’ answer to the above question.

23. What are your main take-aways from your experience at Teton Science Schools?

24. Would you have interest in participating in place-based professional development designed for teachers?
    a. Yes
    b. No
APPENDIX C.

INTERVIEW QUESTIONS

Semi structured interview questions facilitated over the phone.

1. What made you decide to bring students to Teton Science Schools originally?
2. Why do you continue to bring students back to Teton Science Schools?
3. Were your goals for students met during your time at TSS?
4. Were your professional goals met during your time at TSS?
5. How has your experience impacted your relationship with your students?
6. How has TSS impacted your own teaching in the classroom?
7. How has your experience at TSS changed your understanding of PBE, if at all?
8. How has your experience at TSS changed your understanding of Inquiry, if at all?
9. Do you incorporate place-based education or inquiry-based learning into your own teaching? Why or why not? Please give examples.
10. If you are interested in incorporating either into your classroom, what do you think Teton Science Schools could do to give you the tools or confidence needed?
11. What are your biggest learning outcomes from your experiences Teton Science Schools?
APPENDIX D.

TETON SCIENCE SCHOOLS’ PROGRAM EVALUATIONS

GENERAL EVALUATION

Name (optional): School/Organization: Date:

Your feedback is valued by Teton Science Schools and used to continually improve the program and to plan for future visits. Please provide detailed comments in each section. YOUR COMMENTS ARE APPRECIATED!

1. Please list your goals for the students’ experience at Teton Science Schools:

2. Please describe the program’s effectiveness at achieving/meeting your goals for your students:

3. Please describe how successful the program was at achieving Teton Science Schools’ Pillars of Field Education & Outreach:

   CONNECTION TO PLACE
   What: Inspire curiosity, wonder and understanding for place.
   How: Explore social, economic and ecological systems of place through interdisciplinary observation, study, expression and reflection.
   Why: Motivate an awareness, appreciation and stewardship for local and global place.

   FIELD SCIENCE PRACTICES
   What: Understand natural systems and processes.
   How: Apply the scientific process in conducting field research and critically examine ecological issues from multiple perspectives.
   Why: Build scientific literacy to inform personal decision making in social, economic and ecological systems of place.

   LEADERSHIP IN COMMUNITY
   What: Engage individuals and self in the development of community.
   How: Develop community skills and self-awareness through immersion and mentorship in authentic leadership roles.
   Why: Gain a greater sense of self, work constructively with others and take initiative to influence place.

4. Based on your requested focus for the week, rate the program’s effectiveness in reaching each of these three pillars:

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<th>More Effective</th>
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<tr>
<td>Connection to Place</td>
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<td>1 2 3</td>
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<tr>
<td>Field Science Practices</td>
<td>NA</td>
<td>1 2 3</td>
</tr>
<tr>
<td>Leadership in the Community</td>
<td>NA</td>
<td>1 2 3</td>
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   4 5
5. Please describe the program's proficiency in each of the following areas:

RISK MANAGEMENT: Promoting and teaching in all aspects of the program

FACILITIES: Quality and cleanliness of lodges, classrooms, outdoor campus spaces and vans

DINING EXPERIENCE: Quality & quantity of food, serving logistics and food waste curriculum

INSTRUCTION: Overall quality of instruction and staff interaction with students

ORIENTATION: Clarity of expectations and roles; continuous support from staff

PRE-ARRIVAL COMMUNICATION: (please fill out only if lead teacher)

6. Please share testimonials of Teton Science Schools and the value of this experience for you and your students

7. Please share any additional feedback relating to the program

Your comments are appreciated. Thank you for your feedback!