The Influence of the Outdoor Learning Environment
on Student Engagement

by

Patricia Lynne Crowder

A dissertation submitted to the faculty of
San Diego State University
In partial fulfillment of the requirements for the degree
Doctor of Educational Leadership
May 21, 2010
SAN DIEGO STATE UNIVERSITY

The Undersigned Faculty Committee Approves the
Dissertation of
Dr. Patricia Lynne Crowder
The Influence of the Outdoor Learning Environment
on Student Engagement

Cynthia Uline, Chair
Department of Educational Leadership

Carla Mathison
School of Teacher Education

Maruta Gardner
Educational Consultant

May 21, 2010
Approval Date
DEDICATION

This study is dedicated to two people, who encouraged me to pursue a doctorate,
but who did not live to see me complete it: my father, Harold Hosking,

and my mentor, Dr. Mark Steckbauer.

I also dedicate my work to my husband, Robb, who took over the cooking
for three years, served me cups of tea as I wrote,

and always believed in me.
This qualitative case study explores the influence of outdoor learning on high school student’s engagement in core academic content courses. Students placed at risk of school failure benefit from instructional supports that help them stay engaged in learning. This study examined the learning experiences of 14 at-risk students within four grade 9 and 10 core classes, including English 1-2, Biology 1-2, Algebra Explorations 1-2, and Geometry 1-2. Each student participant was observed across three separate outdoor lessons. Students took photographs of their experiences in the outdoors and participated in photo-mediated individual and/or focus group interviews. Three teacher research participants provided lesson plans for review and participated in interviews before and after class observations. Study findings support a growing body of research that connects high quality learning environments with student engagement: academic, behavioral, psychological, and social. Teacher assessments, student reports, and student class grades reflected increased conceptual understanding of core concepts through hands-on learning activities supported by group work in a number of flexible, open spaces on campus. The students appreciated the fresh air, green environment, open spaces, views, ease of movement, and close relationship to nature. They also valued having a choice of how and with whom they worked, as well as freedom from the direct supervision of their teachers. Students also voiced appreciation for their teachers’ demonstrated respect and trust in them. Study findings advance understanding how teachers leverage certain facility and school site conditions and design features to increase student engagement in learning. These findings inform school and district leaders’ decisions regarding educational facility planning, design, and use.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>SECTION</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABSTRACT</td>
<td>v</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>ix</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>x</td>
</tr>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>xi</td>
</tr>
<tr>
<td>CHAPTER 1—INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Statement of the Problem</td>
<td>1</td>
</tr>
<tr>
<td>Purpose of the Study</td>
<td>5</td>
</tr>
<tr>
<td>Overview of Methodology</td>
<td>6</td>
</tr>
<tr>
<td>Delimitations and Limitations of the Study</td>
<td>7</td>
</tr>
<tr>
<td>Significance of the Study</td>
<td>8</td>
</tr>
<tr>
<td>Definitions</td>
<td>9</td>
</tr>
<tr>
<td>Summary</td>
<td>10</td>
</tr>
<tr>
<td>CHAPTER 2—LITERATURE REVIEW</td>
<td>12</td>
</tr>
<tr>
<td>Student Disengagement</td>
<td>13</td>
</tr>
<tr>
<td>Dropout Data</td>
<td>20</td>
</tr>
<tr>
<td>Student Engagement</td>
<td>25</td>
</tr>
<tr>
<td>School Facilities</td>
<td>33</td>
</tr>
<tr>
<td>Safety Standards</td>
<td>42</td>
</tr>
<tr>
<td>Design Patterns</td>
<td>43</td>
</tr>
<tr>
<td>Outdoor Learning Environments</td>
<td>49</td>
</tr>
<tr>
<td>Environmental Psychology and Outdoor Experiences</td>
<td>55</td>
</tr>
<tr>
<td>California Student Assessment Project</td>
<td>58</td>
</tr>
<tr>
<td>Qualitative Studies of Outdoor Environmental/Place-Based Learning Projects</td>
<td>61</td>
</tr>
<tr>
<td>Summary</td>
<td>65</td>
</tr>
<tr>
<td>CHAPTER 3—METHODOLOGY</td>
<td>67</td>
</tr>
<tr>
<td>Research Design</td>
<td>67</td>
</tr>
<tr>
<td>Research Study Background</td>
<td>71</td>
</tr>
<tr>
<td>Participant Observer</td>
<td>73</td>
</tr>
<tr>
<td>Population</td>
<td>76</td>
</tr>
<tr>
<td>Sample</td>
<td>76</td>
</tr>
<tr>
<td>Participants</td>
<td>80</td>
</tr>
</tbody>
</table>
CHAPTER 4—RESEARCH FINDINGS. .......................................................... 97

Student, Teacher, and Class Profiles. .................................................. 98
  Student Profiles ............................................................................. 98
  Teacher Profiles ........................................................................... 100
  Course Profiles ............................................................................ 101
Research Findings ........................................................................... 102
  Research Question: To What Extent and Under What Conditions
  Do Outdoor Learning Experiences Encourage Academic,
  Behavioral, Psychological, and Social Engagement on the Part
  of the Students? ........................................................................... 103
    Academic Engagement. ............................................................... 104
      The teacher teaches a concept and uses authentic work .......... 106
      Involvement in learning .......................................................... 111
      Accomplishment .................................................................... 114
    Behavior Engagement .............................................................. 116
      Positive, on-task behavior ....................................................... 117
      Novelty .................................................................................... 118
      Less controlling environment .................................................. 120
      Respectful, caring relationships between student and teachers .. 123
      Supportive of multiple learning modalities ............................. 123
    Psychological Engagement ....................................................... 125
      Reduced stress in response to nature ....................................... 125
      Sensory experiences ............................................................... 127
      Affective responses ............................................................... 131
    Social Engagement ................................................................... 133
      Encourages collaboration ....................................................... 133
      Learning about themselves and others ................................. 135

Research Question: In What Ways Do Teachers and Students
Leverage the Qualities or Elements of Outdoor Learning Spaces
to Support Teaching and Learning in High School Math, English,
and Science? ............................................................................ 138
  Teachers Leverage Outdoor Learning Spaces ........................... 138
Students Leverage Outdoor Learning Spaces ............................................. 141
Research Question: How and to What Degree Do These Learning Spaces Encourage a Sense of Motivation and Enthusiasm on the Part of the Teachers and Students? .................................................. 144
Student Learning Improves ................................................................. 145
Trust and Respect ................................................................................. 146
Nature is Fun and Provides Space ......................................................... 147
Outdoor Learning Recommendations ................................................... 149
Research Question: Why Do Teachers Choose to Include Outdoor Learning Activities in Their Instruction? .............................................. 152
Conceptual Learning Experiences ......................................................... 153
Location Increases Student Focus ......................................................... 157
Supports Group Work ........................................................................... 158
Supports Individual Work ..................................................................... 160

CHAPTER 5—DISCUSSION ........................................................................ 162
Summary of the Study ........................................................................... 163
Major Findings ..................................................................................... 163
Student Engagement ............................................................................ 164
Academic Engagement ......................................................................... 165
Behavior Engagement ........................................................................... 167
Psychological Engagement ................................................................... 168
Social Engagement ............................................................................... 171
Leveraging the Qualities and Elements of Outdoor Learning Spaces .... 172
Encouraging Student and Teacher Motivation and Enthusiasm .......... 175
Teacher Decisions ................................................................................ 176
Unexpected Findings ............................................................................ 177
Delimitations, Limitations, and Suggestions for Future Research .... 180
Delimitations ....................................................................................... 180
Limitations and Suggestions for Future Research .............................. 181
Conclusions ......................................................................................... 182
Implications for Action ......................................................................... 183
Final Comments ................................................................................... 185

REFERENCES .......................................................................................... 187

APPENDICES

A. Observation Protocol ................................................................. 197
B. Student Interview Protocol .......................................................... 198
C. Teacher Interview Protocol—Pre-Outdoor Lesson Observations ... 201
D. Teacher Interview Protocol—Post-Outdoor Lesson Observations ... 203
E. Student Focus Group Interview Protocol ......................................... 206
F. Figures ............................................................................................. 208
### LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1. Degrees of Involvement</td>
<td>75</td>
</tr>
<tr>
<td>Table 2. Teacher and Course Description</td>
<td>81</td>
</tr>
<tr>
<td>Table 3. Research Interview Questions</td>
<td>91</td>
</tr>
<tr>
<td>Table 4. Student Profiles</td>
<td>99</td>
</tr>
<tr>
<td>Table 5. Observational Data Matrix</td>
<td>106</td>
</tr>
<tr>
<td>Table 6. Different Purposes for Outdoor Learning Spaces by Class.</td>
<td>139</td>
</tr>
<tr>
<td>Figure</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>Ms. Reed’s lessons: Tower project and personality profile.</td>
</tr>
<tr>
<td>2</td>
<td>Mr. Deinae’s respiration demonstration and stair activity.</td>
</tr>
<tr>
<td>3</td>
<td>Mr. Sum’s algebra students solve problems before finals.</td>
</tr>
<tr>
<td>4</td>
<td>Mr. Sum’s geometry class discussion and drawing constructions.</td>
</tr>
<tr>
<td>5</td>
<td>Mr. Sum’s geometry constructions and class discussion.</td>
</tr>
<tr>
<td>6</td>
<td>Mr. Sum’s algebra class and group work in the amphitheater.</td>
</tr>
</tbody>
</table>
ACKNOWLEDGMENTS

There are many people who helped me along my journey to complete this doctoral program. Thank you, Nellie Meyer, for encouraging me to apply. Thank you, Carol Whaley, for stepping in as my research assistant to help me throughout my research and in our classes. We were a great trio who thought alike and loved working together.

I have a deep appreciation for the guidance and inspiration by Dr. Cynthia Uline, a kindred spirit who shares a passion for quality school facilities that support student achievement. Thank you for all your support and guidance during the research process.

I want to thank my committee members, Dr. Maruta Gardner and Dr. Carla Mathison, who helped guide my research and were a pleasure to get to know.

Thank you to my wonderful teachers: Ted, Kate, and Ovi. Your creativity and enthusiasm for learning outdoors were an inspiration to me. I also want to thank my vice principals, Laurie Guido and Jim Good, for your support, so I could complete my research.

I also want to thank my children (Jeff, Paul, Robb, and Juliet) and daughters-in-law (Cody and Rosie) for all their encouragement, particularly Juliet who shares my love of outdoor environments and landscape design. Thank you, Kate, for not feeling the neglect of absent grandparents. Thank you also to my uncle, Jim Hosking, for setting the pace of writing a book in six months and inspiring me to meet my short deadlines. And thank you to my mother, Grace Hosking, who has always supported my educational goals.

I also dedicate my work to those who believe in the call of the outdoors, even if it is just outside the door, and who believe the words of Rachel Carson (1965): “If a child is to keep alive his inborn sense of wonder, he needs the companionship of at least one adult
who can share it, rediscovering with him the joy, excitement, and mystery of the world we live in” (n.p.).
CHAPTER 1—INTRODUCTION

Outdoor education refers to three different kinds of learning experiences in which students participate outside the classroom building: environment-based education, place-based education, and outdoor education. The last category, outdoor learning, is a learning tool to teach traditional subjects across the school curriculum. In my role as principal of Paul Revere High School, I have experienced an evolving interest in outdoor learning as I have observed classes engaged in such learning activities, particularly after a major landscape renovation of the Paul Revere High School main common area, the Quad, and additional landscape renovations between classroom buildings creating grassy open spaces and secluded gathering places. Teachers and their students began to move their lessons outside to use the newly built structures and planted areas with grass, trees, planters, and flowers. Observations from a distance showed the students actively engaged in many creative activities from classes in all content areas. After I saw a majority of the school’s 100 teachers conduct at least one lesson a year outside the classroom, I chose to conduct research in the subject. I wanted to understand better if learning activities taking place in natural or manmade structures outdoors influence at-risk students’ engagement in their learning.

Statement of the Problem

Students’ engagement with academic work is essential to their achievement performance, as well as their social and cognitive development. Research reflects low levels of engagement at all grade levels, particularly in classrooms (Croninger & Lee, 2001; Dei, 2003; Finn & Voelkl, 1993; Marks, 2000; Peterson & Fennema, 1985). Marks found a considerable variation in student engagement and a strong correlation between
authentic instructional work and increased student engagement. Students who do not actively participate in classroom and school activities manifest patterns of academic, behavioral, psychological, and social disengagement, risking failure and encouraging decisions to drop out of school (Azzam, 2007; Croninger & Lee, 2001; Dei, Mazzuca, McIssac, & Zine, 1997; Finn & Cox, 1992).

Recent research indicates that students perceive their learning extends beyond the classroom walls (Tanner & Lackney, 2006; Uline, Tschannen-Moran, & Wolsey, 2009). Further research demonstrates a significant relationship between outdoor learning and achievement (Lieberman & Hoody, 1998; Tanner, 2000, 2006, 2009). Students attending schools with poorly designed outdoor spaces had lower achievement scores (Tanner, 2000, 2006, 2009). Tanner (2000) also reported that a positive outdoor space, including outdoor learning environments with natural and manmade elements, “invites nature to blend with the school’s function and form” (p. 327). In addition, “research shows that when students learn in outdoor settings as compared to staying in the classroom, they learn more quickly, appreciate the experience more, and retain skills longer” (Tanner, 2001, p. 66).

Research into the influence of environment and behavior has revealed that having access to vegetation and natural areas near one’s residence and school can help to bolster the resilience of children and others encountering stress, challenge, or adversity (N. Wells & Evans, 2003). “Natural areas proximate to housing and schools are essential features in an effort to foster resilience of children and perhaps to promote their healthy development” (N. Wells & Evans, p. 327). Although N. Wells and Evans conducted their research within a rural context, results revealed that lining an environment with
additional green landscape appeared to positively influence children’s resilience against stress or adversity. N. Wells and Evans recommended increasing green spaces with lawns, bushes, and trees around schools, homes, and neighborhoods as positive influence on student behavior and academic achievement.

School leaders, focused on high stakes student assessments, pressured to increase graduation rates, and strapped by declining revenues, may not recognize or utilize research that correlates outdoor learning environments and student achievement (Tanner & Lackney, 2006). Teachers are rarely encouraged to plan lessons in an outdoor learning environment, and educators lack knowledge regarding high quality outdoor learning spaces. As buildings deteriorate because of age and a lack of resources for improvements, outdoor spaces receive little attention and are overlooked as a valuable influence on student cognitive achievement (Tanner & Lackney). A growing body of evidence suggests that the quality of learning spaces within the classroom, and outside, are significantly related to student achievement, often through the mediating influence of engagement in the learning process (Cash, 1993; Earthman, Cash, & Van Berkum, 1995; Hines, 1996; Tanner, 2000; Tanner & Lackney, 2006; Uline & Tschannen-Moran, 2008; Weinstein, 1979). Educators are wise to consider any and all opportunities to reverse the negative influences of student disengagement and disaffection. School leaders need to consider every strategy in student engagement and learning that will help students to achieve and graduate.

Research also reveals low levels of student engagement within the classroom (Croninger & Lee, 2001; Dei, 2003; Finn & Voelkl, 1993; Marks, 2000; Peterson & Fennema, 1985) and that disengagement in class activities influences a student’s
academic, behavioral, psychological, and social relationship to school, including a student’s decision about whether to drop out (Croninger & Lee, 2001; Dei, 2003; Finn & Voelkl; 1993, Marks, 2000; Peterson & Fennema, 1985). In addition, research shows a link between student success in school with positive outdoor environments and learning experiences (Lieberman & Hoody, 1998; Lieberman, Hoody, & Lieberman, 2000; Tanner, 2000, 2006, 2009; Tanner & Lackney, 2006). To better understand the relationship between student engagement and activities in outdoor learning spaces, the following questions will be posed:

**Primary Research Question:**

- To what degree and in what manner are outdoor learning spaces associated with student engagement at the high school level?

**Secondary Research Questions:**

- To what extent and under what conditions do outdoor learning experiences encourage academic, behavioral, psychological, and social engagement on the part of students?
- In what ways do teachers and students leverage the qualities/elements of outdoor learning spaces to support teaching and learning in high school math, English, and science?
- How, and to what degree, do these learning spaces encourage a sense of motivation and enthusiasm on the part of teachers and students?
- Why do teachers choose to include outdoor learning activities in their instruction?
Purpose of the Study

This study will examine the link between learning experiences within high quality outdoor learning spaces and increased student engagement, as measured by student focus group interviews, student photo interviews, teacher interviews, document review of teacher lesson plans, and observations of students engaged in outdoor learning environments and activities. This study builds on recent research that confirms a link between outdoor learning and student achievement in English, math, and science classes (California Student Assessment Project: Phase Two, 2005; Dyment, 2004; Education Development Center, Inc. & the Boston Schoolyard Funders Collaborative, 2000; Lieberman & Hoody, 1998; Tanner, 2000, 2006, 2009; Tanner & Lackney, 2006). In addition, this study will examine student engagement of a diverse population of students, including students who may be at risk of failing and dropping out of school, to understand how the outdoor learning environment influences their engagement in these activities and their relationship to the class.

Activities students engage in while in an outdoor environment include, but are not limited to, reading, writing, discussions, team building activities and discovery activities (Billmore, Brooke, Booth, Funnell, & Bubb, 1999; Broda, 2007; Moore & Wong, 1997). At times, the activities involve using the open space provided outside the classroom to gain a more concrete understanding of concepts, such as angles, speed, acceleration, distance. At other times, the defined sitting and performing spaces create a theater for students to act out plays, deliver speeches, and recite poetry. Students may be grouped in many ways as they participate in various activities: individual activities, small group activities, whole group activities, multiple-class activities, and so forth (Billmore et al.,
1999; Broda, 2007; Moore & Wong, 1997). Outdoor learning environments do not require a big investment in manmade construction. Students may use lawns, sit under trees or at tables, and use concrete spaces for stages or activity areas (Billmore et al., 1999; Broda, 2007; Moore & Wong, 1997; Rickinson, 2004).

Overview of Methodology

Much of the research exploring the relationship between student achievement and outdoor learning is quantitative in nature. In fact, there is little research about why and how students engage in outdoor learning environments, why and how teachers plan their outdoor learning activities, and what aspects of the outdoor environment are significant in planning for and undertaking these activities. This study will help to further the understanding of how and why students engage when they learn in an outdoor environment, and it will help provide teachers with an understanding of a resource they can utilize just outside the classroom door.

This qualitative study explored the dynamics of the relationship between student engagement and outdoor learning activities by observing three at-risk students in four different academic classes engaged in at least three different outdoor learning activities. The observations focused on the types and levels of student engagement, with each other and their teacher, as well as with learning activities themselves. Student research participants also photographed their activities to help record significant aspects of their learning experiences. These photographs then served as artifacts during individual student interviews. In addition, a focus group interview of students provided opportunities for students to share their thoughts together and to build their understanding of their learning experiences in the outdoor environment.
This study also utilized individual teacher interviews to further investigate why they choose to include outdoor learning in their instruction, how they planned their outdoor learning activities, and how the activity lesson plans focused on student engagement and authentic learning. Teacher interviews also addressed the outdoor learning environment itself to better understand the manmade and natural elements that supported student outdoor learning activities (Cohen, Manion, & Morrison, 2000; Patton, 1990). Recent research indicates a link between student achievement and a positive outdoor environment, which includes outdoor learning spaces (*California Student Assessment Project: Phase Two*, 2005; Lieberman & Hoody, 1998; Lieberman et al., 2000; Tanner, 2000; Tanner & Lackney, 2006). Research also indicates a positive link between outdoor environmental education and student achievement (Lieberman & Hoody, 1998; Lieberman et al., 2000; Null, 2002), but there is little research that examines the nature and quality of outdoor learning space, what it includes, and what teachers need to do to support their use of it as an instructional resource in the content subjects.

**Delimitations and Limitations of the Study**

The primary delimitations of this study was the choice to study, in depth, one high school whose students participated in at least three outdoor learning activities during one quarter of the 2009-2010 school year. This single case study limited the ability to compare and contrast different schools’ experiences in outdoor learning activities, and schools in different parts of the country. This case study only examined outdoor learning activities during the months of December to February, and weather and other factors affected the activities teachers planned outdoors. Some of these factors included
curricular decisions based on the scope and sequence of their units of study, time constraints that affected the planning and implementation of the outdoor learning activities, and the quality of the outdoor learning environment itself. Because the school is located in Southern California, there were some natural environmental factors that affected this specific outdoor learning environment, including a heat wave and the El Nino rains.

Other limitations of this study included the qualitative study itself and the reliance upon student interviews to understand their feelings. In addition, the researcher’s dual role as participant observer and the principal and authority figure may also have affected the students’ and teachers’ responses. The researcher as participant observer took steps to assure student and teacher responses were candid and objective by maintaining positive relationships, as well as recognizing and addressing this dual role with participants and researcher peers. Attention was paid to provide the most credible data from student interviews through triangulation, peer debriefing, and member checking. These procedures are explained in Chapter 3.

Significance of the Study

This research is important to teachers and school leaders who are under pressure by No Child Left Behind (NCLB) to increase graduation rates and to improve student performance on standardized tests. If using the outdoor learning environment helps to improve student engagement and achievement, then teachers could feel confident in including outdoor learning as an effective and inexpensive instructional strategy. School leaders would have a better understanding of student learning and how students relate to their outdoor learning environment, and they would encourage their teachers to move
their lessons beyond the classroom building. School leaders would feel more justified in providing professional development for teachers that would enable them to conduct more effective outdoor learning activities.

In addition, understanding the relationship between student achievement and a school’s landscape would encourage facility planners to include students and educators in the planning and design process of outdoor learning environments. School facility planning would benefit from understanding the natural and built elements of a landscape that are helpful in supporting student learning in the outdoors. Additional research may aid school district and state policy makers to address establishing policies and fiscal allocations for the development of outdoor learning environments that systematically help improve student engagement, learning, and graduation rates.

Definitions

At-risk student: A student who may not graduate from high school because of poor academic achievement, low grades, and/or excessive absences. Students who fall behind academically may be identified as (or placed) at risk at any time in their education from kindergarten through high school.

Outdoor learning: In this research study, outdoor learning means simply taking the class lesson outside the classroom walls to the open, natural environment. The outdoor learning environment may consist of natural and manmade structures to support student learning, such as benches, tables, space dividers, and awnings for protection from the sun. Outdoor learning environments may also consist of spaces with lawns, trees, bushes, flowers, rocks, and other vegetation, and/or mineral objects used to create a
landscaped area. All outdoor learning environments provide free movement of air within the space.

Summary

This chapter has provided the background and context for this study of outdoor learning and student engagement at Paul Revere High School. It has also explained the need for addressing student engagement as it relates to student achievement of at-risk students. In addition, this chapter presented reasons for the urgency of this study to provide a resource, often overlooked, that can positively support student success in learning when high stakes testing, higher standards, and reduced budgets are making high school graduation a more challenging goal.

This chapter also outlined the reasons why a qualitative case study of student engagement in outdoor learning is appropriate and viable. This qualitative study will further current quantitative research that identified the connection between the quality of the outdoor environment and student achievement. The theoretical framework of this study was presented, as well as the methodologies of the qualitative study: observations, interviews, focus interviews, and document review. The primary and secondary research questions were presented to clarify the scope of this study in addressing student engagement, as well as teacher planning and integration of the outdoor learning environment in the planning of student activities.

The limitations of this study were also addressed to identify factors that could affect the data collected, including the environmental factors such as the weather, teacher factors, and the role of the researcher as the principal and participant observer. Being the participant observer in this study will provide an opportunity for the researcher to gain a
higher level of understanding of student engagement and learning in the outdoor environment. Becker and Geer (as cited in Patton, 1990) state:

The most comprehensive form of the sociological datum, after all, is the form in which the participant observer gathers it: an observation of some social event, the events which precede and follow it, and explanations of its meaning by participants and spectators, before, during, and after its occurrence. (p. 25)

The next chapter will examine the research concerning student engagement, student disengagement, and the relationship of school facilities to student achievement. Following this, a detailed outline of the theoretical basis and methodologies of this research study will follow in Chapter 3.
CHAPTER 2—LITERATURE REVIEW

This review of literature explores the connection between school facilities and student engagement, particularly outdoor learning facilities and environments. Organized in two main sections, this chapter reviews the effects of student disengagement from learning and how school facilities support student engagement in learning. First, student disengagement from the classroom and school is considered to understand what happens when students are not engaged in their learning. Students’ gradual emotional and physical disengagement from school may indicate behaviors of a student who drops out of school. Government studies reveal the negative individual and societal impact resulting from students dropping out of school. The dropout data helps to explain this crisis to society and the urgency to improve education practices, increasing the likelihood that students will remain engaged and complete high school. Next, student engagement research presents a description of behaviors that students exhibit when they are actively engaged in learning. By understanding how students engage in learning, educators can provide needed supports to help prevent at-risk students from becoming disengaged and possible dropouts.

The second section examines the role of school facilities and how the physical learning environment relates to student attitudes about school and learning. The condition, age, and safety features of a facility are important to how students perceive their learning environment. One design element of a positive learning environment is an outdoor environment which can be used for instructional activities. The different ways in which instruction is conducted in an outdoor learning environment are explored to
understand how students respond when learning within this often overlooked resource just outside the classroom door.

**Student Disengagement**

Student disengagement at school, particularly in the classroom, became a focus of many studies in the 1980s when researchers presented a dismal picture of the culture of comprehensive high schools (Finn, 1989; Marks, 2000). Student disengagement, characterized by students being bored and uninvolved in their learning, is still a problem in American schools (Marks, 2000; Newmann, 1992). American students who exhibit emotional and behavioral withdrawal or disengagement are more likely to leave school before graduating (Dei et al., 1997; Finn & Voelkl, 1993). One report estimated that 40%-60% of middle and high school students showed signs of chronic disengagement (Steinberg, 1996). Other forms of disengagement from academics include chronic truancy, getting into trouble at school, and putting little effort into work assignments (Alexander & Entwisle, 2001; Finn, 1989).

Alexander and Entwisle’s (2001) study of student disengagement behaviors included an examination of student attendance records in Baltimore City Public Schools. Their study revealed that students who had a high number of absences in high school and later dropped out also had a significantly higher number of absences while attending middle school. Alexander and Entwisle examined both student engagement behaviors and school performance in relation to students’ dropping out of school. They studied 790 nonrepeating first grade students’ academic performance and tracked placements at the following critical times in the students’ educational experiences: 1st grade, elementary years (years 2-5), middle school years, and 9th grade (1st year of high school). Their
quantitative study examined odds ratios from univariate logistic regression analysis in which the dropout risk was predicted from the measures of academic performance and experience, parents’ attitudes, and students’ engagement attitudes and behaviors such as school attendance.

Their study revealed that middle school students in grades 6-8 who later dropped out of high school had an average of 27.6 absences annually. Absences for students in middle school who stayed to graduate averaged 11.8 days. Students who dropped out of high school had an average of 46.8 absences per year in their 9th grade before dropping out, compared with 13.5 absences for 9th graders who graduated 3 years later. Disengagement as a result of not attending school is a significant factor for students who become future high school dropouts.

Croninger and Lee’s (2001) study of 10,979 students from 1,063 public and private high schools between 1988 and 1992 examined the relationship between social risk, academic risk, and the probability students will drop out of high school. Croninger and Lee used the National Educational Longitudinal Study (NELS) data to examine the relationship between social risk, academic risk, and the probability that students will drop out of high school. The NELS is a biennial general-purpose survey of 10,979 eighth grade students sponsored by the National Center for Education Statistics (NCES). First, risk factors such as low socioeconomic status (SES) and academic risk factors or grade point averages less than a C grade in middle school were established. Next, social capital was determined by student-teacher relations and student-teacher talks outside the classroom. A logistic regression was used to examine the effects of social capital on risk factors on dropping out, examining models in order of the simplest to the most complex. To
minimize multi-collinerarity in these analyses, and to facilitate the interpretation of the results, the researchers stratified their investigation by students’ academic-risk status. They estimated the probability of dropping out for two groups of students: those who enter high school with no academic-risk factors and students for whom one or more risk factors are present.

The social risk factors that might influence a student’s disengagement included living in a single-parent household or one in which the family income is below poverty level, speaking English as a second language, belonging to a disadvantaged minority, or having a mother who failed to complete high school. Academic risks studied that may increase a student’s probability to drop out include having a grade point average less than a C in middle school, being held back between the 2nd and 8th grades, having no expectation of education beyond high school, being sent to the office more than once during the first semester of the 8th grade, and having parents notified more than once about school-related problems.

Marks’ (2000) study of student engagement was represented by two measures: academic success and alienation. Academic success was measured by the student’s grade point average from core subject classes. Student alienation or disengagement was measured by the student’s attendance and suspension data which included the frequency the student was late arriving to class, truant, and the number of days the student was disciplined by in-school and out-of-school suspension. The study sample included 24 restructuring schools (8 elementary, 8 middle, and 8 high schools) and focused on students in grades 5, 8, and 10 from six core classrooms (three math and three social studies) in each school.
Marks (2000) used a two-way analysis of variance (ANOVA) and Hierarchical Linear Modeling (HLM) analyses to analyze data from the 3,660 students. The study investigated student academic success and alienation. Data from the students’ grade point averages in the six core subjects in grades 5, 8, and 10 were compared with student attendance and suspension data. Authentic instructional work was measured through student survey question data. Analysis of variance was used to evaluate the effects of subject and level. The HLM analysis involved three levels of analyses: the classroom level and variations in individual student characteristics, between classroom variations, and school level effects. The study concluded that student alienation identified by the above risk factors detracted from engagement to the greatest extent among middle school students, and poor achievement, prior to entering high school, can influence whether a student is engaged in high school. Like Croninger and Lee’s (2001) study, Marks’ conclusion emphasized the importance of student engagement and academic success prior to entering high school. Further, the risk factors result from a number of sources, including student characteristics, the classroom level, and the school level.

Dei et al. (1997) conducted a 3-year study entitled *Reconstructing “Drop-out:” A Critical Ethnography of the Dynamics of Black Students’ Disengagement from School.* The research was a reconstruction of the social, structural, and institutional practices that led Black youth to lose interest in school and to leave before graduation. It examined how institutionalized structures and processes of schooling led to premature school-leaving of Blacks, from the perspective of Black school dropouts, Black students, Black parents, non-Black students, and school personnel. The first year participants included 40 African-Canadian students, grades 10-12, in two Toronto schools, and over 20 students each in
two other schools. In addition, over 24 students from other Metropolitan Toronto schools and 21 actual school “dropouts” and students designated “at-risk” participated in three focus group interviews.

By the end of year two, a total of 150 Black students had been interviewed for the project from the selected schools for the project. In addition, the researchers conducted four focus-group meetings of 10 students in each of these schools and collected survey data from the same students. The researchers interviewed 55 Black parents, caregivers, and community workers for their views on public schooling in Ontario. They spoke with 41 teachers and some school administrators about their views on public schooling in Ontario, and solutions to the school “dropout” dilemma. The researchers also interviewed 59 non-Black students individually and in groups in each of the four high schools to cross-reference the narratives of the Black students. Data were analyzed qualitatively and quantitatively to reflect general trends, and particularly the impact of gender and social difference on the issue of student disengagement and the process of “dropping out” or “fading out” of school.

Findings from Dei et al.’s (1997) study, which included individual and focus group interviews of students and dropouts over 3 years, underscored the need to attend to all students who are becoming disengaged from school. Black students “observed that the school seems not to notice or, indeed, care when students start to disengage or fade out of the system” (Dei et al., p. 209). The students in the research sample felt the school system seemed to have little interest in rescuing “at risk” students who were Black, and they perceived the system was eager to kick them out. “Such conscious or unconscious school practices, combined with negative attitudes and poor teaching styles on the part of
teachers, led students to formulate negative opinions of the school system” (Dei et al., p. 210). The students’ negative feelings influenced whether they stayed in school and graduated.

Finn and Voelkl (1993) also examined student engagement as an affective relationship to the school. The relationship to the school size, structure, and procedures were studied to understand the degree to which school procedures are structured and rigid and the severity of school disciplinary measures related to the engagement levels of high-risk 8th grade students. The quantitative study focused on school characteristics and how they affected students at risk of dropping out of school. It included 6,488 8th grade students from 758 schools across the United States who had at least one risk factor. Student engagement indicators came from school/teacher reports that indicated the student’s rate of tardiness, nonengagement in completing homework, attendance, preparation for class, behavior, and student-teacher relationships. Teacher reports, report cards, and attendance records were used, as well as environment indicators from total school enrollment and the student to teacher ratios. Areas of focus included the extent to which the schools enforced rules requiring hall passes for students who were out of class, severity of punishment of youngsters for a first occurrences of offences such as cheating, alcohol or drug use, or verbal/physical abuse of teachers, and the degree to which discipline was emphasized in the school, classroom activities, and school day.

Like Marks (2000), Finn and Voelkl (1993) also used HLM Analysis to examine a possible relationship of the above school characteristics and student engagement. They sought to understand the degree to which school procedures are structured and rigid and how the severity of school disciplinary measures are related to the engagement levels of
high-risk 8th grade students. The sample consisted of 6,488 at-risk 8th grade students from 758 schools across the nation. Student engagement indicators came from school/teacher reports. The impact of the schools’ structural and regulatory environments on engagement levels was tested using HLM.

A strong correlation was found between school size and the rate students arrived late, were absent, as well as reports of nonengagement. Greater numbers of students of color were associated with low levels of participation. Rigid rules indicators were associated with slightly poor perceptions of warmth and supportiveness of the school environment and lower participation rates as indicated by late arrival, nonengagement, and attendance rates. Students’ feelings about their school were manifest in their engagement levels.

These studies demonstrate the relationship between student achievement and how students feel about their learning environment. When students do not feel connected with their learning environment and receive little focused support, students are more likely to leave before graduating (Dei et al., 1997). Students who feel the school rules are rigid and do not encourage a warm, caring learning environment, are also more likely to disengage from their education and not attend school regularly (Finn & Voelkl, 1993). Students need a warm, caring learning environment that supports their learning by creating supportive relationships and interactions that will encourage them to attend school regularly and engage their hearts and minds. The next section will examine the statistics of what happens to students who become disengaged from their schools and education and do not earn a high school diploma.
Dropout Data

The result of students disengaging from school is an increased risk they will not stay in high school to graduate. “Dropping out is a way for students to ‘dis-engage’ from the school environment” (Yazzie-Mintz, 2007, p. 1). Young people ages 16 through 24 who are out of school and who have not earned a high school diploma or equivalent credential (e.g., a General Educational Development certificate, or GED) are defined as dropouts. Estimates of national dropout data by the National Center for Education Statistics (2007) for 2005 include:

- Approximately 3.5 million young people, 9.4%, who were enrolled in high school in October 2004 left school before October 2005 without completing a high school program.
- Males were more likely than females to be high school dropouts (10.8% compared with 8.0%).
- Hispanic and Black high school students were more likely to drop out than were White and Asian/Pacific Islander students. The rates are 22.4% for Hispanics and 10.4% for Black students, compared with 6.0% for White students and 2.9% for Asian/Pacific Islander students.
- Students living in low-income families were approximately six times more likely to drop out than students from high-income families (8.9% compared with 1.5%). Dropouts suffer a number of negative outcomes over the course of their lives.

Students who leave high school without graduating often experience negative consequences, including earning a lower annual average income, compared with high
school graduates. The U.S. Census Bureau (as cited in NCES, 2007), presents the following statistics concerning high school graduates and nongraduates. In 2005, the average income for a person who did not graduate from high school was $20,100 compared with $29,700 for high school graduates. Students who drop out of school are more likely to be unemployed. They also report worse health as adults than adults who are not dropouts. High School dropouts also make up a higher percentage of prison inmates. The estimates are approximately 30% of federal inmates, 40% of state prison inmates, and 50% of persons on death row are high school dropouts from 1997 and 1998 data (U. S. Department of Justice, as cited in NCES, p. 1).

In a research paper examining the consequences of dropping out of school (Sum, Khatiwada, McLaughlin, & Palma, 2009) the nations’ young high school dropouts varied across gender, ethnicity, and household incomes. In 2008, the jobless rate for African-Americans between 16 and 24 years old was 69% and 47% for Hispanics. Dropouts make up a disproportionate share of the unemployed, and high school dropouts living in low income families (below $20,000 annual income) were the least likely to be employed at 38%. Young female dropouts were six times more likely to give birth than their peers who attended college or graduated. In addition, young female high school dropouts were nine times more to become a single mother than females with a bachelor degree. Nearly one of every 10 male high school dropouts was incarcerated or institutionalized on a given day in 2006-2007, in contrast to the rate of 1 in 33 for high school graduates.

Overall, the lifetime net fiscal contributions of adults 18-64 years old by educational attainment in 2007 revealed that the higher one’s education, the higher one’s net positive impact upon society over a lifetime, except for high school dropouts who have a negative
impact of costing society $5,191. A high school diploma means a +$287,384 net fiscal impact; some college is +$461,661; a bachelor’s degree is +$793,079; a master’s or high school degree is +$1,094,945.

A body of research conducted over the past two decades seeks to understand why students become disengaged and drop out of school (Alexander & Entwisle, 2001; Azzam, 2007; Barton, 2006; Finn, 1989; Marks, 2000). Newmann (1989) explained that students in middle and high schools begin to develop new patterns of social and sexual relations that divert much of their attention away from educational goals, at a time when they need to invest more effort to master knowledge that may not be interesting to them.

Some students drop out as a response, and a solution, to their difficult home-related life experiences or school-related social pressures resulting from racism, sexism, or homophobia (Dei, 2003). According to Dei, “Addressing questions of power, equity, and social difference is significant to ensure student engagement and retention in schools, leading eventually to enhanced learning outcomes” (p. 249). The qualitative study by Dei et al. (1997) focused on the social, structural, and institutional practices that lead Black youth to lose interest in and to leave school. This study over 3 years included interviews, focus group responses, and surveys. It examined how institutionalized structures and processes of schooling lead to premature school-leaving of Blacks, from the perspective of Black school dropouts, Black students, Black parents, non-Black students, and school personnel. In particular, the study revealed that students of diverse ethnicities benefitted from feeling included, respected, and connected to their school and learning. Quality instruction and positive relationships with teachers influenced their engagement in school.
The 2006 High School Survey of Student Engagement (HSSSE; Yazzie-Mintz, 2007) reported student responses about dropping out of school from HSSSE surveys conducted at 110 schools from 26 different states in the United States. Fifty percent of the respondents had skipped school at least once, and 22% had considered dropping out of high school. Among those who considered dropping out, 73% said they did not like school, 61% did not like the teachers, 60% did not see the value in the work they were asked to do, and 24% felt no adult cared about them. Other reasons students considered dropping out of high school included family issues (42%), the work was too hard (52%), the need to work (35%), being picked on or bullied (28%), and the work was too easy (19%).

Other factors correlated with dropout rates included students who came from low-income or single-parent families, earned low grades in school, had high absence rates, and changed schools (Barton, 2006; S. Wells, Bechard, & Hamby, 1989). Alexander and Entwisle (2001) studied 790 nonrepeating 1st grade students’ academic performance and track placements at critical times in students’ educational experiences: 1st grade, elementary years (years 2-5), middle school years, and 9th grade (1st year of high school). The students initially were selected from 20 schools (6 African-American, 6 White, 8 integrated) and by SES (14 inner city or working class; 6 middle class). The final sample of 790 1st grade students (55% African-American and 45% White) were randomly selected from the previous year’s kindergarten rosters and their current first grade rosters to ensure the students in the sample had not been retained. The parents’ educational levels ranged from less than 8th grade to graduate and professional degrees, averaging 11.9 years of schooling. By year 13 of the study (spring 1995), 84% (N = 663) still participated in
the study. Student academic levels were measured by scores on the California Achievement Test, as well as by grades. The track placements indicated if a student was retained, was identified as a special education student, or was placed in a low, regular, or high level academic curriculum. Alexander and Entwisle’s study also looked at students’ SES. The study showed that higher test scores and grades were associated with lower dropout rates for children in all SES levels. “Good school performance offsets SES disadvantage somewhat, but academically successful lower SES youth remain highly vulnerable” (p. 777). The study revealed that a student who was retained at any point in his/her education was more likely to drop out. Retention in the middle school showed an 89% risk factor, the highest level, for dropping out. When students had a record of poor performance, they revealed a weakened attachment to school. Dropping out under such circumstances was a means of escape from an environment that was psychologically punishing (Alexander & Entwisle). The disengagement process was described as “fading away,” in which the students attended school less frequently and were less and less engaged until they stopped altogether. “Engagement behaviors at school rival test scores and report card marks in forecasting eventual dropout—and this holds all along the way, including 1st grade” (p. 802).

Students who are at risk of not completing high school become disengaged from school for many reasons. One of the most significant factors is the student’s SES. Poverty and its many consequences make regular attendance and academic achievement difficult (Alexander & Entwisle, 2001). Other factors related to student disengagement result from actions by the schools themselves: student retention, track placements, disciplinary actions, and even bullying by other students at school. Because students of diverse
ethnicities benefitted from feeling included, respected, and connected to their school and learning, the learning environment of the school is very important. Quality instruction and positive relationships with teachers influence students’ engagement in school (Dei et al., 1997; Yazzie-Mintz, 2007) and support achievement and student resilience. In order to improve student achievement, particularly the achievement of at-risk students, school leaders need to pay more attention to the affective needs of students and how to build positive relationships that will increase student engagement in their learning.

Student Engagement

Scholars have defined student engagement in terms of participation in school and classroom life. According to research, actively engaged students attend school regularly, pay attention to their teachers, following directions, answering questions, and complete assignments (Finn & Voelkl, 1993). Student engagement in relation to classroom instruction is viewed as a psychological process, in which the students’ attention, investment, and effort in their work imply both affective and behavioral participation in the learning process (Marks, 2000). “Engagement is an important facet of students’ school experience because of its logical relationship to achievement and to optimal human development” (Marks, p. 155). Marks’ study consisted of a survey of items about attitudes, behaviors, and experiences in either a mathematics or social studies class, in school in general, and their personal and family background. Twenty-four restructuring schools were selected, eight elementary, eight middle, and eight high schools. The sample focused on students in grades 5, 8, and 10 from six core classrooms (three math and three social studies) from the 24 schools. At least one teacher was involved in the restructuring process, and the students represented the achievement range of the school. More than
3,660 students in 143 of 149 core classrooms completed the surveys, a 96% response rate. The students’ achievement was measured by the National Assessment of Educational Progress (NAEP) reading, mathematics, and writing tests. This allowed student achievement to be compared to a national sample. The students in the mathematics classes took the NAEP mathematics assessment, and the students in the social studies classes took the NAEP reading and writing assessments.

Orientation toward school was represented by two measures: academic success and alienation. Academic success was measured by the student’s grade point average from English, math, social studies, and science classes. Student alienation was measured by the student’s attendance and suspension data that included the frequency the student was late arriving to class, truant, and the number of days the student was disciplined by in-school and out-of-school suspension.

Authentic instructional work was measured through survey questions that asked students about the frequency in which they were involved in meaningful academic experiences in core mathematics and social studies classes. The four measures of this component included whether a student was asked an interesting question or to solve a new problem, to think deeply about a problem, to apply the subject to a situation outside the school, and to discuss ideas with the teacher or students.

Marks’ (2000) study revealed the highest correlations to student engagement in school came from a student’s background of prior success in school, the student’s orientation (feelings) toward school, and authentic instructional work with social support. Assignments that were cognitively challenging and connected to the world beyond the
classroom showed the strongest influence upon students’ engagement in learning. Another strong influence on student engagement came from social support of learning.

In a study of 4th grade math students, Finn and Cox (1992) found that participation in the classroom in younger years, particularly if participation led to successful outcomes, would lead to a sense of identification with school. A sample of 1,388 4th grade students, from 72 schools across the state of Tennessee, was rated on a teacher questionnaire assessing participation and nonparticipation. Based on their assessments, three groups were formed: active participants, passive participants, and nonparticipating students. The groups were compared on demographic characteristics, attendance, achievement, and self-concept for the preceding 3 years. Students identified as members of the Participation Groups had distinctly higher achievement measures beginning in the 1st grade, and they maintained those distinctions over time.

Researchers have shown that a sense of belonging would also lead the young student to value learning (Dei, 2003; Finn & Cox, 1992). Finn and Cox explained the close link between class participation and success. Participation leads to academic success, which in turn influences identification with school. Marks (2000) also found school climate affected engagement, because students who feel good about their learning environment will engage in their learning. In later sections of this review, other aspects of school climate, such as the feel of a well designed and equipped facility, will also have a positive relationship to student engagement and academic achievement. When students participate at a high level, they may initiate questions and dialogue with the teacher and show enthusiasm for learning by spending extra time in the classroom or doing more class work or homework than is required (Finn & Voelkl, 1993).
Peterson and Fennema (1985) studied 4th grade students in math classes. They used both qualitative and quantitative analyses to examine the effects of student engagement in classroom activities and sex-related differences in learning mathematics. Thirty-six 4th-grade teachers (3 male and 33 female) in 15 schools, located in rural areas or small towns in Wisconsin, participated in the study. The student observations, qualitative observations, were conducted at 60-second intervals until all 12 target students per class were observed. The observers were trained to randomly order the list of target students each day before observations began, so the order of observation of students changed daily. Observers sat in the back or side of the room, and sometimes moved around the classroom. Their scores were put into a computer program to use with the achievement data. The quantitative data came from student results from the NAEP. T-tests were used to compare means, such as if boys and girls are engaged the same amount of time in class.

A scatter plot of the average boys’ achievement scores and the girls’ achievement scores helped to identify those with the biggest gains. The researchers computed means on the engaged-time observation categories for each of the groups of classes and for girls and boys within each group. The design was a 3 x 2 (group times sex) split-plot design. Rather than computing overall F tests, they did three pair comparisons for groups Tukey’s HSD method to test the sex-group interaction.

The results showed that student engagement and nonengagement in mathematics activities in the classroom related to students’ mathematics achievement. Four classroom activities were found to have different effects upon the boys’ and girls’ achievement in mathematics: competitive mathematics activities, cooperative mathematics activities,
social activity, and off-task behaviors. The girls’ mathematics achievement was negatively related by engagement in competitive mathematics activities, and the boys’ achievement was slightly positively related. It was suggested that the boys’ verbal assertiveness in the competitions helped them to be more successful. The girls’ mathematics achievement was positively related to participation in cooperative mathematics activities, but the boys’ mathematics achievement was not. Off-task behaviors negatively affected the boy’s mathematics achievement, but not the girls’; however, mathematics activities that involved social or personal content negatively affected the girls’ mathematics achievement and not the boys’. The highest level of mathematics achievement occurred by boys engaged in autonomous learning. The explanation for the lack of autonomous behavior by girls was that females may not have been encouraged or rewarded for engaging in autonomous learning behaviors. The results of this study provide some guidance for educators in what different learning activities may positively or negatively influence mathematics achievement by males and females. It also provides guidance to educators about what kinds of learning activities and student behaviors may negatively affect mathematics achievement of students by gender.

A longitudinal study by Shernoff, Csikszentmihalyi, Schneider, and Shernoff (2003) examined high school students’ classroom behaviors across the United States. Their study revealed how students spent their time in school and when they were most engaged in learning. The researchers studied student engagement in high school classrooms from the perspective of flow theory. The study included 526 high school students from 13 high schools over 5 years. The Experience Sampling Method (ESM) was used to measure participants’ location, activity, and affective and cognitive
experiences at random moments. Preprogrammed wrist watches randomly signaled participants eight times daily to complete an Experience Sampling Form (ESF) which contained 45 items. Trained analyzers coded the ESM data using a detailed coding scheme. To estimate a participant’s overall level of engagement in classrooms and subsequent analyses, raw ESM scores were analyzed as well as their conversion into \( z \) scores. The standardized \( z \)-scores were measured relative to each student’s individual experience throughout the week. A one-way ANOVA was used as the primary statistical test, with Duncan’s Multiple Range serving as the post-hoc statistic for significant results.

The high school students in this study spent their instructional time as follows: one-third passively listening to information from lectures, watching television or a video; more than one-half on independent work, such as doing individual work, taking notes, taking an exam, studying or doing homework; and approximately 14% on interactive activities including class discussions and group activities. Individual work (23%) and listening to lectures (21%) were the two activities with the highest percentages. The students reported being more engaged during individual and group work than when watching a TV/video or listening to a lecture. Individual work and group work were associated with high levels of concentration, enjoyment, and interest. Students reported that nonacademic subjects were more engaging than academic ones in terms of positive emotions. The results of the study suggested the need to develop activities in which learning is experienced as challenging and relevant, while allowing students to feel in control of their learning environment and confident in their ability. These activities were ones in which the students concentrated, experienced enjoyment, and provided immediate intrinsic satisfaction that supported future learning. “Teachers succeeding in providing
such engagement most likely consider not only the knowledge and skills to be learned, but also the students as learners, adapting instruction to their developmental levels and individual interests” (Shernoff et al., 2003, p. 173).

Qualitative studies of student engagement have examined individual classrooms and student behaviors and discourse using a number of techniques. Newmann (1992) presented findings from five main research projects in the National Center on Effective Secondary Schools between 1985 and 1991. High quality discourse and engagement in the study of literature were studied using observations of multiple classrooms on multiple occasions to record classroom learning activities with audio recorders and lap-top computers. Class size and teacher experience were not related to the level of teacher discourse in the study of literature. The practice of teachers asking authentic questions about literature in English classes helped the students to better understand the literature. The proportion of authentic questions asked in high-level English classes was three times greater than in low level English classes. High quality discourse rarely occurred in regular freshman literature study in English courses. The research recommended the inclusion of more open-ended and authentic questions for all students studying literature as a means to increase their understanding.

The HSSSE (Yazzie-Mintz, 2007) examines three primary dimensions of student engagement: cognitive/intellectual/academic engagement, social/behavioral/participatory engagement, and emotional engagement. Some findings of the student engagement analysis included girls reported they were more engaged across all dimensions than boys. The White students and Asian students reported they were more engaged on all dimensions than students of other races. Students in honors or advanced courses reported
they were more engaged on all three dimensions than students in other academic tracks. Special education students reported they were less engaged on all three dimensions than students in other academic tracks. Students in general education or vocational classes reported approximately equal levels of engagement on all three dimensions and fell between the other two tracks in terms of levels of engagement. In addition, students who were not eligible for free or reduced-price lunch programs reported higher levels of engagement across all three dimensions than students who were eligible for free or reduced-price lunch programs. This study recognized the existence of a student engagement gap that needs to be closed in order for the student achievement gap to be closed. “Addressing the engagement gap is an important step toward engaging all students in a school community” (Yazzie-Mintz, p. 8).

Pickett (2007) conducted a mixed method study of student engagement in two high achieving alternative high schools by examining results of the HSSSE and staff interviews, document review, and observations. The results of the study indicated that the staff clearly understood the need and desire to work with highly at-risk students, and their support of the students addressed their academic needs as well as social-emotional needs. The small school environment and the reduction of class size were also important to allow the time for personalization to occur between the student and teacher. Data also indicated that expectations, accountability, and support were systemic. Relevancy and interest level of materials were important considerations if the student felt bored and disinterested in the learning. Study recommendations underscored the importance of addressing the relevancy and interest level of resources and materials to engage students in things that interest them.
These studies of student engagement emphasized the need for educators to think of the students as learners and how they learn best. This includes providing more opportunities for students to engage in activities that are cooperative, relevant, self-directed, and encourage open-ended and authentic questioning.

In addition to studying what and how students are instructed, studying where and under what conditions students learn is important to understanding student engagement, behavior, and achievement. The influence of the physical learning environment is a significant element in student engagement (Billmore et al., 1999). Billmore et al. described educational uses of school grounds and how the necessary resources could be created and managed. They recommended that all school stakeholders become aware of the potential contribution that appropriately designed and managed grounds make to teaching and learning. Their research also highlighted the value of a multidisciplinary approach and the need for teachers to make the presentation of material relevant to students. “The reinforcement of knowledge resulting from exploration and the use of imagination and from sharing and caring is that much greater where the design and management of the grounds is completely responsive to the widest possible spectrum of educational use” (Billmore et al., p. iv). Understanding the connection between instructional practices and quality learning environments may help educators support at risk students to stay engaged in learning and to graduate from high school.

School Facilities

Recent studies of school facilities have helped educators and school planners to understand how students relate to their learning environment. Studies presented in this section reveal an association between the physical condition of a school and student
achievement, behavior, and affective response to learning. School safety conditions and certain design elements are also associated with student performance.

A growing body of research examined the influence of different aspects of school facilities, such as light, sound, and color, classroom design, and their relationship to student behavior (Cash, 1993; Earthman et al., 1995; Hines, 1996; Lackney, 1996; Tanner, 2000; Tanner & Lackney, 2006; Weinstein, 1979). In Cash’s (1993) study, data were provided from the Commonwealth Assessment of Physical Environment (CAPE), a researcher-developed building assessment instrument completed by principals who rated structural features of the school facility quality such as roof leaks, locker condition, ceiling covering, interior and exterior paint cycles, clean floors, graffiti removal, and other indicators of good facility maintenance. The entire population of small, rural high schools in Virginia was used in this study: 47 schools in 36 divisions, all had a population of fewer than 100 seniors and were located outside urban areas during the 1991-1992 school year. The design of the study permitted a comparison of achievement and behavior scores among schools with facility condition ratings of substandard, standard, or above standard. Behavior scores, achievement scores, and facility condition ratings were determined by the researcher based on the information collected from the individual school. The number of students on free and reduced lunch was also provided by the individual school. The academic achievement data came from the individual school averages for the Test of Academic Proficiency (TAP), the 11th grade test of the Virginia State Assessment Program administered in 1991-1992. Student achievement was found to be higher in those buildings with higher quality ratings. When building condition was subdivided into structural and cosmetic conditions and student achievement was
compared across the levels of the building conditions, higher student achievement mean scale scores were found in schools with higher quality cosmetic building condition ratings. The higher student achievement may have resulted from the students’ positive feelings about their school learning environment. When students’ affective relationship with school is strengthened, they care more about their learning and are more engaged. It is not surprising that student achievement appeared to be more directly related to cosmetic factors. Science achievement scores of students were higher in buildings with better quality science facilities than in facilities with lower quality science facilities. Higher achievement was associated with schools with at least some air conditioning in instructional spaces, with less graffiti, with better locker conditions, with better science laboratory equipment, with classroom furniture in better condition, with pastel painted walls instead of white walls in instructional areas, and with less noisy external environments.

Building condition is more than a static condition. It is a physical representation of a public message about the value of education. If students perceive education as something to be done in a poor quality facility, they may also perceive it to be of less value. To encourage academic excellence and potential economic success, schools must represent a better way of life—a promise of the future. Schools should reflect the environment of success. (Cash, 1993, p. 83)

Hines (1996) based his study of building condition and student achievement and behavior on the Cash (1993) model, studying the schools in urban areas of Virginia. Hines found the number of suspensions, expulsions, and violence/substance abuse incidents in schools changed significantly with the improvement in building conditions.
Somewhat surprisingly, Hines found suspensions and violence/substance abuse incidents actually increased when building conditions improved from substandard to standard, and then dropped when building conditions changed from standard to above standard. Hines theorized that, “a better maintained building promoted higher diligence in maintaining discipline and demanding more acceptable behavior” (pp. 86-87). Hines also noted a relationship between increased test scores and improved structural conditions. Whether the building improvements were a result of structural or cosmetic improvements, (i.e., a fresh coat of paint or regular sweeping and mopping), these changes were accompanied by an increase in student achievement.

Earthman et al. (1995) conducted a similar study in North Dakota using the CAPE rating instrument to compare the building condition with student achievement, and similar results of improved student achievement and behavior were reported.

The effects of chronic noise exposure and reading skills were linked in a study by Maxwell and Evans (2000). In addition, their study of ninety 4- and 5-year-old children over a 2-year period, before and after sound absorbent panels were installed in the classroom, focused on the children’s attentional skills. Their study furthered research of the impact on important developmental processes related to both language acquisition and reading. The study demonstrated a link between interior chronic noise levels and prereading skills in preschool children. “Children’s use of, and understanding of, language is poorer in loud classrooms” (Maxwell & Evans, p. 6). Children also took longer to solve a challenging puzzle and were prone to induced helplessness and lack of persistence.
Chan (1996) studied the relationship between improvements in the physical environment and student achievement through his examination of seven studies conducted in the 1960s and 1970s. All seven studies considered building age as an independent variable. Two explored the relationship between building age and achievement across large samples of secondary schools. Three of the studies found a significant relationship between the building age and the students’ reading and verbal ability. In an earlier study of 189 Georgia middle school buildings, Chan (1979) found only 1% of the variance in student achievement attributable to school building age. From his study, he concluded that an educational program is successful to the degree that school facilities meet students’ instructional needs.

In addition to studying student performance and behavior, researchers have studied the relationship between student attitudes toward school and the quality of their learning environment. Cheng (1994) studied the relationship between student affective performance (feelings) and the physical conditions of the school and classroom, social climate, and management style in 190 elementary schools in Hong Kong. He developed an assessment instrument to measure 11 items in the physical environment of the classroom, including spacing, neatness, cleanliness, and lack of pollution. He found that students’ attitudes toward teachers and school were strongly correlated with the perceived quality of the physical environment. Furthermore, the perceptions of students were closely related to those of their teachers. The quality of the classroom related to nearly all the measures of student affective performance, except self-concept. Maintenance of the facility was also a significant factor in supporting students’ attitudes toward school and achievement.
The improvement in a school’s facilities has also been studied to determine its effects upon student achievement as well as parent and community involvement. Maxwell (1999) conducted multiple case studies of student performance from before, during, and after the renovation of several buildings in Syracuse, New York. By studying the changes that occur when improvements are made to the quality of several school facilities, Maxwell combined a nonparticipatory empirical action research model and a participatory diagnostic phase model that included observations, interviews, and student and teacher surveys. The state Pupil Exam Program (PEP) Test was used to measure student achievement over 5 years before the renovations and 5 years after, totaling between 11-12 years. Prior to the renovations, the students’ test scores had declined. More students were identified as receiving free or reduced lunch every day, a rough estimate of low SES. After the renovations, the tests scores showed a gradual increase each year in spite of increased low-SES numbers. Other positive effects were the increase in pride in the schools and participation on the part of parents in the PTA. Schools also increased their community interaction with evening computer classes.

Sanoff (1993) also conducted qualitative case studies of the planning of two elementary schools in Davidson, North Carolina, that focused on improving teacher instructional strategies to provide optimal learning. Interviews, walk through interview/evaluations, photo interviews, focus group meetings, and planning sessions were conducted to study the process of educating teachers to identify educational objectives for different grade levels and complementary teaching methods for achieving those objectives. Following interviews of 30 teachers, the architects conducted a walkthrough evaluation of existing two-story school buildings to reveal many negative
features of those building. Teachers also identified building features that were valued. Parents, staff, students, and teachers participated in large and small focus groups to clarify objectives for their learning environments inside and out to support student learning and innovative teaching methods.

To increase participation in the planning process, the school community members were provided design aids to increase their awareness of the relationship between the learning environment and the groups’ learning objectives: personalization of the learning environment, control of student movement, adequate meeting and social gathering spaces, and special flexibility for student activities and projects. The use of photographs in the focus groups helped the participants to envision classroom special settings and to explore a range of traditional and nontraditional learning environments, including the use of the outdoors for reading, art, eating, gardening, and other activities. This discovery influenced the building design by recommending outdoor learning areas be provided adjacent to classrooms, such as porches or courtyards. Another recommendation included designing a media center that could open to the outdoors. The group design process led teachers to explore instructional practices that would support team teaching and other ways to engage students in learning. The recommendations also included design features such as an atrium, bright colors, and outdoor learning environments.

Berner (1993) also studied the condition of public school buildings in the Washington, DC public school system and its relationship to parental involvement. In a quantitative study, she used a rating instrument to examine the school buildings’ conditions. Other data on student demographics, neighborhood characteristics, student enrollment, and parent involvement were analyzed with regression testing, and $F$ test and
Chi squares. The study showed that the size of a public school’s PTA budget was positively related to the school building’s condition. The condition, in turn, was shown to be significantly related to the student’s academic achievement. An improvement in the school’s condition by one category, such as from poor to fair, was associated with a 5.5 point improvement in the students’ average achievement scores. If a school were to improve its conditions from poor to excellent, there was an increase of 10.9 points in the average achievement scores. Increased PTA budgets also led to improved building conditions. “Good infrastructure is truly at the base of a quality education” (Berner, p. 28).

Earthman and Lemasters (2009) investigated the relationship between teacher attitudes about their classrooms and the condition of their classrooms when classrooms are independently assessed. Eleven school facilities identified as being in satisfactory condition were matched with 11 schools assessed as being in unsatisfactory condition. The teachers’ responses to the My Classroom Appraisal Protocol (MCAP) showed the responses of teachers in satisfactory buildings were significantly different from those of the teachers in unsatisfactory buildings. The physical teaching environment influenced the teachers’ attitudes, which in turn affects their performance. These effects also affect morale among the teaching staff.

In paired studies, Uline and Tschannen-Moran’s (2008) quantitative study and Uline et al.’s (2009) qualitative study, both explored the interplay of quality facilities, school climate, and student achievement. They examined the proposition that part of the explanation of the relationship between the quality of school facilities and student achievement may be the mediating influence of school climate. The quantitative research
method included a survey of teachers from 80 Virginia middle schools. The survey included the School Climate Index, a 7-item quality of school facilities scale, and three resource support items. Data on student SES and achievement were also gathered. A bivariate correlation analysis was used to explore the relationship between the quality of facilities, resource support, school climate, student SES, and student achievement. Results of the analysis of data from the teacher survey and student data confirmed a link between the quality of the school facilities and student achievement in English and mathematics. Quality facilities were positively related to three school climate variables, confirming the hypothesis that school climate plays a mediating role in the relationship between facility quality and student achievement.

The qualitative study conducted by Uline et al. (2009) built upon the results of the quantitative study, which had identified two high-poverty schools whose facility ratings were in the upper quartile of school facilities. The collective, instrumental case study design provided inquiry information from observations and interviews. The interviews included individual interviews, walk through and photo interviews, and focus group interviews. The results indicated that school climate helped to influence the interactions that took place among the school occupants, their environment, and their learning. The stories the occupants told helped to increase understanding of the students’ relationships within the school, building conditions, and the various ways in which design features helped to foster their sense of belonging, control, and competence within the learning environment.
Safety Standards

A high quality classroom, as described in the research by Lemasters (1997), is one perceived as being well equipped with appropriate physical facilities, space, and being neat, clean, and free of pollution. An essential factor in a school facility is the extent to which it meets health and safety standards for students and staff. Research has also been conducted to determine the relationship between health and safety conditions and student performance. Buckley, Schneider, and Shang (2004) studied the relationship between the extent the Los Angles Unified School District (LAUSD) complied with health and safety regulations and the academic performance of students on California’s Standardized Testing and Reporting (STAR) Program. All the LAUSD schools were evaluated on 14 measures of compliance: accident prevention, asbestos management, fire/life safety, campus security, chemical safety, pest management, lead management, restroom facilities (e.g., mold, supplies, and ventilation), indoor environment related to air quality, maintenance and repair, safe school plan, emergency preparedness including earthquake preparation, traffic and pedestrian safety, and lab science safety. These measures were combined to create an overall compliance rating (OCR) for each school. Then the OCR ratings and the schools’ Academic Performance Indicator (API) scores were compared using a multiplicative heteroscedastic regression model.

The study found the difference in a facility’s rating from the worst school condition to the best led to an average increase of 36 points on the school’s Academic Performance Indicator (API). The effect of health and safety compliance measures is about the same as that of a reduction in classroom enrollment. The researchers did not identify the specific elements of compliance that were linked to changes in student
achievement, but they did find that, “school buildings in poor shape lead to poor achievement” (Buckley et al., p. 5). Consistent enforcement of health and safety standards at every school may improve learning conditions that support instruction and convey a concern for every student’s health and welfare.

Design Patterns

Studies of the learning environment have included the special distribution of activities in classrooms. Weinstein (1977) conducted a study in a 2nd- and 3rd-grade open classroom before and after changes in the physical settings to understand the relationship between the classroom’s design and changes in the students’ behavior. A time-series analysis was conducted of 25 2nd- and 3rd-grade students in an open classroom which a teacher had divided into five curricular areas: mathematics, reading, games, art, and science. Observations were conducted six times per day at 25-minute intervals for 4 days, and a quantitative analysis of the observation data was conducted. The descriptive analysis of the post-change behavior from the data included one- and two-way frequency distributions for most of the variables. The study revealed that changes in the classroom design did influence how students behaved. Design also had a role in decreasing undesirable behavior. Weinstein recommended that teachers examine both the practical and symbolic ramifications of their classroom designs to ensure the learning environment and the curriculum are as compatible as possible.

Martin (2002) conducted mixed methods research on the design of the classroom environment and its effects on teacher practice. Data were gathered through observations of lessons and teacher interviews. A behavioral mapping technique was developed to study student and teacher movements in the classroom space. A total of 61 classroom
lessons in 12 schools were observed. A combination of lesson mapping, observations, and interviews were conducted. Because the study explored what teachers do in the classroom, identifying the relationships between teaching, activities, and the use of open space required a research instrument that mapped the teachers’ movements within the classroom. A map of the classroom layout of furniture and the students’ location was used to mark where the teacher moved during the lesson using line marks. The mapping process, a behavioral mapping, was used with the observation data to develop constructs that generated a series of trend relationships. The constructs were visually descriptive instruments of both how the teachers constructed their lessons and what areas of the room they used with that specific structure. They also provided a way to visually “see” a lesson. The cluster column, a series of horizontal bars representing the different classroom activities along a timeline, is a construct created by plotting time spent in each cluster activity during the lesson, informing what proportion of the lesson was spent in each cluster.

The interviews were analyzed to add further information to the constructs and to validate the results of the observation data. The observation data revealed that teacher-centered lessons occurred more often in classrooms with less space and a higher density of students. Child-centered lessons were observed in classrooms that had a high space per child. The “practical” subjects lent themselves to more child-centered activities. Academic classrooms tended to be more flexible than practical workspaces. Practical rooms require the use of fixed, wired, or plumbed equipment. The data also identified a link between the teacher’s satisfaction with the environment and his/her feelings of control. The unsatisfied teachers, those who changed the classroom arrangements, tended
to be child-centered teachers. Habitual ways of seeing and thinking about classrooms created an obstacle for seeing alternative possibilities.

Martin (2002) expressed a need for teachers to question their surroundings and to find solutions to meet student needs in how the classrooms are organized. He emphasized that teachers need to be aware of their relationship to their students and the learning environment, as well as the effects the classroom has on both the students and teachers. Martin concluded that professional teachers understand how the environment affects the students’ learning and how to use it effectively.

Tanner’s (2000) study of school facilities was one of the first to include the outdoor environment as an element of the school facility that might affect student achievement and behavior. Tanner studied 39 relevant design patterns at 44 elementary schools, and he found the following four patterns predicted achievement as measured on the Iowa Test of Basic Skills: technology for teachers, clearly defined pathways with freedom of movement, overall impression, and positive outdoor spaces. He concluded that the overall positive impression sends subtle messages of friendly student and teacher learning environments. He also surmised that because high quality school facilities support student achievement and positive attitudes about learning, they are an important aspect of education that should be included in any plan to improve student achievement and engagement in learning. Facilities maintenance and health standards convey a clear message of caring to students and staff, but are often overlooked as unrelated to helping dropouts stay in school. Because students have higher achievements when they have positive feelings about learning in a caring environment, a high quality learning
environment is an important factor in helping students stay engaged and on track for graduation.

Tanner (2008) investigated the effects of selected school design elements on 3rd grade students’ achievement from 24 elementary schools. The schools’ physical environments were defined in terms of four design patterns: movement and circulation (space and movement), large group meeting areas, daylight and views (natural light and windows), and instructional gathering spaces. Each of the four design patterns was positively related to student achievement measured by the ITBS. Learning facilities are viewed as a collection of environments that influence learning. Tanner (2009) further studied spaces where students learn to determine if they make a difference in how much students learn using the ITBS. His study of student test data of 5th grade students from 71 rural and suburban Georgia elementary schools indicated the importance of three classifications of school design patterns: movement and circulation, day light, and views. Movement and circulation show a significant effect upon student reading comprehension. The other two variables had little significant effect on reading. Daylight influenced variance in reading vocabulary and science scores. Classrooms with views (opportunity to see outside) influenced variance in reading vocabulary, language arts, and mathematics.

Gislason’s (2009) study of a senior high school’s open plan design positively contributed to the school climate. The students preferred the open plan campus design over a conventional classroom design because it facilitated social relationships with a larger number of peers, and they enjoyed their time better in the open-plan school. Included in the open-plan design study were the outdoor learning spaces on the grounds, which supported the environmental curriculum, as well as nurtured a pro-environmental
attitude through direct and sustained contact with nature. The students preferred learning in the naturalized environments over the heavily urbanized spaces. The study also presented a connection between natural and built environments, such as trees and parking lots, and the students’ association with them of emotional qualities, such as freedom and confinement. The physical setting reflected the students’ feelings about conventional school environment they perceived as confining and out of tune with the natural world. The students viewed their school as a “relatively calm, inspiring setting that fosters a reflective approach to observing and studying the natural environment” (Gislason, p. 31).

Studies of indoor and outdoor school facilities emphasize the great need for improvements to our current schools (Buckley et al., 2004; Lackney, 1996; Lemasters, 1997; Tanner, 2000, 2001, 2008, 2009; Taylor, 1993). Lackney conducted a qualitative action research case study of five elementary schools in the Baltimore City Public Schools. The case study involved collecting data through a physical survey, archival survey, observations, interviews, student and teacher surveys, and workshops. The research demonstrated that the experience of place can be described as a complex set of mutually interacting attributes of environmental quality. They are perceived by occupants of the school to have some relationship to educational outcomes such as student academic performance, student social development, and teacher instructional performance. Each school saw environmental quality attributes differently, including physical comfort and health, classroom adaptability, safety and security, building functionality, and aesthetics and appearance.

Taylor’s (1993) qualitative study of 16 cases revealed basic patterns for reform in school curriculum and facilities design illustrating the philosophical framework behind
the School Zone Model for participatory planning. These findings include the need for community members to develop design literacy for intelligent participation in the design process. In addition, her study revealed that the instructional delivery system of schools is changing. Taylor concluded that no longer should there be isolated classrooms located along double-sided corridors or students seated in rows.

Before schools are built, communities must initiate a programming and planning process that operates within the context of local concerns, that synthesizes thinking from multiple sources, that demands excellence, and that result in well designed spaces serving as visible expressions of community sensibility and culture. (Taylor, p. 60)

Taylor concluded the needs of the entire child’s development from academic needs to personal, emotional and social needs should be considered in the design process. “If we are to achieve the new visions of education, we must remodel current classrooms, design and build new schools and outdoor landscape laboratories . . . let’s produce optimal—not minimal—learning environments, ones that act as teaching tools” (Taylor, p. 41).

Currently, there is a backlog of billions of dollars in needed improvements. In planning future school development, researchers stress the need for child/student involvement in the planning process (Dyment, 2004; Sanoff, 1993; Stine, 1997; Taylor, 1993; Titman, 1994). Dyment conducted a qualitative case study of 45 schools in which 149 parents, teachers, and administrators were asked to complete questionnaires. Interviews of 21 of the participants revealed that students were involved in selected aspects of the outdoor landscape projects, notably in designing, planting, and maintenance. Her study provided recommendations to include student collaboration in the
planning process right from the beginning and to allow students more involvement and responsibility for the school garden.

Outdoor Learning Environments

Just as the indoor learning environment can affect how students learn, the outdoor landscape of playgrounds, meeting areas, plants, and environmental features has an impact upon how students learn, behave, develop personally, and gain a respect for the environment (Lieberman & Hoody, 1998; Sobol, 2004; Tanner, 2000; Titman, 1994). Many aging schools have neglected their outdoor landscape, tolerating weeds, broken playground equipment, and pitted asphalt play areas. The schools of the 1950s and 1960s were built with little or no planning or concern for how students related to their outdoor environments. Often these schools looked more like prisons with chain link fences surrounding vast asphalt play yards (Taylor, 1993). In addition to the outdoor environments being neglected at some schools, many students are finding their time outdoors has been curtailed. With more pressure for students to meet testing standards, recess time has been curtailed or eliminated in order to increase daily time on task, leaving students little or no time in the outdoors.

Organized sports, music lessons, and supervised activities have replaced the unstructured play time from a few years ago, and children spend less time outdoors learning about the environment on their own (Broda, 2007; D. Johnson, 1998; Sobol, 1996). In addition to helping children develop intellectually, children’s relationships to the outdoors help their physical, emotional, social, and spiritual development (J. Johnson, 2000). The outdoor learning environments of schools, when used as an instructional
facility, have the potential to help children to learn about their world, themselves, and their relationships to others and the environment itself (Sobol, 1996).

Titman’s (1994) qualitative study involved in-depth interviews of children in 12 schools in England and Wales to examine children’s attitudes and behaviors in relationship to their school grounds and how the grounds were managed. The study included the use of collage boards to help the children reveal the conclusions they drew about outdoor environments in general. Titman conducted interviews and surveys to explore the significance to children of particular elements or features of outdoor environments. Titman’s findings were that the schools’ grounds were symbolic to children of whether the school practiced what it preached about caring. Where school grounds were used for the formal as well as the informal curriculum, and the adults and children were involved together in outdoor activities, the children had the most positive responses. Students understood participation in terms of allowing their ownership of the school grounds. When they were involved in a meaningful way with the school grounds, they saw the grounds as “theirs.” Otherwise, the grounds belonged to the school or community. If there was negative evidence of physical caring for the grounds, such as litter, graffiti, vandalism, broken fences, and so forth, the children read these as signs that the school did not care about the environment or them. Titman’s study revealed the schools’ grounds, as part of the “Hidden Curriculum,” exerted considerable influence on the attitude and behavior of children in all schools (p. 76).

Another researcher who studied the relationship between student attitudes and outdoor learning, Rickinson (2004), conducted an action research of six English schools using case studies and surveys to study the process and ongoing reflections about the
collaborative design of landscape projects. Rickinson conducted case studies of different models of secondary school grounds development: the school council/student steering group model and the curriculum-based model. Rickinson’s methods of consultation with the students included video interviews, informal walking interviews, questionnaires, school observations, garden design software to visualize and evaluate designs for a school setting, and visual displays students created using magazine pictures. Consultation methods employed by Rickinson also provided feedback about the consultation process in relationship to how the methods engaged the students’ attention. When consulting students in the study, they learned it was important to provide a variety of methods to solicit student responses, involve every student in some way, use appropriate methods for the age of the student, treat every student with respect, insure a quick pace for the consultations, and provide clear understandings of the purpose and importance of the consultations. Rickinson’s annual evaluations of developments, progress, and impacts at each of the six-case study schools were conducted over 3 years and provided further information about the grounds improvement process.

Tanner (2000) further examined the relationship between a school’s design and its influence upon student behavior by extending that influence to student learning. Tanner conducted a quantitative study of 44 elementary schools in 13 contiguous school districts in Georgia to measure the environment through the assessment of design patterns. The students’ learning behavior was measured by a standardized test, the Iowa Test of Basic Skills (ITBS). One of the 39 design elements, outdoor learning environments, was included in the facility survey instrument and emerged as a significant design characteristic related to student achievement. A correlation analysis of the survey results
and students ITBS scores determined the relationships between the student achievement and the design elements. One of the four significant design elements was the presence of outdoor spaces, including outdoor classrooms.

Students attending schools with poorly designed and maintained outdoor spaces had lower ITBS scores. It is clear to me that positive outdoor spaces invite nature to blend with the school’s function and form. . . . A positive outdoor area gives a feeling that the school’s learning environments are “in harmony with nature.” A positive outdoor space may also be a “built” environment. (Tanner, 2000, p. 327)

Tanner (2000) noted from his school observations that schools “in harmony with nature tended to have students who earned high ITBS scores” (p. 327). He also noticed that low scoring schools also lacked any positive outdoor environments.

Tanner and Lackney’s study (2006) also revealed that outdoor spaces had a significant influence upon student achievement. This study examined various student populations from a sample of twenty-four rural elementary schools (K-6) with 11,500 students located in the west-central geographic region of the state of Georgia. One trained researcher visited all 24 schools to conduct the physical environment rating scale during 2-hour tours of each campus. All site visits were completed before the test data (ITBS scores) were obtained. Data were collected by school from the Georgia Department of Education: achievement data from the ITBS scores per school, number of students representing various ethnic groups, average length of teacher experience of teachers and their levels of training, the number of gifted students, and the approximate number of students on free or reduced cost lunches for the SES numbers.
Tanner and Lackney’s (2006) study showed that positive (i.e., well designed and maintained) outdoor spaces, invite nature to blend with the school’s function and form. Tanner and Lackney’s study revealed that outdoor settings are often a missed opportunity for learning and are a valuable resource for student learning. They advised creating protected learning areas that can be accessed year-round. “Learning environments should allow for a variety of learning activities and experiences not available indoors, such as nature trails, gardens, exploratoriums, fields, forested areas, ponds, and other natural learning settings” (Tanner & Lackney, p. 38). The study highlighted the importance of two kinds of outdoor spaces: transitional spaces, such as porches and decks between the indoors and outdoors in which learning activities may occur, and outdoor spaces, such as fields, ponds, and nature trails to provide learning activities and experiences.

The Education Development Center, Inc. and the Boston Schoolyard Funders Collaborative (2000) jointly developed a paper to consolidate existing research information on the impact of schoolyards and how they facilitate academic learning, cognitive development, environmental stewardship, and safety. The researchers conducted a qualitative study, reviewing the literature to determine characteristics that indicate a high performing schoolyard. Then the researchers conducted a survey of these indicators across a sample of 200 educators in four countries involved in schoolyard programs.

The research suggested six characteristics of high performing schoolyards, including a collaborative design process, multi-use outdoor facilities, activities integrated into the school’s curricula, as well as the curricula planning processes, and maintenance mechanisms for sustainability. The Initiative’s survey was designed to study these
characteristics with the experiences of educators engaged in outdoor learning programs. The surveys were sent to educators involved in schoolyard programs that published information or had been written about, had an Internet reference, or had been associated with any conference related to schoolyards. The recipients could respond online and were encouraged to share the survey with other schoolyard participants.

One hundred twelve respondents, mainly teachers and principals, representing four countries and 31 U.S. states and the District of Columbia, completed the surveys and rated their level of agreement with hypotheses about the benefits of well-designed schoolyards. The research revealed that most respondents strongly supported the six characteristics of a high quality schoolyard, responding between 82% and 99% in favor. From the respondents’ observations, well designed school ground programs appeared to make a big difference in academic performance and child development. Environmental education and science were subjects most frequently taught using outdoor learning environments, followed by math, art, language arts, and reading. Many of the programs used inquiry-based and hands-on instructional strategies. Gardens were the most commonly reported feature, and several sites reported having composting and recycling projects. The respondents recommended a rigorous study of evidence to validate a case to policy makers for increased investment in school ground activities.

Calling the practice of taking the class lesson outdoors, “schoolyard-enhanced learning,” Broda (2007) outlined why educators are motivated by the instructional benefits of schoolyard-enhanced learning, including that it is easy to reach, provides a wide range of topics, has no time limit, and introduces a fresh setting and variety to teaching and learning. Broda provided examples of pedagogical decisions to move the
instructional practices out of the classroom and onto the school grounds: learning to write a poem about one’s senses while sitting outside on a warm afternoon, estimating the heights of trees using indirect measurement techniques, and learning about perspective by drawing the school buildings and environment. The benefits of “schoolyard-enhanced” learning include concrete experiences to help clarify abstract concepts and motivation for the reluctant learner. Learning outdoors allows the students to experience the content in a natural setting. Students with different learning modalities also benefit because they often experience more tactile/kinesthetic learning when lessons are outdoors.

Outdoor learning goes beyond the study of science and is an instructional tool to enhance learning in a variety of ways. By moving beyond the four walls of a classroom, the outdoors can become a vehicle for teaching the traditional content areas of English, math, social studies, science, and the arts (Billmore et al., 1999; Broda, 2007). Outdoor learning also includes using the environment for school gardens, giving students direct contact with nature, and providing a living laboratory for exploring the cycles of nature (Billmore et al., 1999; Broda, 2007; Moore & Wong, 1997; Sobol, 1996). Gardens provide an immediate and direct connection to our food source, and they add to the aesthetics of a site as well as reinforce concepts such as responsibility, patience, and stewardship. They also give students a feeling of accomplishment as they develop an environmental ethic (Billmore et al., 1999; Broda, 2007).

Environmental Psychology and Outdoor Experiences

Environmental psychology studies have shown a link between one’s environment and cognitive functions. In a study of children residing in poor, urban environments, N. Wells (2000) found the nearby natural environment played a significant role in the
children’s attentional capacity and cognitive functioning. N. Wells conducted a quantitative study of the effects of “greenness” on children’s cognitive functioning when they were moved from an urban home environment with surrounding vegetation to a new home with more surrounding vegetation. Seventeen children participated in this study, nine boys and eight girls. They were ages 7-12, with six eight-year-olds. Of these, 76% of the children (13 of 17) came from female-headed single-parent households. The majority (65%) of the children was African American; the rest were White. They were from families who had low income and participated in a self-help housing program through which their families helped to construct and then purchase a new home. Six (35%) of the 17 families resided in public housing. The families were visited before they moved and again at least 4 months after their move to a new home out of the urban environment. A scaled measure of naturalness and attention deficit disorder evaluation scale (ADDES) were used pre- and post-move, and the data were compared. The study indicated that children who experienced the most improvement in the natural elements (i.e., moving to home surrounded by trees, lawns and vegetation) tended to have the greatest ability to direct their attention several months after moving to the new home. The results indicated a relationship between increased green space and vegetation around the home and community environment and a decrease in ADDES factors.

Hinds and Sparks (2007) studied the role of affective connection and identity with the natural environment of people who grew up in urban and rural environments. Experience of the natural environment may elicit positive environmental attitudes and behaviors, as well as facilitating positive psychological well being. The study included 199 students at the University of Sussex, UK who completed a questionnaire about
their childhood location, attitudes about engaging in the natural environment, and environmental identity. The results addressed the importance of the development of meaningful bonds with the natural environment during childhood. Participants from rural childhoods reported more positive affective connections, stronger identification, stronger behavioral intentions, and more positive attitudes about engaging with the natural environment than did participants who attended urban schools. The experience of the natural environment has an important role to play in the formation of positive affective relationships with it (Hinds & Sparks).

Other studies have examined the relationship of natural environment and restorative effects upon people. De Kort, Meijnders, Sponselee, and Ijsselsteijn (2006) conducted a quantitative study of how immersion in a simulated natural environment helped to reduce stress. The measures of stress were self-reported by participants, and physiological measurements of heart period and skin conductance (the level of conducted electricity) were taken throughout the study. Repeated measured analyses of variance (REMANOVA) were used to test the effects. Participants who were immersed in a simulated natural environment, such as they were surrounded by pictures of the outdoors or watched films of the outdoors, had lower hear rates and skin conductance levels. The research revealed that even in simulated natural environments, people experienced a reduction in stress.

Evans, Hygge, and Bullinger (1995) studied the psychological effects that chronic noise exposure has upon children. They focused on psychophysiological, cognitive, motivational, and affective processes in relation to chronic noise exposure among young children. They found a link between chronic noise exposure and physiological changes
that affected student achievement on standardized tests, poorer long-term memory, speech perception, and motivational qualities such as persistence. Students living near a major airport reported more annoyance and a lower quality of life than did children in quiet communities.

These studies have revealed the positive effects upon people’s physical, affective, and mental health from an association with the natural world. Students who were surrounded by a green environment of trees, bushes, and lawns showed an increase in attention to their class work and academic achievement. School leaders and facilities designers would benefit from these studies in order to create learning environments that support positive feelings toward schools and increased academic achievement. Additional studies about the relationship between school facilities and outdoor learning are in the following section.

California Student Assessment Project

The State Education and Environment Roundtable conducted a series of studies from 1998 to 2005, both quantitative and qualitative, to explore a range of successful outdoor learning programs. The initial study in 1998 examined schools from across the United States that had adopted the concepts and frameworks of Environment as an Integrating Context (EIC). Environment as an Integrating Context refers to a framework for education: “a framework for interdisciplinary, collaborative, student-centered, hands-on, and engaged learning” (Lieberman & Hoody, 1998, p. 1) in which the school’s surroundings and community are employed as a means to learn about academic subjects.

The 1998 study of the relationship between students engaged in EIC approaches and student achievement revealed students engaged in EIC approaches demonstrated
higher academic achievement. Environment as an Integration Context, also known as outdoor environmental education or “place-based education,” allows children to interact with nature while learning about science, conservation, and ecology. Student projects can include habitat restoration, ecology studies, and conservation projects to recycle and save natural resources. Lieberman and Hoody (1998) and Lieberman et al. (2000) reported on two detailed studies for the California State Education and Environment Roundtable (SEER) entitled *Closing the Gap: Using the Environment as an Integrating Context for Learning*. The first study conducted in 1998 focused on student achievement in relation to the use of outdoor learning. Their study of EIC programs included 40 schools from 13 states representing all grade levels (K-12). Interviews were undertaken with more than 400 students and 250 teaches and administrators in addition to four different surveys with educators. The researchers conducted comparative analyses of standardized test scores, student grade point averages, and attitudinal measures. The researchers found all “EIC programs generated enthusiastic and engaged learners—children who act more independently and responsibly than students in traditional educational settings” (Lieberman & Hoody, 1998, p. 19). Fourteen of the study schools conducted comparative analyses of data of students in EIC programs and traditional classes, and all 14 schools found that quantitative measure confirmed the academic benefits of EIC learning. Data showed students in EIC programs earned higher grade point averages, better standardized test scores, and had more positive behavior. In addition to better performance on standardized measures of academic achievement, the findings of the 40-school study showed the learning effects of EIC include reduced discipline and classroom management
problems, increased engagement and enthusiasm for learning, and greater pride and ownership in accomplishments.

The second study, conducted in 2000, was a quantitative and qualitative comparison of eight paired schools, one treated with EIC and another without an EIC Program. Achievement was evaluated based on the results of standardized tests: the Stanford Achievement Test (SAT), the California Test of Basic Skills (CTBS), and the California Achievement Test (CAT). Student grade point averages, attendance rates, were also used to measure student achievement. The qualitative programs were compared using an instrument developed by SEER consisting of 23 rubrics that assessed the status of school programs in relation to EIC’s principle characteristics. Both quantitative and qualitative studies showed students at schools involved in EIC instruction had higher achievement.

These two studies were followed by the California Student Assessment Project: Phase Two: The Effects on the Environment-Based Education on Student Achievement (2005) conducted by the State Education and Environmental Roundtable for the California Department of Education. This study revisited four of the matched school studies from 2000. Further data were gathered from the treatment and control pairs to provide a comparative analysis study of the effects of environment-based education on student achievement and attendance rates. This project was designed to determine if there were measurable changes in academic achievement, as indicated by standardized test scores for the students in the paired schools. The students’ test data from Standardized Testing and Reporting (STAR), student mobility data, second language student data, and the student socioeconomic data, were analyzed from the four matched schools in the 2000
study. Again, the schools that included EIC instructional programs had higher student achievement as measured from the state testing results and student engagement as measured by the student attendance rates. Today’s educational leaders would benefit from an understanding of this relationship between EIC instructional programs and higher student achievement to provide similar programs that will have a positive impact on student learning.

Qualitative Studies of Outdoor Environmental/Place-Based Learning Projects

The SEER quantitative research inspired the preparation of a set of case studies in 2000 of school programs from six states in *Environment-based Education: Creating High Performance Schools and Students* by The National Environmental Education & Training Foundation. Methodologies in these case studies included observations, interviews, and document study. The case studies also revealed increased improvements in student performance in reading, math, science, and social studies. In addition, students learned to “do science” rather than just “learn about science” (p. 4). Teachers reported that classroom discipline problems declined, and students performed at a high level, including students who had previously performed at a low level. The observed benefits of EIC included increased engagement and enthusiasm for learning, as well as greater pride and ownership in accomplishments. Some of the factors that influenced student achievement included creating smaller learning communities for more personalization of learning, integrated learning of science and other core subjects, and using the environment to integrate the curriculum. Students felt they had more control over their learning and this made them want to learn more. School leaders and teachers would benefit from an
understanding of the affective impact of these programs upon their students. Such strategies have a great potential to change students’ relationship to learning and their achievement.

Additional qualitative and quantitative studies indicated place-based education, in which students learn about the environment, helped to improve student engagement and/or achievement. In a project at Lely High School in Naples, Florida, Kerby and Egana (as cited in Grant & Littlejohn, 2001) brought several departments together to create a cross-country practice trail around a storm water pond located behind the football stadium. In this project students removed invasive plants, propagated native plants from cuttings and transplants, and learned mapping and GPS (global positioning system) skills in order to create new habitat areas. English teachers incorporated logistical and planning concerns related to the project into a unit on critical thinking. Students shared their project experiences in expository writing and stories. The case study of this project described the students’ interest and involvement in this and other projects, including a butterfly garden for students and the community.

Other studies of place-based education in Louisiana (Null, 2002) and Alaska (Loveland, 2003) have found a link to student achievement. Both of these place-based programs recommended expanding the experiences to all students, particularly at-risk students. In one project, the outdoor education program implemented by the East Feliciana Parish Schools, Louisiana, students and teachers participated in student-designed economic development projects and learned the skills of nature study and journaling. The project included participation by community and Americorps volunteers to build nature trails near three schools to provide access to creeks where students
monitor water quality and explore the natural environment. Student achievement was compared using the Louisiana Educational Assessment Program for the 21st Century. The achievement scores of the 4th grade students in the three schools increased 13% on the science portion of the assessment in 1 year, and they achieved the state average pass rate of 85%. One of the three schools in the district had a pass rate of 95%.

In the Loveland (2003) study, the Alaska Rural Systemic Initiative (AKRSI) collaborated with 20 of the 48 rural school districts in Alaska to implement initiatives that integrate student studies of the Alaska Native culture and the environment. Four years of norm-referenced math scores of eighth graders engaged in place-based education showed increased scores for schools that participated (Loveland, 2003). One of the principals involved in a place-based initiative noted, “The change in the attitude about school in the middle grades has been tremendous” (p. 3). In this study designed to address the school’s problem of students dropping out, teachers and community members developed a curriculum that included learning about subsistence activities that are part of the Native culture.

Place-based education provides the real-world context that is missing in strict adherence to textbook lessons and rote memorization (Yager, 2003). Yager conducted case studies of individual school programs involving outdoor environmental projects. He states,

There has never been a time when it is so clear that typical instruction wedded to textbooks and teacher lesson plans and characterized by discipline-bound classes throughout the school day must be changed. These conditions do not improve learning—they inhibit it. (p. 6)
Yager also recognized the importance of the situation in placed-based learning (i.e., real experiences, environmental problems, local issues) that invited students to engage in meaningful learning, something that was missing in a typical classroom-based program. Understanding and appreciating our environment is important today as students learn how to live in a global economy in which natural resources are becoming more scarce and threatened by global warming. Learning about conservation also helps children to protect and respect our natural environments and find answers to our environmental problems (Sobol, 1996).

Student participation in outdoor learning has been related to higher student achievement scores (Lieberman & Hoody, 1998; Loveland, 2003; Null, 2002; Tanner, 2000). These findings led researchers to recommend the creation of outdoor learning areas throughout the entire school (Billmore et al, 1999; Greenman, 1988; Techentin, 2002; Tanner, 2000; Wagner, 2000). One example of how the outdoor environment can be linked to the classroom is presented in the case study of a school planning process in which teachers first learn about how building design and outdoor learning can help to meet student learning objectives. Sanoff (1993) conducted an action-research qualitative study of the design process of a new elementary school planned for Davidson, North Carolina. The design process included an assessment process to determine objectives of what the teachers, parents, and students wanted in their school. The teachers were able to expand the physical characteristics of the education specifications to include the objectives for each grade level. “The opportunity to use the outdoors for a variety of different activities, for small or large group activities, for reading, art, eating, and gardening, expanded the teachers’ awareness of new opportunities for their new school
building” (Sanoff, p. 70). This discovery resulted in the addition of outdoor areas adjacent to each classroom, covered porches, and a variety of courtyard spaces. Understanding and implementation of this important learning environment improved the teachers’ instructional strategies and student learning. Today’s school leaders, engaged in continuous improvement of instructional practices, need to understand the influence of the learning environment, inside and outside the classroom, upon student engagement in learning and academic success. Leaders who create a vision of success for all students must also develop a vision for the learning facilities that will increase student engagement and the higher achievement they seek.

Summary

Research reveals that students absorb and retain math, science, and language arts better when they learn in their immediate environment and use all five senses (Lieberman & Hoody, 1998; Tanner, 2000, 2001, 2006, 2008, 2009; Tanner & Lackney, 2006). Because students are disengaged from learning (Alexander & Entwisle, 2001; Finn, 1989; Marks, 2000; Newmann, 1992) and a significant number of middle and high school students drop out every year (Laird, Kienzl, DeBell, & Chapman, 2007), there is a need to research every instructional practice that will improve student engagement and achievement. With the high cost to society from the millions of high school dropouts and the relative low cost for developing an outdoor learning environment, there is a financial incentive to learn more about the inexpensive instructional resource just outside the classroom door. Current research about outdoor learning lacks qualitative studies to understand how students engage in learning in an outdoor environment, and there is very little information about how teachers plan such lessons and why. There is no cost for
taking a classroom activity outside, and from quantitative research (Tanner, 2000, 2001, 2006, 2008, 2009; Tanner & Lackney, 2006) there is evidence such activities support increased student learning. How students engage in their learning while in the outdoor learning environment is the subject of my proposed qualitative study. The need to engage all students in meaningful, creative instruction is clear from current low achievement data. The call has been sounded “to use the most powerful audio-visual tool around—the outdoors” (Broda, 2007, p. 24).
CHAPTER 3—METHODOLOGY

The purpose of this study was to explore the relationship between student engagement in learning and the role school facilities play in supporting an engaging learning environment, particularly an outdoor learning environment. To better understand the relationship between student engagement and activities in outdoor learning spaces, the following questions were posed.

Primary Research Question:

• To what degree and in what manner are outdoor learning spaces associated with student engagement at the high school level?

Secondary Research Questions:

• To what extent and under what conditions do outdoor learning experiences encourage academic, behavioral, psychological, and social engagement on the part of students?

• In what ways do teachers and students leverage the qualities/elements of outdoor learning spaces to support teaching and learning in high school math, English, and science?

• How, and to what degree, do these learning spaces encourage a sense of motivation and enthusiasm on the part of teachers and students?

• Why do teachers choose to include outdoor learning activities in their instruction?

Research Design

the outdoor environment on school grounds was a significant influence on students’
academic achievement. Most of the research in the subject of outdoor learning has been
quantitative (Lieberman & Hoody, 1998; Tanner, 2000; Tanner & Lackney, 2006),
providing the statistical evidence of the relationship between student achievement and
interactions with the outdoors. However, very little qualitative research in this subject has
been conducted to understand what it means to be engaged in learning in an outdoor
setting.

Because the research questions involve examining “how” and “why” learning in
the outdoors affects student engagement, a qualitative case study research design would
better answer these questions (Yin, 2003). Qualitative research helps “us understand and
explain the meaning of social phenomena with as little disruption of the natural setting as
possible” (Merriam, 1998, p. 5). Through structured observations of student engagement
in lessons conducted in the outdoors, individual interviews, focus group interviews, and
document review, this research provided rich descriptions of the nature of outdoor
learning and how outdoor learning related to student engagement from the perspectives of
the student as well as the teacher. Within this natural context, the research was designed
to understand and explain this phenomenon of outdoor learning with as little disruption to
the learning activities as possible.

According to John Lofland (as cited in Patton, 1990, p. 32), there are four
people-oriented requirements in collecting qualitative data. The researcher must get close
enough to the people and situation studied to understand in depth the details of what is
happening, aim to capture what people actually say and do, provide detailed descriptions
of people, activities, interactions, and settings, and include direct quotations from people,
both from what they say and write. Qualitative data are “detailed, thick description” that provides in-depth inquiry with direct quotations to capture people’s personal perspectives and experiences (Patton, 1990, p. 40).

The case study design can offer an “in-depth understanding of the situation and meaning for those involved” (Merriam, 1998, p.19). According to the technical definition, as it relates to the scope of investigation, case study is a form of empirical inquiry that investigates contemporary phenomenon within its real-life context, the boundaries of which are not clearly evident. “You would use the case study method because you deliberately wanted to cover contextual conditions—believing that they might be highly pertinent to your phenomenon of study” (Yin, 2003, p. 13).

Qualitative studies, such as case studies, provide intense descriptions, not experiments to learn about a single variable. “The interest is in the process rather than the outcomes, in context rather than a specific variable, in discovery rather than confirmation” (Merriam, 1998, p. 19). The data collection and analysis strategies allowed for exploration of many more variables of interest than discrete points from multiple sources of evidence. Case study inquiry provided multiple sources of evidence that “converge” in a triangulation of data and “benefits from the prior development of theoretical propositions to guide data collection and analysis” (Yin, 2003, p. 14). The case study emphasizes the research question and is designed to “optimize understanding of the case rather than to generalize beyond it” (Stake, as cited in Denzin & Lincoln, p. 120). The case study gains credibility by triangulating the descriptions and interpretations. Thus, the analysis of the detailed collected data is critical. Case study
research focuses on what is common and what is particular about a case as it is observed in detail.

The case study research is strong in data, descriptions, and evidence of real events, but it does have its limitations. The strengths of case study research include a general ease of understanding methods, analysis, and findings; an ability to capture unique features that may otherwise be lost in larger scale data; and the provision of insights into other similar situations. Case study research can be undertaken by a single researcher, who is able to account for unanticipated events and variables (Cohen et al., 2000). Case studies are limited in their capacity to render generalizable results. They may not be open to cross-checking, and may be biased, personal, and subjective. Case study research must demonstrate reliability and validity, replacing quantity with quality and intensity. Instead of an emphasis upon frequency of data, case study research emphasizes significant data, “offering the researcher an insight into the real dynamics of situations and people” (Cohen et al., p. 185).

This case study research attempted to further describe and understand at-risk students’ engagement in learning taking place in the context of outdoor learning environments within four math, science, and English classes in one comprehensive high school in a large Southern California urban school district. The researched conducted formal observations of students in each class as they engaged in activities that took place outside the classroom on the school campus. In addition to class observations, individual interviews of teachers, photo interviews of a total of 14 students, and one focus group interview of 5 students provided rich sources of information that could help other educators to better understand student engagement, as well as teaching in the outdoor
environment. Document review of teachers’ lesson plans, as well as teacher interviews about their plans and pedagogical decisions, were conducted before and after the lesson study and student observations. This also provided information about how teachers plan their lessons, the purpose of their lesson designs, and how their lesson planning may have changed because of their experience as a participant in this research study of their students’ engagement in learning outside the classroom.

This qualitative research design studied the nature of engagement in learning through structured observations of students engaged in learning activities in the outdoor environment, as well as instrumental interviews with both students and teachers about their activities, their participation, and their feelings concerning learning outside the classroom walls. Observations within the natural context were structured in such a way to cause the least disruption to the subjects and enabled the researcher to provide meaningful description. Direct quotations from instrumental individual and focus group interviews provided rich details and direct quotations from participants.

The research design also provided a greater understanding of how students engaged in their learning, how they felt about engaging in lessons outside the classroom, and why teachers chose to conduct their lessons away from the classroom. It also provided information about what aspects of the outdoor environment influenced teachers to plan lessons away from the traditional classroom setting.

Research Study Background

The context of this study was a large urban high school with a diverse student population, many of whom are at risk of dropping out of school. The high school was focused on improving student achievement in its many desegregated student populations
seeking to meet targets set by its state Academic Performance Indicators (API) and those
set by national requirements of Adequate Yearly Progress (AYP) under No Child Left
Behind.

The high school also had the central communal area of the school, the quad,
landscaped in the past 2 years to provide more trees, lawns, plants, and manmade
structures for student seating, shade, space for learning activities, and access to a natural
environment. Other areas of the school also had lawns and trees planted to remediate the
damage done by construction to enlarge the library in 2005 and a science building in
1999. Some of the additional lawns were planted a few feet from the classroom doors
and ran parallel to the classroom buildings and walkways. A local landscape designer,
and parent, who studied students’ activities on campus, designed the landscape
improvements. The improvements were intended to provide a better environment for
students to meet, gather, and eat lunch, as well as to participate in lunchtime student
social activities organized by the school’s Associate Student Body. The resulting design,
constructed in fall 2007, includes a row of 12 large circular planters, plus four adjacent
planters where students can sit. These structures stretch north to south the length of the
cafeteria and performing arts building. Each planter has a large shade tree with blooming
agapanthus plants at the base. The central quad area has three large, separate lawns that
are of different shapes and are surrounded by seating areas, plants, and trees. The south
lawn is built on a gentle slope for viewing of quad activities. The center oval lawn is the
site of most activities, and the north area has a circular concrete stage surrounded by a
circular seating wall for student performances, communications, or musical events. A
very large tree stands at the south end of the oval lawn, with a number of additional trees shading the north area beyond the circular seating.

The school facility, built in 1968 at the height of the Baby Boom Era, is a series of five single-floor buildings laid out in rows down one side of the quad, with a gym at one end, the counseling and administrative offices at the other, and the cafeteria and performance buildings on the side opposite to the classroom rows. The buildings are plain boxes with little architectural features, except the school library that was extended from one of the classroom buildings to align with the central oval lawn. The library is faced with green and tan stone. The rest of the buildings are painted tan with a dark green fascia. The new landscape stands out when one enters the quad area because of the number of trees, colorful planters, seating areas, and green lawns. In contrast to the plain buildings, the landscape is inviting.

**Participant Observer**

The researcher was also the principal of the school being studied in this research, and thus, the study utilized the participant observer research model. With participant observation, the researcher experienced the setting through personal experience, observations, and discussions with participants about the experience (Patton, 1990). As a participant observer and school principal, the researcher had opportunities and easy access to observe in depth students and teachers engaged in outdoor learning activities. My role as observer was not unusual to the students or teachers, since I regularly observe and take notes. I had opportunities to hear students and teachers discuss their lessons, as well as to review teachers’ lesson plans and reflections upon the success of their lessons.
Participant observation is a research method employed for intensive field work in which the researcher is immersed in the culture or organization under study (Patton, 1990; Spradley, 1980). Yin (2003) defines participant-observation as a “special mode of observation in which you are not merely a passive observer.” [The researcher] “assumes roles within a case study and may actually participate in the events being studied” (pp. 93-34).

Participant observation provides an opportunity “to perceive reality from the viewpoint of someone ‘inside’ the case rather than external to it” (Yin, 2003, p. 94). It also helps to provide an “accurate” portrayal of a case study phenomenon. Being an observer participant allows the researcher to manipulate minor events, such as convening a meeting of a group of persons in the case study or gathering documents to review. This can assist in the research, but Yin warns that although manipulations will not be as precise as those in experiments, they “can produce a greater variety of situations for the purposes of collecting data” (p. 94).

According to Spradley (1980), the researcher as participant observer maintains a dual role: to observe the situation and to engage in activities appropriate to the situation. Spradley outlined the degrees of involvement/participation of the participant observer from the data collector to complete participation in which the researcher is an “ordinary participant” (p. 58). Table 1 presents the relationship between involvement and participation. As the school principal, the researcher has complete participation. As an observer who is watching specific participants and passively taking notes, the researcher did not participate in the experience and had a lower level of involvement. The students and teachers knew that the researcher was the principal. An additional researcher, not
related to the participants, conducted the recruiting of the students and teachers and provided the consent and assent forms for student and parent signature. The methodology was approved by the Institutional Review Board of San Diego State University. The student and teacher recruiter was a retired principal and doctoral student. The dissertation advisor provided an additional perspective during data analysis to increase the triangulation of data.

Table 1

*Degrees of Involvement*

<table>
<thead>
<tr>
<th>Degrees of involvement</th>
<th>Type of participation</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Complete</td>
</tr>
<tr>
<td>High</td>
<td>Active</td>
</tr>
<tr>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>Low</td>
<td>Passive</td>
</tr>
<tr>
<td>No involvement</td>
<td>Nonparticipation</td>
</tr>
</tbody>
</table>


The recruiter read a prepared script, approved by the Institutional Review Board, to ensure the participants were told the purpose of the study and were assured that the observations were not for evaluation purposes. Both the teachers and students were free to decline from participating at any time they wished. Providing participants a full disclosure of the purpose of the observations, helped to ensure the opportunity to opt out, and supplying a copy of research results upon request also helped to relieve participants’ worries regarding the purpose and results of the observations.
Population

The population selected for this study of student engagement is grade 9 and 10 students in an urban high school where outdoor learning is a frequent instructional practice. The urban unified school district is large and diverse in the metropolitan area of Southern California. The district’s community shares similar risk factors such as large populations of English learners, low SES, and immigrants new to the United States. Student graduation rates at many of the high schools vary from 2007 Cohort Graduation Rates of 52% to a high of 99% (California Department of Education, 2009). There is a need to better understand how these students engage in learning to increase the graduation rates in every high school.

Sample

The site where this study took place is located in a middle class community of an urban unified school district. The high school, Paul Revere High School, has a diverse student population of over 2,400 students, 800 of whom ride buses from lower income communities in the city. The ethnic make-up of the student body is 49% White, 8% African-American, 30% Hispanic, 13% Asian and other. Approximately 33% of the students apply for free and reduced price lunches, but there may be more students of low SES. This low percentage of participation in the free and reduced lunch program results in the school not receiving Title I funds to support these students. There are a variety of student programs, including: 8% English Learners, 13% Special Education, and 30% Gifted and Talented.

The researcher employed “purposeful sampling” to select the school, courses, teachers, and grade levels of students to observe and interview. Purposeful sampling of
participants can provide the rich information required for in-depth study (Patton, 1990). Participants who can provide rich information are those whose experiences, demographic descriptions, and opinions align with the researcher’s field of study increasing researcher’s opportunities to learn about the areas of the research. Patton also points out that there are no rules for sample size in qualitative inquiry. What is important is “the information-richness of the cases selected and the observational/analytical capabilities of the researcher” (p. 185).

The decision to study grade 9 and 10 at-risk students at Paul Revere High School was purposeful in order to provide rich information concerning students at the most critical age for risk factors associated with dropping out of school. Every September, the freshman class of Paul Revere High School begins with approximately 740 students, and approximately 480 students graduate in the senior year from this original cohort. Approximately 260 students leave the school over the 4 years, many of whom are placed in alternative or charter schools. These students have not stayed engaged in their learning and have earned low grades in their classes. In their 2009 Western Association of Schools and Colleges (WASC) Report, staff and community at Paul Revere High School recognized and identified the need to support students who are at risk of not graduating: English Learners, students in grade 9-10 math classes (Algebra Explorations, Geometry), all grade 10 students in general education classes (English, math, science, and social studies). With at least one-third of the freshman class leaving the school prior to graduation 4 years later, Paul Revere staff and parents acknowledge a need to improve student engagement and success in learning. There are approximately 260 students placed
at-risk of not graduating in each grade 9 and 10 class, providing a significant population of at-risk students from which to select the sample classes for this study.

The school selection for this study was also purposeful. In January 2008, Paul Revere High completed its landscape redevelopment of the main quad area adding lawns, plants, seating planters, seating walls, and shade trees. Lawns were planted between three buildings as well as near the science building where a number of shade trees already existed. All the work was completed in the 22 months prior to the start of the research study. Paul Revere High School was also selected for the case study because a number of teachers across the curricula frequently conduct lessons in the outdoors. Some of the teachers had conducted lessons outside the classroom prior to the landscape improvements, and many chose to take their classes outside when they observed other classes after the improvements were completed. The teachers selected to participate in this study come from the math, science, and English/ELD classes in which at risk students are enrolled.

A student placed at-risk of not graduating is any student who has the potential to leave high school before graduating with a diploma (Alexander & Entwisle, 2001; Finn, 1989; NCES, 2007; Newmann, 1989). The students in general education courses are often placed there because their test scores are at or below basic on the California Standards Tests (CSTs) or they have not earned high grades, A or B grades, in their previous coursework. Any grade 9 or 10 student in general education classes, particularly in math, science, and English, who has low standardized test scores (i.e., below or far below basic on the CSTs), is at risk of not passing classes or graduating from high school (Alexander & Entwisle, 2001; NCES, 2007). Students in grade 9 or 10 math, English, or science
classes would provide sample classes rich in opportunities to learn about at-risk student engagement.

The specific courses are Algebra Explorations 1-2, Geometry 1-2, Biology 1-2, and English 1-2. Algebra Explorations 1-2 is taught to grade 9 students who failed Algebra 1-2 in grade 8 in middle school. Geometry has both grade 9 and 10 students, and both math classes are taught by the same teacher. Biology 1-2 is the grade 10 science course, and English 1-2 is taught in grade 9. A few grade 11 or 12 students will be enrolled in the geometry or biology classes for different reasons, including attendance as a transfer student.

Each sample class has approximately 30-36 students who were randomly selected by the computer for each course. Students in Geometry 1-2 have previously taken Algebra 1-2 in grade 8 or Algebra Explorations 1-2 in grade 9. Students in Biology 1-2 took either Earth Science 1-2 or Physics 1-2 in grade 9. English 1-2 students took Grade 8 English in middle school, and may have redesignated ELD (English Learner Designated) students who took ESL (English as a Second Language) or ELD in grade 8. English Learner Designated or ESL students are placed in the math and science classes as part of the school’s inclusion program for English Learners. The ELD students’ language acquisition is classified from intermediate to advanced intermediate on their CELDT tests. They have not transitioned to Fluent English Speakers. The selected classes did not have special education students, who are placed in collaborative general education with special education supports. The four different classes from three different subject areas provided a diversity of outdoor curricular activities to be studied in a variety of outdoor locations.
Participants

Purposeful sampling is nonrandom sampling with the intention of selecting participants who will provide the greatest opportunity to learn (Merriam, 1988; Stake, 1995). For this study, the purposeful sampling extended to the selection of the teachers in this study. All the teachers in this study were selected based on the following criteria: (a) participants had at least 6 years of teaching experience, (b) participants had some experience in conducting class lessons outside the classroom, (c) participants were concerned not only about teaching the state standards, but also about how their students learn about the subject conceptually, (d) participants were confident teachers who think of students as learners, and they plan their lessons carefully to provide conceptual learning beyond the textbook and basic standards, (e) participants’ relationships with the principal were honest, candid, and open, and (f) participants welcomed the principal’s observations and were willing to be interviewed. The selected teachers and classes provided a gender-balanced sample of experienced teachers who provided cases rich in opportunities to learn about student engagement and student and teacher interaction with the outdoor environment. A chart of each course, grade, and teacher information, gender and experience, is presented in Table 2.

The student participants in this project included at least three grade 9 or 10 students from each of the four different classes. The choice of three students per class acknowledged the challenge of focused observation studies the researcher conducted at one time. Because of the range of participants’ achievement levels from newly transitioned English Learners to Advanced and Proficient levels on the state standardized tests, six students were selected. One did not attend or participate in that group.
Table 2

*Teacher and Course Description*

<table>
<thead>
<tr>
<th>Course</th>
<th>Grade level</th>
<th>Teacher experience</th>
<th>Teacher gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geometry 1-2</td>
<td>9-10</td>
<td>10 years</td>
<td>M</td>
</tr>
<tr>
<td>Algebra Ex. 1-2</td>
<td>9</td>
<td>10 years</td>
<td>M*</td>
</tr>
<tr>
<td>Biology 1-2</td>
<td>10</td>
<td>24+ years</td>
<td>M</td>
</tr>
<tr>
<td>English 1-2</td>
<td>10</td>
<td>15+ years</td>
<td>F</td>
</tr>
</tbody>
</table>

*Same teacher teaches Geometry 1-2.

The research assistant, who is also a doctoral student, conducted the recruiting.

The recruiter met with the teachers and students to ensure there was no undue influence by the researcher because the researcher is the principal of the school. The recruiter read a script approved by the San Diego State University Institutional Review board that outlined the researcher’s purpose for the study, the expectations of the participants, what would be observed, the interviews, and assurances that any participant could choose to discontinue participation at any time. The recruiter returned once to help collect the student consent and assent forms. The student participants in grade 9 or 10 were selected because these are the years when students are most at risk of failing classes and dropping out of school (Alexander & Entwisle, 2001). In addition, five grade 9 or 10 students from the study classes were selected to participate in a focus-group interview. All students involved in the photo interviews or focus group interviews first completed signed parent consent and student assent forms prior to data collection in agreement with the university’s Institutional Review Board directions. These students were also provided a single-use camera and instruction in its use.
Data Collection

The data were collected during December 2009 through February 2010. Five sources of data informed this study, including (a) observations of the students engaged in learning in an outdoor environment, (b) student interviews with the aid of photographs each had taken of his/her learning activities, (c) student focus group interviews, (d) teacher interviews before and after the lesson observations and student interviews, and (e) document review of teacher lesson plans and instructional materials before and after the lesson observations and student interviews. Photos taken by the researcher during the study as well as student photos also provided a visual picture of each of the observed lessons. By conducting multiple information gathering activities, the researcher collected substantial material to triangulate the findings (Denzin, 1970, as cited in Denzin & Lincoln, 2008; Merriam, 1988; Patton, 1990; Stake, 1995). Each method revealed “different aspects of reality” (Patton, 1990, p. 187).

Triangulation is an important way to strengthen a study design (Patton, 1990). The use of triangulation in case study is a useful technique that supports more valid and reliable data (Cohen et al., 2000; Patton, 1987). Four types of triangulation identified by Denzin (as cited in Patton, 1990) were included in this study design: data triangulation, investigator triangulation, theory triangulation, and methodological triangulation. Data triangulation provided multiple data sources; investigator provided for multiple researchers or evaluators; theory triangulation incorporated multiple perspectives to interpret a set of data; and methodological triangulation provided multiple methods of a study. Data and methodological triangulation resulted from different data collected from the multiple observations of multiple kinds of classes and lessons by multiple researchers.
The mixing of the purposeful samples and inclusion of multiple perspectives also supported triangulation within a qualitative study to provide credible data (Patton, 1990).

In addition to the methodological triangulation, the growing base of theories concerning the influence of facilities, outdoor learning experiences, environmental psychology, and student engagement converged in this study. Studies of each of these theories provided evidence of positive influences upon student learning and achievement. School facilities that are bright, well equipped, and maintained provide a positive learning environment that relate to higher student achievement (Tanner, 2000, 2001, 2008, 2009). Students engaged in outdoor education activities also have shown higher academic achievement (Lieberman & Hoody, 1998). Students who live in neighborhoods rich in green landscape also show higher levels of academic achievement (N. Wells, 2000). Student engagement is also related to higher student achievement (Finn & Voelkl, 1993). Triangulating these theories in this study provided a credible reason for studying how and why students and teachers engage in learning outside the classroom.

Observational Data

Observational data describe the setting, the activities that take place in the setting, and the people who participate in the activities (Patton, 1990). The goal is to allow the “reader to enter into and understand the situation described” (Patton, p. 202). The understanding comes from detailed observations that help establish understanding of the observed activities and the impact of the activities on the participants. The components of “thick descriptions” involve recording enough details to help recreate the scene observed, including speech acts, nonverbal communications, and records of time and timing of events, observer’s comments, and detailed contextual data (Carspecken, as
cited in Cohen et al., 2000). Observational field notes are quick, fragmentary jottings, transcriptions, a comprehensive and comprehensible account, reconstructions of conversations, descriptions of physical settings of events, descriptions of events, behavior, and activities, and descriptions of the researcher’s activities and behavior (Spradley, as cited in Cohen et al.).

To increase the reliability of observational data, it is a common procedure to have more than one observer involved in the observations. More people will help to maintain unbiased evidence (Yin, 2003). During observations of outdoor lessons and students, the researcher and classroom teacher participated in the process. Observations of the students in this study, engaged in instructional activities, included examining student behaviors to determine the students’ level of engagement in the learning. Engagement included the student’s attention, listening, participation in the activity, following directions, and completing the assignment neatly and carefully (Norris, Pignal, & Lipps, 2003). The students were studied specifically for differences in participation and the influences on their engagement in outdoor learning activities. An observation form (Appendix A) with specific, identified engagement behaviors and activity descriptions helped to provide a systemic method of recording observations with space for field notes. Additional field notes were recorded immediately after each observation. The observation instrument is further detailed in the Instrumentation section.

Observations of three to five students from four classes (a total of 14 students) participating in three different instructional outdoor activities per class (a total of at least 12 classes) during fall and winter of 2009-2010 provided a variety of outdoor learning activities and meaningful descriptions of the selected students’ behaviors and engagement
in learning. (At least one additional class lesson was observed after the formal
observations to further validate data already collected.) Each outdoor learning activity
lasted 15-55 minutes. The participating students were randomly selected from those who
volunteered to participate in the research and who returned both their parent consent form
and their own assent form to participate.

Interviews

The purpose of interviews was to gain an understanding of what the participants
were thinking. “We interview people to find out from them those things we cannot
directly observe” (Patton, 1990, p. 278). Because we cannot observe everything or see
how the participants understand their world, we need to ask to gain this explicit insight
into their thinking and perspectives (Patton). Interviews help participants to express how
they interpret situations from their own point of view (Cohen et al., 2000). Interviews
were tape recorded and transcribed to provide written reference for coding and analysis.
All participants were informed verbally before the study began, and on the consent and
assent forms, that their interviews would be recorded.

After the student observations were completed, interviews of each of the 14
students (10 individual interviews and 5 students in the focus group interview, with 1
student participating in both interviews to be a student leader in the focus group) provided
a rich understanding of their feelings and opinions concerning learning in the outdoor
context and their relationship to the natural environment. To help the students remember
their outdoor lessons, they were given a disposable camera prior to each outdoor activity
observation to take photos of the outdoor activities. An introductory session was held on
a separate day before the observations began to familiarize the students with how to use
the cameras. Each student was also told to take about 9-10 photographs per outdoor lesson. Each camera was labeled with the student’s name, and each class’s cameras were kept in a resealable plastic bag. After the three observations of each student were finished, the photos were developed before each of the students was interviewed, so each student reviewed the outdoor activities prior to the interview. The photos provided a visual representation of the outdoor activity and what each student felt was significant about that activity. The photos also helped the students to remember the details of activities and to provide a reference and resource for them to reflect upon their experiences in outdoor learning (Patton, 1990).

The interviews followed a partial structured and unstructured design. The students were given time to sort their photographs into groups that helped them explain what was significant about the outdoor learning activity. The structured portion of the interview was one in which the content and procedure were organized in advance (Cohen et al., 2000). The wording and sequence of questions were determined in advance. A benefit of a structured open-ended interview is that the respondents answer the same questions, which increases the degree to which the responses can be compared. This also reduced the effects of the interviewer bias and also facilitated the organization and analysis of the interview data. The inclusion of unstructured questions increased the relevance of the questions and helped to match the interview to the individual. It also allowed the interview to be “built on and emerge from observations” (Patton, 1990, pp. 288-289). The interview instrument (Appendix B) with structured and unstructured questions captured the students’ feelings, attitudes, and reflections about their learning experiences in an outdoor environment. The interview protocols were similar for each participant, and the
questions aligned with the research questions. The instrument is described and presented in the Instrumentation section.

Interviews of the teachers provided further understanding of their diverse activities, their opinions about learning in the outdoor context and their relationships to the natural environment, and how their lesson planning process may have changed during the course of this study. A set list of structured and unstructured questions were used to interview the teachers to understand their reasons for selecting an outdoor learning environment, designing the particular lesson plan, and supporting student engagement in the learning. A focus on the post-observation interview was on how the teachers’ thinking about student learning may have changed because of their experiences in conducting their lessons outside and/or because of their experience in this research process. The first teacher interview took place before any communication about this research project was made with the teachers’ students, and the interview acted as a baseline in studying any changes in the teachers’ lesson planning process, pedagogical decisions, and understanding of student engagement in learning. The interview protocol and questions (see Appendix C) were also aligned to the research questions.

Student Focus Group Interviews

In addition to the individual student interviews, a focus group interview of five students was conducted to gain the students’ collective opinions and thoughts about their experiences of learning in the outdoors. Focus group interviews rely upon the interaction of the participants within the group and not with the interviewer (Cohen et al., 2000). Participants, focused on a topic,
will yield insights that might not otherwise have been available in a straightforward interview; they are economical on time, producing a large amount of data in a short period of time, but they tend to produce less data than interviews with the same number of individuals on a one-to-one basis. (Morgan, as cited in Cohen et al., 2000, p. 288).

The student participants in the focus group interview, one or two from each class, for a total of five students, were also selected randomly from the group of 14 who volunteered to participate in the research and who returned both their parent consent form and their own assent form to participate in the study. Ten students were interviewed individually, and one student participated in both the individual and focus group interview, acting as a student leader for the focus group interview. The focus group interview students were selected from the sample group of students who were part of the observations. The focus group students also had a structured list of open-ended questions, aligned to the research questions, to help generate a discussion of their reflections, feelings, and attitudes about learning in an outdoor environment. The focus group had one student who undertook a leadership role in having the students take turns asking the questions and facilitating the discussion, so the researcher was just an observer listening and recording the students’ discussion. The focus group questions and interview protocols (Appendix D) are also aligned to the research questions.

Document Review

Program records and documents constitute another rich source of information (Patton, 1990). Documents serve as a basic source of information “about program
decisions and background, or activities and processes,” and they give the researcher ideas “about important questions to pursue through more direct observations and interviewing” (Patton, p. 233). Through careful study of the teachers’ written lesson plans before and after the lesson observations, rich information was gained about their planning process, use of the outdoor learning environment, and outcomes expected of the students during the activity. The teachers verbally described their lessons prior to the lesson observations, and later they provided their written lesson plans. The teachers’ lessons were discussed in detail during the interviews.

In addition to the lesson plans, the student and research photographs provided a source of information about what was significant to the students when they participated in their outdoor activities.

Instrumentation

Observations

The observation instrument’s principal components were a combination of engagement behaviors identified from research by Newmann (1992) and Norris et al., (2003). The latter research based the student engagement behaviors on those identified in The National Longitudinal Survey of Children and Youth (NLSCY), a study initiated in 1994-1995 by the Human Resources Development Canada and Statistics Canada. Two of the identified engagement behaviors were modified to include quality discourse among the students and level of interest student shows while participating in the activity. Both of these items were identified in Newmann’s (1992) study. These identified student behaviors were included in the observation instrument behaviors to increase the validity of the instrument. The observation instrument provided a matrix on which to note the
level of particular engagement behaviors and a description of the activity, outdoor environment, and any built structures. All student names were coded to protect the students’ identity.

The observation instrument was field tested by observing five students in a class to determine its validity. The students who participated were not a part of the study. A different class from those in the study was selected for the field test (see Appendix A, the Observation Protocol).

The individual interviews took place indoors because of weather conditions. The students were able to review their photos to help them remember their class lessons and the outdoor environment within which they participated. The focus group interview was conducted outdoors in the covered lunch area, and the students were in close proximity to a large lawn that helped them to remember the outdoor environment they were engaged in and to express their ideas and feelings about outdoor learning.

Interviews

The interview protocol used for the students, teachers, and focus groups was designed to align the questions with this study’s research questions. Table 3 presents the relationship between the research questions and the interview questions of each sample group. One way of controlling for reliability is to have a highly structured interview (Cohen et al., 2000). The interview protocols provided the same structured questions, in the same order, and allowed for open-ended questions for participants to share their own opinions and understanding of their experiences (see Appendices B, C, D, and E).
Table 3

*Research Interview Questions*

<table>
<thead>
<tr>
<th>Research question</th>
<th>Student interview questions</th>
<th>Teacher interview questions</th>
<th>Focus group questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>How is outdoor learning associated with student engagement?</td>
<td>1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 14</td>
<td>1, 2, 3, 4, 5, 6, 7, 8</td>
<td>1, 2</td>
</tr>
<tr>
<td>How do teachers and students leverage outdoor learning spaces to support math,</td>
<td>10, 11, 12, 13, 14</td>
<td>7, 8, 9, 15</td>
<td>2, 8</td>
</tr>
<tr>
<td>English &amp; science?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How do outdoor learning spaces motivate students and create enthusiasm by teachers and students?</td>
<td>12, 13, 15, 16, 20, 21, 22, 23</td>
<td>6, 7</td>
<td>3, 6</td>
</tr>
<tr>
<td>Why do teachers choose outdoor learning activities?</td>
<td></td>
<td>1, 2, 3, 4, 5, 6, 7, 8, 10, 14</td>
<td>3, 5</td>
</tr>
</tbody>
</table>

Ethical Issues

Ethical concerns arise from qualitative study because the methods are highly personal and interpersonal (Patton, 1990). Interviews are interventions because they help participants to reflect upon their thoughts, feelings, and knowledge, which is an intervention in itself that affects people. Some ethical issues to be recognized and addressed include promises and reciprocity. The researcher had to be careful when asking teachers and students to participate because of her role as an authority figure at the school. Patton advises not to make any promises, even promises to copy the report, because every promise must be kept.
Providing a risk assessment is also recommended (Patton, 1990). Are there any psychological stresses, legal liabilities, ostracism by peers or others, or political repercussions? Because class observations are a common practice and teachers monitor their students’ behavior, there is little risk of increased stress or other risk factors. Ensuring student safety is primary on the teachers’ planning requirements, and safety will be addressed in all lesson plans and activities. A risk assessment was completed as part of the San Diego State University Institutional Review Board certification process.

Confidentiality of data collected from the observations and interviews will be maintained. All participants were informed that their names would be changed as part of the coding process, so their confidentiality would be maintained. Informed consent involved full review by the San Diego State University’s Behavioral and Science Review Board as part of the Institutional Review Board certification process. Review of the research methodology and informed consent process was also conducted by the school district. The use of pseudonyms helped to maintain anonymity for both the teachers and students.

The researcher’s advisor was available to advise and counsel the researcher if any unforeseen ethical concerns arose during the study. Maintaining a positive relationship with all participants and the ongoing communications with the research advisor helped to establish an objective relationship between the researcher and participants. No ethical unforeseen issues arose during this research study.

Credibility in qualitative methods “hinges to a great extent on the skill, competence, and rigor of the person doing fieldwork” (Patton, 1990, p. 14). To provide strong credibility of results of this research study, procedures were implemented to reduce
subjectivity and bias: prolonged engagement, triangulation, member checking, and peer examinations, all reduced the possibility of researcher’s bias (Merriam, 1998).

Prolonged engagement results from the extensive time during the winter semester that the researcher was engaged in the observation and interview processes. At least one informal observation took place after the formal observations were completed. In the fall, at least one informal observation of each class, without any observation of specific students, took place to see where the classes were located and the kind of lessons taught be the teacher. Triangulation involves using multiple investigators, sources of data, and methods (Merriam, 1998). This study also included a peer researcher who conducted the recruitment of the students and teachers. Multiple sources of data also included document review. Member checking involved taking data and tentative interpretations back to the “people from whom they were derived and asking them if the results are plausible” (Merriam, 1998, p. 204). Part of the data analysis involved time to take data and tentative interpretations back to the teachers to ask if the patterns that emerged and results were plausible. Peer debriefing involved reviewing data and analysis with an impartial researcher, such as the peer researcher and advisor. Reviewing the data collection processes and data collected helped to clarify the patterns that emerged during the study, and this was conducted at least twice during the data collection process. Clarifying the researcher’s assumptions and theory behind the study at the beginning of the study helped to make the researcher’s views and purpose transparent. The researcher’s interest and background in the topic of outdoor learning was clarified earlier in this methodology chapter.
Data Analysis

Data analysis is the process of reviewing and summarizing the data, cross-checking and looking for patterns, and finally, drawing conclusions (Dewalt & Dewalt, 2002). The challenge of data analysis is how to make sense of all the data, reduce it to significant patterns, and construct a framework to articulate the essence of what the data reveal (Patton, 1990). Patton breaks the analysis process into three phases: description, interpretation, and reporting. The first task of analysis is description, “thick description” according to Denzin and Lincoln (2008). In organizing the analysis, the researcher reviewed the questions that were generated during the conceptual phase of the study and “analytic insights that emerge during data collection” (Patton, 1990, p. 378).

Case study data included all the information collected from the observations, interviews, and document reviews (Patton, 1990). The data analysis process included the coding of information and organizing it with word processing software. The data were hand coded. Patton recommends every interview be coded by two independent coders. The analysis process began by assembling the case data, then constructing a case record, and finally writing a case narrative (Patton, 1990). Merriam (1998) recommends a constant comparative method in which the researcher compares one incident with another.

This researcher wrote thick description of the data collected and used inductive analysis of the data to allow patterns, themes, and categories to emerge. The interviews were coded to identify significant concepts. The strength of qualitative research lies in its detailed focus, providing considerable information about a few people and cases (Cohen et al., 2000). The details from the observations, interviews, and document review
provided the details for the thick description. Once these tasks of organizing and
describing the data are completed, then it is time to consider the causes, consequences,
and relationships (Patton, 1990). The researcher used inductive analysis to examine
for patterns, themes, and categories that helped to answer the research questions.

Strategies for analyzing interviews included writing a case study of each person
and focus group interviewed. Then cross-case and cross-interview analyses for each
question were conducted. Feedback is another useful strategy during the process of
ongoing thinking about the research (Patton, 1990). Feedback from the teachers helped in
the analysis of qualitative data as the researcher was reviewing notes, organizing the data,
checking for patterns against the data, cross-checking data sources and findings, and
making connections among the various findings. An outcome matrix can be particularly
effective in organizing data and determining the linkage between processes and outcomes.
The outcome matrix can help to articulate the processes and impacts when either or
both are unspecified (Patton). An outcome matrix that identified the level of student
engagement in outdoor activities and the influence of the outdoor environment for each
class was completed and will be discussed in Chapter 4. In addition, combining all the
answers to each question asked helped to provide the diversity of responses to each
question. The significance of students’ ideas stood out when a number of them responded
either in the same way or in completely different ways. The analysis of student and
teacher responses, when taken as a whole, helped to inform the data analysis. This also
helped to develop the linkages between student and teacher relationships to the outdoor
learning environment and how they each perceived the level of student engagement in
learning.
The interpretation of the data examined the causes, consequences, and relationships among the elements of the outcome matrix. The interpretation process includes determining significant linkages, relationships, and meanings from the data analysis. “Thick description sets up and makes possible interpretation” (Patton, 2000, p. 430). Description helps to balance analysis and interpretation. A sufficient amount of each is important, so sufficient analysis will result in sufficient interpretation. Ongoing analysis, by the researcher and advisor along with triangulation of linkages, relationships, and meanings gathered from the data, helped to add credibility in the findings.

Summary Statements

This study triangulated data across direct observations of students and multiple forms of interviews. Thus, the study produced rich data to analyze for better understanding the extent to which, and in what ways, students are affected by taking the learning outside, as well as how teachers plan the outdoor learning activities. The students revealed much about their thoughts and feelings of engagement and disengagement in the learning environment. The teachers also revealed how their pedagogical decisions about lesson planning developed during the study experiences as they conducted their lessons outdoors. The results provided insights about physical learning environments for school leaders and school planners as they develop school facilities and a vision to improve academic achievement for all students.
CHAPTER 4—RESEARCH FINDINGS

Chapter 3 provided a detailed explanation of the research methods employed to explore the relationship between student engagement and the outdoor learning environment. This study included observations of 12 class lessons conducted outside the classroom, interviews of 14 students individually and as a group, and teacher interviews before and after the observations. The students also took photographs of their outdoor lessons to record the activity for later discussions and to provide a visual record of their experience. A document review of teacher lesson plans was also conducted. The research questions this study addressed are as follows:

**Primary Research Question:**
- To what degree and in what manner are outdoor learning spaces associated with student engagement at the high school level?

**Secondary Research Questions:**
- To what extent and under what conditions do outdoor learning experiences encourage academic, behavioral, psychological, and social engagement on the part of students?
- In what ways do teachers and students leverage the qualities/elements of outdoor learning spaces to support teaching and learning in high school math, English, and science?
- How, and to what degree, do these learning spaces encourage a sense of motivation and enthusiasm on the part of teachers and students?
- Why do teachers choose to include outdoor learning activities in their instruction?
Chapter 4 begins with the student, teacher, and class profiles to provide a detailed background of the participants and class lessons observed and studied. A presentation of the data follows, including data from interviews with the participants, observations, and documents to support the concepts presented. The data presentation begins, first with a discussion of the significant findings about the relationship between outdoor learning experiences and student academic, behavioral, psychological, and social engagement. Then, the discussion moves to the effects of outdoor learning by subject upon the students, how teachers and students leverage outdoor learning experiences, and what kinds of support encourages the use of outdoor instruction.

Student, Teacher, and Class Profiles

Student Profiles

The students selected to participate in the research classes were a diverse group, academically and ethnically. See Table 4 for student profiles and their achievement by grades and standards testing. The participating students were those who returned completed student consent and parent assent forms to the collection box in the identified teacher’s classroom. Nine students were in grade 9, three in grade 10, one in grade 11, and one in grade 12. The 11th grade student was an English Learner who was repeating Geometry 1-2. The 12th grade student transferred to the school and needed to take biology to graduate. The group, comprised mainly of 9th and 10th grade students, represented those most likely to be at risk of not graduating (Alexander & Entwisle, 2001). Nine students were males, and five were female. Pseudonyms are applied throughout.
### Table 4

**Student Profiles**

<table>
<thead>
<tr>
<th>Student name</th>
<th>Ethnicity</th>
<th>Gender</th>
<th>Class period</th>
<th>Teacher</th>
<th>Course</th>
<th>Grade</th>
<th>GPA</th>
<th>California Standards Test*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mia</td>
<td>Hispanic</td>
<td>F</td>
<td>4</td>
<td>S</td>
<td>Geometry</td>
<td>10</td>
<td>1.83</td>
<td>B/FB/B</td>
</tr>
<tr>
<td>Kia</td>
<td>Hispanic</td>
<td>F</td>
<td>4</td>
<td>S</td>
<td>Geometry</td>
<td>11</td>
<td>1.40</td>
<td>Early Adv./Intermediate (EL)</td>
</tr>
<tr>
<td>Art</td>
<td>White</td>
<td>M</td>
<td>4</td>
<td>S</td>
<td>Geometry</td>
<td>9</td>
<td>4.00</td>
<td>n/a</td>
</tr>
<tr>
<td>Jeff</td>
<td>White</td>
<td>M</td>
<td>4</td>
<td>S</td>
<td>Geometry</td>
<td>9</td>
<td>1.67</td>
<td>B/B/B</td>
</tr>
<tr>
<td>Al</td>
<td>Hispanic</td>
<td>M</td>
<td>5</td>
<td>S</td>
<td>Alg. Ex.</td>
<td>9</td>
<td>1.67</td>
<td>B/B/B</td>
</tr>
<tr>
<td>Sue</td>
<td>White</td>
<td>F</td>
<td>5</td>
<td>S</td>
<td>Alg. Ex.</td>
<td>9</td>
<td>3.33</td>
<td>n/a</td>
</tr>
<tr>
<td>Alexa</td>
<td>Hispanic</td>
<td>F</td>
<td>5</td>
<td>S</td>
<td>Alg. Ex.</td>
<td>9</td>
<td>1.83</td>
<td>Early Adv./B/B/B/BB (EL)</td>
</tr>
<tr>
<td>n/a</td>
<td></td>
<td>M</td>
<td>4</td>
<td>T</td>
<td>Biology</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Don</td>
<td>White</td>
<td>M</td>
<td>4</td>
<td>T</td>
<td>Biology</td>
<td>12</td>
<td>3.50</td>
<td>n/a</td>
</tr>
<tr>
<td>Dave</td>
<td>White</td>
<td>M</td>
<td>4</td>
<td>T</td>
<td>Biology</td>
<td>10</td>
<td>2.83</td>
<td>A/B/A</td>
</tr>
<tr>
<td>Rick</td>
<td>White</td>
<td>M</td>
<td>5</td>
<td>K</td>
<td>English</td>
<td>9</td>
<td>3.00</td>
<td>A/P/A/P</td>
</tr>
<tr>
<td>Ron</td>
<td>White</td>
<td>M</td>
<td>5</td>
<td>K</td>
<td>English</td>
<td>9</td>
<td>3.67</td>
<td>B/B/B/P</td>
</tr>
<tr>
<td>Roy</td>
<td>Asian</td>
<td>M</td>
<td>5</td>
<td>K</td>
<td>English</td>
<td>9</td>
<td>2.83</td>
<td>Advanced (EL)</td>
</tr>
<tr>
<td>Riley</td>
<td>White</td>
<td>F</td>
<td>5</td>
<td>K</td>
<td>English</td>
<td>9</td>
<td>3.17</td>
<td>B/B/B/P</td>
</tr>
<tr>
<td>Rob</td>
<td>Hispanic</td>
<td>M</td>
<td>5</td>
<td>K</td>
<td>English</td>
<td>9</td>
<td>2.50</td>
<td>P/BB/P/A Redesignated EL</td>
</tr>
<tr>
<td>n/a</td>
<td></td>
<td>M</td>
<td>5</td>
<td>K</td>
<td>English</td>
<td>9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. A = Advanced; P = Proficient; B = Basic; BB = Below Basic; FB = Far Below Basic; EL = English Learner Student. Students 2-4-1 and 3-5-6 were not present during observations.

*California Standards Test—Grade 10 (English/Math/Science), Grade 9 (English/Social Studies/Math/Science)
The student group closely represented the ethnicity of the school with five Hispanic students, eight White students, and one Asian student. Because no consent forms were returned by African-American students, no African-American students participated in the study. African-American students account for 9% of the students in the school, and a significant number of those at risk of not graduation in 4 years. Four of the students were identified as English Learners; two of them had recently been reclassified as fluent English students. They were also representative of the English Learner students in the school at approximately 30%, with half of them redesignated as Fluent English during grades 9 and 10.

The students had a range of grade point averages: four had less than a 2.0 grade point average, five had a grade point average of 2.0-3.0, and five had a grade point average higher than a 3.0. Nine students had 2009 scores from the California Standardized Tests. Of these, six scored basic on the English Language Arts test; one scored proficient; and two scored advanced. Six of the students scored basic on the math test; one scored below basic; one scored far below basic; and one scored advanced. Any student scoring below a 2.0 grade point average is placed at risk of not graduating, because this grade point average is the minimum graduation requirement set by the Board of Education.

*Teacher Profiles*

The three teachers who participated in this research, one from each of the science, English, and math subjects have all taught at least 10 years. Each teacher is identified by a pseudonym. Mr. Deinae, the science teacher, is an alumnus of this high school, and he has taught over 25 years at this school, including a number of physical and life science
courses. He specializes in teaching all levels of biology from Biology 1-2 to Advanced Placement Biology 1-2. Ms. Reed, the English teacher, has taught over 14 years at this high school, teaching grade 9 and 12 English courses to students of diverse achievement. Mr. Sum, the math teacher with the Algebra Explorations 1-2 and Geometry 1-2 classes, has taught at this school for 9 years with a 3-year absence while he pursued a doctoral degree in mathematics. He returned to this high school 2 years ago while he completed his research and worked on his dissertation. All the teachers have shared their beliefs in planning lessons that engage students in their learning, thinking about different instructional strategies that would help students to understand complex concepts and improve performance.

_Course Profiles_

The classes observed in this research, one science, one English, and two math, were selected because they are most likely to include at-risk students. The courses, Biology 1, English 1, Algebra Explorations 1, and Geometry 1, comprised mostly grade 9 and 10 students. The courses are nonadvanced, college preparatory classes in which students of average or below-average achievement are placed.

Students in the Algebra Explorations 1-2 class are the least successful 9th grade students, because they were not proficient in middle school algebra and scored at basic or below on the California Standards Tests in mathematics in the 8th grade. The geometry students are a mixture of grade 9, 10, and 11 students. The grade 9 students in geometry were successful in middle school algebra to progress to geometry in grade nine. The grade 10 students were placed in Algebra Explorations in grade 9, and whether they passed or failed Algebra Explorations, they were placed in Geometry 1 in grade 10. The
few 11th grade students in Geometry 1-2 received a D or F in Geometry 1 or 2 in grade 10, and they repeat the course before moving to a higher level math class in grade 12. The grade 9 students in Algebra Explorations 1-2 and grade 10 and 11 students in Geometry 1-2 have low math achievement standards test scores and class grades, indicating they are struggling in this subject and could be at risk of continuing to struggle academically and not staying in high school to graduate (Alexander & Entwisle, 2001).

The students in English 1 and Biology 1, in grades 9 and 10, respectively, are mainly of average and below average achievement based on their course history in previous math and science classes, standards test achievement, and course grades. Students who have not been successful in math, science, and English courses could be at risk of continuing to struggle academically (Alexander & Entwisle, 2001).

Research Findings

The research findings are organized by key topics addressed by each of the secondary research questions presented above and in Chapter 3. The secondary research questions were answered using data from classroom observations and the teacher, student, and focus group interviews. Specific interview questions were aligned with the research questions. The researcher studied the responses to the specific interview questions to determine patterns, themes, and insights to answer each of the research questions. The students’ and teachers’ responses were grouped together after each question and coded by common themes that emerged throughout the study. The teachers’ and students’ names were also coded with pseudonyms to hide their identity. The themes emerged as question responses were repeated across different students and teachers, as well as through observations, photos, and lesson plans of the lessons.
Student photographs provided a visual representation of what they found significant within their outdoor learning experiences. Each student was provided with a single-use camera complete with film. Prior to the first observation the students were each given a short lesson on how to operate the cameras and approximately how many pictures to take. The students’ cameras were stored in a plastic bag by class and distributed before the class observations. The students’ photographs were developed before their interview, so they could study their photos to help them remember the observed lesson and what was significant to them. The photographs were also studied for themes that emerged from them.

The data from the observations, interviews, and photograph and lesson plan review are presented in support of various themes. The first research question is focused upon the students’ experiences and the remaining research questions focused more upon the teachers’ and students’ interactions with the outdoor environment. The last research question addresses teachers’ lesson planning, which included a document review of the teachers’ available lesson plans. Their lesson plans were provided upon request, and they included their purpose, instructional strategies, and expected outcomes.

**Research Question: To What Extent and Under What Conditions**

**Do Outdoor Learning Experiences Encourage Academic,**

**Behavioral, Psychological, and Social Engagement**

**on the Part of the Students?**

This research question addresses the four main types of engagement as well as areas in which children develop. Educators support a child’s development by addressing their behavioral, psychological, and social development as well as their intellectual
growth. Johnson (2000) recognized that the outdoor learning environment helped children develop intellectually, and their relationships to the outdoors helped their physical, emotional, social, and spiritual development. The effects of outdoor learning and the students’ academic, social, psychological and behavioral development are presented below. The students’ academic engagement is related to their proficient performance on state content standards and passing grades in their classes.

Academic Engagement

A growing body of research connects positive outdoor spaces with student achievement (Lieberman & Hoody, 1998; Lieberman et al., 2000; Tanner, 2000; Tanner & Lackney, 2006). All three teachers who taught biology, algebra, geometry, and English classes thought about using the outdoor environment as an instructional strategy to support student learning. Mr. Deinae, the Biology 1-2 teacher, noted that “it [teaching outdoors] gets them up out of their seats into a new environment. . . . It’s different, and as such, it gets them engaged more. . . . The outdoor activity help[s] them to draw upon the experience as they learn chemistry.” Likewise, Mr. Sum, the Algebra Explorations 1-2 and Geometry 1-2 teacher, considers the importance for students in making measurements of large geometric constructions, “The subject of the course is measurement, and so outdoors gives us space to measure large objects. . . . The outdoors gives me the ability to make measurements.” Both teachers think about how students learn a concept with the outdoors as an instructional support.

Ms. Reed, the English 1-2 teacher, explained that when she plans her lessons, she thinks about “what we can do outside class, group projects we can do outside.” Ms. Reed plans the outdoor environment for a variety of activities: reading, taking a survey, group
projects, reciting lines, literature study, and group play reading. When she reflected on the students’ group activity, she stated, “I wouldn’t be able to do it if I didn’t have the outdoor environment . . . we have the shaded area if it is drizzly. I can move around.” For her space, reduced noise, and ease of movement influenced her decisions to move the class lesson outdoors.

The photographs students took showed the high level of student focus and engagement in their learning activities. For example, the students in the English class are shown with their heads down writing their personal profiles or reading an article. The photographs of a tower building project show the students grouped tightly together in a circle with one or two students holding and piecing together the parts to make it stand tall. The other students in the group appear to be interacting and offering suggestions, and they are all focused on the tower. One of Ron’s photographs showed a student smiling as the tower is standing tall and straight and its height is measured by the teacher (see Appendix F, Figure 1).

The results of the student observations are presented in Table 5. The observation instrument was designed to record the level of engagement of a student in an instructional activity in the outdoor environment, as well as how the student interacts with peers and the outdoor environment itself. Student engagement items are based on observable student behaviors while participating in the instructional activity in the outdoor environment (Newmann, 1992; Norris et al., 2003).

Most, if not all, of the students in this study completed their class assignments by actively participating, discussing, and interacting with their fellow students. A counter explanation for the high level of involvement may be that the students volunteered for the
study and knew they were going to be closely observed during the lessons. However, there was significant evidence that student research participants were engaged in the lesson to a degree that they lost sight of the observer’s presence. Further explanation of Table 5 will take place in the appropriate sections that follow.

Table 5

*Observational Data Matrix*

<table>
<thead>
<tr>
<th>Level of involvement in activity</th>
<th>Always</th>
<th>Sometimes</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student works well with other students</td>
<td>33</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Student is interested in the activity</td>
<td>30</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Student conversation is high quality and focused on the activity</td>
<td>22</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Student listens attentively</td>
<td>32</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Student follows directions</td>
<td>33</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Student completes work on time</td>
<td>34</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Student stays focused on activity</td>
<td>32</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Student works carefully</td>
<td>33</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

Academic engagement is further examined by the subthemes that emerged, whereby teachers provide conceptual learning experiences that involve the students in the activities, and encourage students to complete the associated assignments.

*The teacher teaches a concept and uses authentic work.* The math and science teachers in this study used the learning environment in order to support the teaching of a concept to their students. One biology lesson helped students to understand cell respiration, replicating how ATP (Adenosine Triphosphate) is converted into energy. Students were paired as researchers in a respiration lab to understand how the conversion
of energy in human beings could be measured by counting the number of breaths one student took while at rest in the classroom, after a quick walk across the campus, and after 2 minutes of stair climbing. The students studied the results of the outdoor activities, charting results of each person’s breathing data in comparison to the class average and drawing conclusions about the respiration cycle in which ATP is converted into energy. The student-made photographs of this activity capture the students climbing stairs to increase their energy output as they physically experience producing ATP. Students also focused their camera viewfinders on the teacher’s demonstration of how energy, like a piece of wood, can be broken into pieces (see Appendix F, Figure 2). According to one student, Dave, “when we counted the breaths, we could see if [the number of] our breaths increased. That is what I found interesting; we got to experience it.”

In thinking about how his students learned, the biology teacher said, “I think about what the students know and don’t know, and how I am going to cover the material in the curriculum. . . . Can I do this outdoors? Can I use the environment to help them to learn the concept?” This teacher planned the activity according to the students’ specific academic needs to meet proficiency in state standards.

Mr. Sum explained that he included outdoor instruction because in the outdoor activity, at least the geometry ones, they [the students] learn a story, so everything has a history to it. The history is richer outdoors than when they do it indoors. Indoors, I think their learning is more routine. It blurs for them. I had great experiences last year with students who could tell the whole story from beginning to end about how to find the circumference. When they
students] see mathematics as storytelling, it sets them up for proving. It is important for them. A proof is important to tell as a story.

Mr. Sum’s students also referred back to their outdoor experience to help them understand and explain the concept they are learning. He also preferred the outdoor environment to help students understand abstract concepts, “I also like the outdoors, so they can focus on the concept that is more abstract.” Mr. Sum considered different learning environments for different kinds of student learning as he explained, “I feel their ability to focus is diminished in a lecture situation.”

Mr. Sum recognized the benefits of outdoor learning in providing concrete experiences to help clarify abstract concepts and motivate the reluctant learner.

Mr. Deinae had students stand and move around during a cell mitosis demonstration “to help the students to visualize the idea of a large molecule that can be broken down.” Mr. Sum used the parking lot and wood to help students understand the relationship between pi and the diameter. He explained, “The sheer size of the wood and the parking lot gives the students a new perspective on the concept.” Students in the biology and geometry classes participated in physical activities by moving around, drawing with wood and chalk, or measuring objects. Mr. Deinae summed up his philosophy about providing activities outdoors, “It goes back to my philosophy to use something new to move students outdoors.”

Authentic instructional work that is cognitively challenging and connected to the world supports engagement (Marks, 2000). In addition, better student learning comes from lessons in which students concentrated, experienced enjoyment, and felt immediate intrinsic satisfaction that supported future learning (Shernoff et al., 2003). When students’
affective relationship with school is strengthened, they care more about their learning and are more engaged (Cash, 1993).

All the interviewed students who participated in the biology and geometry lessons conducted outdoors stated they were actively involved in the learning activity. The observation results in Table 2 indicate that most of the students were actively engaged in the lesson. Except for two or three students, the students consistently listened carefully, followed directions, stayed focused on the work, and completed the assignment.

During the interviews of the algebra, geometry, and English students, the following comments were shared. Dave said, “We got to participate in the activity, be a part of the activity instead of just sitting there trying to absorb it. It made it a lot more interesting than the usual classroom stuff.” In describing the algebra students’ final exam review conducted outside while answering questions posted on a row of tables, one math student, Alex, shared, “We had two minutes to answer the questions, and we would switch. It was fun.” The student photographs capture the long row of tables with students working together to solve the review problems (see Appendix F, Figure 3).

When asked what the students liked about participating in an outdoor learning activity, the students underscored movement, air quality, and the opportunity to be involved in active, innovative experiences. Dave said, “I get up and do activities versus sitting in a chair for an hour.” Don said, “I just like fresh air.” Sue, in the algebra class, said, “The outdoors was a change of pace.” Ron in the English class said, “I like how we got to . . . build and use our hands. It was really fun.” Roy in the same class could not think of anything. Mia in the geometry class said, “When we come along at the end and talk about what we just did.” Art, also in the geometry class, said, “It gives us a chance to
When the students were asked how they enjoyed their outdoor activities when they worked with their classmates, five students responded saying it was “fun.” One said, “It was interesting,” and another said, “It was better.” Students shared they liked the social aspects as well as the outdoor environment of their activity.

The students were physically involved in the learning activity. Dave noted that, “for some activities we just walked right outside the door, but it made a difference in the amount of information we were able to take in.” The photographs Don took showed the energy demonstration led by Mr. Deinae in which every student is focused on the teacher and wood piece he broke apart. Some of the students had smiles on their faces as they observed.

Data from classroom observations of individual students revealed evidence of student learning in both biology and geometry lessons, and each student interviewed further stated that he/she understood the concept better because of the physical activity. The biology students participating in the respiration lab could count the physical changes in student breathing, and they were able to chart how their breathing changed when different levels of energy were expended, particularly after quickly climbing a long staircase for 2 minutes. The students also made predictions from their data as part of their activities in the biology and geometry lessons. For example, Mia described her prediction during the geometric construction activity, “I was supposed to help measure the triangles and the angles to see if all angles were equal . . . and see if the prediction came out right—if angles were equal or not equal.” In biology, Dan said he checked data and prediction, “When we counted the breaths, we could see if our breaths increased.” The quality of the students’ activities helped them to complete their assignments when they
returned to the classroom. The biology and geometry students immediately utilized and referred to their data collected outdoors to complete their written assignments. All the students used their outdoor experiences as a reference or support for future learning.

*Involvement in learning.* Learning outdoors allows students to experience the content in a natural setting (Broda, 2007). In addition, a sense of belonging leads students to value learning (Finn & Cox, 1992). One example of interaction in an outdoor lesson occurred when the geometry students drew circles and formed triangles using circle radii and bisectors. They drew their figures on the blacktop covered fire lane using a long 2” by 4” board with a large hole at each end. One end fit over a toilet plunger to hold the board in place as a piece of chalk was inserted in the outside hole of the board. The boards of different lengths were used to help students understand that the concepts they learned were universal to all radii.

The teacher and students participated in the lesson with the teacher acting as facilitator and a guide who asked them specific questions about their geometric constructions. Mia described the activity: “You are actually doing something and listening, different from in a classroom where you just listen. I was active, and I wasn’t bored. . . . All the students, well Mr. Sum even participated.” The geometry students, organized into groups of four, focused their attention on their activity. Observations indicated that students consistently worked together to solve the conjectures, make predictions, and then prove them. When Mr. Sum brought the class together, they physically stood around the circles to study the isosceles triangles they drew using circle radii and bisectors. During one discussion, two students were distracted when they found
worms in the dirt nearby. They played with them for a minute or two, and then they returned to complete their group assignment.

The student photographs of the math classes showed how involved the geometry students were in drawing the circles and other constructions during their outdoor activities. Students holding the wood radius, drawing the circles, and completing the activity worksheet were shown in most of the students’ photographs. The students also photographed how they recorded their data on a portable white board, discussed their drawings in groups around their constructions, and participated in reflections with the teacher on a lawn near the parking lot where they had measured their circles (see Appendix F, Figure 4).

In addition, large outdoor learning areas were also positively related to student achievement (Tanner, 2000). Increased knowledge results from exploration and the use of imagination (Billmore et al., 1999). Mr. Sum explained, “I wanted students to experience physically the size [of the circles]. . . . I like the outdoors, so they [students] can focus on the concept that is more abstract. . . . The subject of the course is measurement, and so outdoors gives us space to measure large objects.” The large learning areas in the fire lane and staff parking lot provided adequate circulation for the students engaged with each other in activities that required extended movement and interaction. Mr. Sum described his learning activities as explorations because he wanted his students to physically manipulate the large tools. He also described his activities as semantic mediation, “The students need to figure out the symbols with tools to create understanding and new meaning.” One student, not part of this research, exclaimed at a point of discovery, “Ah, it makes an isosceles triangle!” Mia showed her appreciation of the physical activity with
a smile, and she said, “We actually got to use wood and a plunger and chalk, and that was really cool. I was supposed . . . to see if all angles were equal . . . and if the prediction came out right, if the angles were equal or not equal.” Her response that the activity was “really cool” indicated her enjoyment.

When students participate at a high level, they may also initiate questions and dialogue with the teacher (Finn & Voelkl, 1993). In addition to the physical involvement in the geometry explorations, the students also stopped to stand together around one group’s circle figures to discuss how they knew a triangle was an isosceles triangle. Observation notes recorded how one student presented a detailed explanation of why this was so. Mr. Soto at first expressed his skepticism of the student’s reasoning, but he discussed the student’s reasoning until he was convinced the student was correct. During his geometry class, Mr. Sum told his students they needed to question why their answers were correct in order to understand the reasoning behind them. He said this was a skill they would need when they begin writing proofs. While standing in a circle, the students were interested and attentive to the student and the teacher. In addition, they participated in the activity, and they practiced answering questions about why they believed their triangles were isosceles. Mia noted that Mr. Sum participated in the class discussion about how the isosceles triangles were formed from the radii and bisectors, “He [Mr. Sum] is the one who helped us learn it and showed us what to do with the 2" x 4". Then if we didn’t know how to do it, he would correct us. He would give us a hint, or we could learn to do it by ourselves.” When the class came together, Mia described the communication as a discussion, “We discussed if our hypothesis in the beginning came true.” Student photographs of the activity show the teacher standing near a geometric
construction (drawing of circles and angles from bisectors and radii) discussing with the students who are standing in a circle around him. Every student is standing straight and closely listening to Mr. Sum (see Appendix F, Figure 5).

Class observations, photographs, and student descriptions indicate there were discussions in which students initiated dialogue with the teacher and their classmates. One student presented an explanation of how a triangle was formed, and Mr. Sum acknowledged that the student was correct and that he had not thought of it in this manner.

Additional evidence of academic engagement is the students’ successful completion of assignments in which they gain a sense of accomplishment, the theme discussed below.

**Accomplishment.** A high quality learning environment, including outdoor learning areas, is an important factor in helping students stay engaged and on track for graduation (Tanner, 2000). Schools “in harmony with nature tend to have students who earned higher [standardized test] scores” (Tanner, 2000, p. 327). Higher test scores and grades are important because they are associated with low dropout rates for all children (Alexander & Entwisle, 2001).

Each teacher reported that more students completed the assignments when the lesson was conducted outdoors. Mr. Deinae collected a worksheet from the students; Mr. Sum checked each group’s progress; and Ms. Reed collected a survey, worksheet, or evaluation form from her students. The teachers also reported that more students earned credits for completing their assignments, and this helped the students to earn passing grades for graduation. One outdoor lesson, located in the upper level of the amphitheater,
provided the students a way to check problems for correctness by using symbols. The students sat on benches, and the horizontal walkway space provided enough room for the teacher to present the lesson on a portable white board. The students paid close attention to the teacher’s explanation before working in groups of three or four. Comments heard during the observation included, “We can focus better outside,” and Sue remarked, “I’m taking a picture of this; the entire class is working.” This remark of Sue’s during the class activity stands out because her classmates did not always participate in an activity or complete the assignment. Having all the students participate was an indication the students cared about their assignment.

Sue’s photograph of the amphitheater also shows the various groups of students leaning together as they work together to solve their problems. The other student photograph showed how their teacher presented the short lesson. Most of the algebra students’ photographs showed them bent over their assignments or pointing to solutions to problems as they worked with a partner. In these two photographs students took time to document the accomplishment of various lesson objectives (see Appendix F, Figure 6).

In a study of outdoor learning programs, students in Environment as an Integrating Context (EIC) programs earned higher grade point averages and had better standardized test scores (Lieberman & Hoody, 1998). After taking a test on the material presented during the outside lessons, students in the observed science and math classes said they earned a good grade on their test. Don remarked, “Yes, I got a good grade.” Dave remarked, “My experience helped me to remember. Using all the terms that were on the test and actually seeing them [the words] demonstrated helped me to remember [them] and pass the test.” Mr. Sum made the conjecture, “I think more students will
engage in the activity outdoors. Students will get the class credit outdoors, and it will trickle down to their academics. Ten of the 14 participating students in this study earned grades of a C or better in the observed classes. Their grades in the courses under study were 5 As, 3 Bs, 2 Cs, 2 Ds, and 2 Fs on the first semester report card immediately after lesson observations. When asked why four students had a D or an F grade, Mr. Sum responded that the students may do well on the assignments when they participate in an outdoor activity, but they are not consistent yet in completing all their assignments. This study included a limited number of students in classes most likely to have students placed at risk. At least four of the students were or had been identified as second language students. Two students were enrolled in a 2-hour English literacy class because they scored far below basic on the English standards test, indicating a high level of challenge in literacy skills. Students who complete their work are more likely to earn passing grades, pass their class, and succeed in graduating from high school.

The next type of engagement is behavioral engagement. This includes student discipline, being on task, and working hard. Positive behavior helps every student to stay focused on the activity and learn.

*Behavior Engagement*

Students who are engaged in learning are less likely to be disruptive. Students are more engaged when relevancy and interest levels of resources and materials are considered (Pickett, 2007). The teachers were asked about their students’ behavior, and the students were asked what they liked about the outdoor activity to understand what elements of the activity and environment influenced the students’ behavior. It should be
noted that in both observations and interviews, none of the teacher research participants discussed any inappropriate student behavior when their students were outdoors.

*Positive, on-task behavior.* Lieberman and Hoody (1998) concluded that students in EIC classes had more positive behavior. Positive student behaviors, such as students focused on and actively completing work without off-task talking, were noted by both the students and teachers in the classes observed. The students in the English 1-2 class completed a personality profile while seated in the main quad area, a grassy oval-shaped lawn with a seating wall and planters. The five interviewed students in English 1-2 were enthusiastic about being able to sit outside as they completed their profile form. One student said, “It was cool because it showed the personality; I was a leader, which I am.” Ms. Reed said, “Being outdoors definitely helps with the behavior . . . they are going from class to class and sitting a lot. I see a huge decrease in behavior problems being outside. They [the students] are staying on task more. It seems to curtail talking.” One focus group student reflected on their behavior, “Everyone was on task. Everyone was not misbehaving, because it was fun.” When the Algebra Explorations students lined up tables outdoors, around which to rotate and solve posted problems, the students noticed that everyone was focused. Sue remarked, “I found every student was working hard on it. Usually everyone in the class is not working. I took a picture of everyone working. I was impressed with it.”

Student photographs show the students engaged in various activities. Some of the photographs show students with their heads down, moving, drawing, or recording data. One photograph of the geometry students drawing their constructions showed one boy drawing the circle, another looking on, and a girl smiling as she holds the radius in the
middle circle. Her smile reveals her enjoyment in the activity and their accomplishment of their task (see Appendix F, Figure 4).

There is a relationship between a classroom’s design and changes in student behavior (Weinstein, 1977). Students in the English class noted they had room to spread out. Riley said, “It was kind of better because you weren’t inside the classroom; you had more space outside to think and do work.” Another student, Robert, noted, “I like it better. I think it is more peaceful and it is open; you don’t see [any] walls.” Rick shared his appreciation of the space he had: “She spaced us out so we weren’t together. We were spaced out and we could not mess around. In a classroom we can goof around, and this way we got a lot more work done.” Rick, however, also noted that writing on the seating wall was a little uncomfortable, “It’s [The classroom desk is] a little more comfy.” Some of the student photographs showed students sitting on the wall facing each other as they work on their profiles independently. They appeared to be content to be next to each other as they completed their profiles.

Students are more engaged when educators think of students as learners and how they learn best (Pickett, 2007). Ms. Reed purposefully planned her lesson to take place outside in order to increase on-task behavior. She explained, “I wouldn’t be able to do [the lesson] if I didn’t have the outdoor environment. Some students have a hard time staying focused. I was able to spread them out. It gave many of the students an opportunity to stay on task and finish the assignment.” One student in the focus group reflected, “It gave me a chance to go outside to think and absorb what we were learning.”

*(Novelty)*: The teachers in this study all mentioned trying something new in their lessons to help students learn. A caring environment, interested in student learning and
providing a good teaching style, helps students to stay in school (Dei et al., 1997).

Mr. Deinae has a philosophy of experimenting with new ways of learning:

It goes back to my philosophy to use something new to move students outside.

Any time you can change the location, you get the students to focus. It holds their attention any time you can vary the way it [concept] is presented. They won’t be bored. They will be intrigued, it is not mundane or the same.

A majority of the students responded positively to the change. One focus group student said, “I think it is a lot better just because it gets you to do something different. You are not in the class all day.” Jeff in the biology class said, “It was more fun. It was better than being stuck in the classroom.” Sue in the algebra class said, “The outdoors is a change in pace; the problems went quicker by being outdoors.” Jeff also liked the lesson when the teacher physically broke wood in pieces, particularly because it was, “destructive.” He noted three times that the lesson was fun and unexpected because the teacher was “destructive” when he broke the wood lengthwise with a hammer. The loud hitting of the hammer on the wood made an impression on Jeff. He photographed the process with as many pictures as he could, using all 27 photos on the camera. When he showed me the photos he took, he was able to line up three photos that showed most of the class watching the demonstration. Only one student did not appear engrossed in the activity.

Students’ feelings about school were manifest in their engagement levels (Finn & Voelkl, 1993). On Fridays, Ms. Reed allows her students to bring their independent reading book to read outside her classroom. “On Fridays students with books go outside on the grassy knoll. I use it as a reward.” At the beginning of the year, the teacher “had a hard time getting the students to bring a book,” but now the students come prepared.
School climate affects engagement because students who feel good about their learning environment will engage in their learning. Dave generalized his feelings about outdoor lessons with his motivation to come to school, “It was a lot more interesting to learn. If teachers would do it more often, I think it would be better going to school.” One student photographed a friend who is smiling and holding up a copy of the article she has just read.

Overall, the students had positive responses to questions about why they liked their outdoor activities. In most statements, the students discussed how the experience was something new and different, and that they liked the novelty of it. The responses to why they liked the outdoor activities included Dave’s: “We got to go outside and go somewhere different;” Don’s: “It was outdoors. It was fresh air. It was a nice breeze;” Sue’s: “Working with a partner;” Ron’s: “It was calm outdoors. . . . It wasn’t very loud outside, so we didn’t have to talk very loudly; Mia’s: “Everyone goes off their separate ways;” Al’s: “You can move around;” and Jeff’s: “Instead of telling us why it was correct, he was showing us why it was correct.” One student, Roy, liked the opportunity to meet new students. The students who responded gave a wide variety of reasons why they liked learning outdoors, topics that are repeated throughout the research.

Less controlling environment. Student engagement is an affective relationship to school. The degree of control and discipline is emphasized in classroom activities affects student engagement factors. Student options in lessons show freedom, less control, and more caring (Finn & Voelkl, 1993). At least three of the interviewed students related they had more freedom outside. Rick said, “I think it gave us a little bit more freedom. . . . We were not next to the teacher, so we could have fun while we were doing it.” Roy said,
“We got more freedom, and it was like, well, it was more fun. It was better than being stuck in a classroom.” Al commented about being outdoors and paying attention: “It’s like you don’t have to be in a classroom to pay attention. . . . I guess they put you in a classroom because they think that you can pay attention better indoors, but I really have to disagree.” In addition, the outdoor lessons were more student-centered and their learning environments had more space for the students to move around. The students noticed the space outdoors, and they used words, such as “space,” “room,” and “open” to describe what they like about the environment. Mia liked that “everybody goes off their separate ways.” Al also noted, “What I like is the option; you can do what you want.” The greater use of space and activities allowed students to interact with their classmates and the environment in different ways.

Students also appreciated having options in how they learned. Al in the algebra class noted, “In a little classroom, you have to be next to this person; [outside] you don’t have to be next to this person. You can be by yourself. It’s cramped in there [the classroom]. So what I like is the option; you can do what you want.” As noted earlier in this chapter, students participated in the tower building activity in the quad. They had a bag of materials, including tin foil, a toilet paper roll, a plastic bottle, pipe cleaners, and a hanger to build the tallest structure possible that would hold the weight of an egg. The students were free to try many ways to build their tower, discussing and testing what would work best. When the project was finished and the winner announced, the students returned to class to write a reflection about their different roles and how each student contributed to the group’s work. The teacher rewarded them for their efforts, and she had the students relate their personality style to their participation in the group activity
through an individual evaluation. The activity allowed students to choose where in the 
quad they wanted to complete their group activity, separated from other groups, and for 
the most part, from the direct supervision of the teacher. Each group decided how to solve 
the challenge, who would physically build the tower, and who would give suggestions. 
Students determined how the materials were assembled, and their teacher did not 
communicate any further directions to the students. The student descriptions of the 
activity focused on their personal experiences, with no mention of their teacher. For 
example, Ron explained,

> We all looked through the supplies, and saw what we could do. And I looked to 
see a bigger plan of what I could do, like how to make it as tall as possible. I told 
other people what to do. Sometimes it worked, and other times it didn’t. I mainly 
told others my ideas of what to do.

The topic of control was also observed during an additional geometry lesson in 
which Mr. Sum’s students gave group presentations of their proofs outside next to the 
administrative building. The students taped their posters with outlined proofs onto the 
exterior windows of the administrative building which provided a covered area next to 
a lawn and trees. Each group of four or five students gave presentations to their peers. 
When asked why doing the lesson outside helped them, a common response was, “It is 
fun.” When asked more questions to understand why they said it was fun, students in 
different groups explained that all the groups can give their presentations simultaneously, 
with their teacher observing them at a distance or move from group to group as needed. 
They noted that each group conducted their presentations appropriately without their 
teacher standing over them telling them what to do. They gave positive comments about
their freedom to conduct their own presentations, including asking clarifying questions of the presenters. Most of the discussions were among the students and did not include the teacher’s after each presentation.

Respectful, caring relationships between students and teachers. Having a caring teacher is important to students and their learning. Twenty-four percent of dropouts felt no adult cared (Yazzie-Mintz, 2007). The students’ interview responses all showed a respect for their teachers and their learning activities. Mia noted, “Our teacher is the one who helped us learn it and showed us what to do. He would give us a hint, or we could learn to do it by ourselves.” Jeff remarked, “The way it helped us show why the conclusion, that Mr. Sum was driving us to get, was correct. Instead of telling us why it was correct, he was showing us why it was correct.” Mia also thought the geometry constructions were “cool,” and “how Mr. Sum was coming to each group and making sure we were on the right track, to make sure we understood how the triangles came out equal.” Rick indicated his teacher thought a lot about his class to let them go outside, “I have not participated in outdoor activities since this. I can remember in middle school they did not do that.” None of the students described their activity or the teacher’s role in negative terms. The students gave positive descriptions and used terms, such as “fun” and “cool,” to describe their outdoor activities.

Supportive of multiple learning modalities. Instructional practices and quality learning environments may help students placed at risk to stay engaged in learning and to graduate from high school (Billmore et al., 1999). During the pre-observation interviews, the teachers talked about how they plan their lessons to support different learning styles. Mr. Deinae reflected, “I think about how I’m going to organize the students and what they
will learn from the lesson each day.” He also thinks about the “social relationships” in the class, and as he says, “whether they are focused or not for the lesson.” He tries to adapt “around what is going on with the students.” Mr. Sum responded, “Sometimes I take the students outdoors and do the same lesson.”

During the follow-up interviews, after the observations were conducted, their responses were more specific. Mr. Deinae explained, “Everyone has different learning styles, and I try to vary my teaching styles for different students.” Ms. Reed thought about the relationship between physical movement and memorizing lines in a play, “For some students physical movement helps trying to remember to recite lines. I think the kinesthetic learners increase attention.” Ms. Reed spent time planning ways to support her students’ learning through different instructional strategies and learning modalities, which included physically building a tower, allowing for students to move around while reading outdoors, and taking the class outside for a writing lesson about the senses.

Students with different learning modalities also benefit because they often experience more tactile/kinesthetic learning when lessons are outdoors (Broda, 2007). When the geometry students drew a large circle with various lengths of 2” x 4” boards, they also measured how many times the radius would go around the circle. The students had a challenge to measure the circle with a long board, but they carefully manipulated their boards to follow the curve of the circle. Each group’s determination of how many radii will go around a circle was almost identical. Mr. Sum noted that moving and using the tools was an important part of the lesson, “The outdoors gives me the ability to make measurements. The geometric figures can come out of the size. The tools also frame the challenge for the students, and they have a bodily experience.” Kia mentioned, “I thought
the activity was fine because it was more physical than just doing it on a computer program.”

When students were asked what they would recommend about outdoor learning to their teachers, each recommended their teachers should take their students outdoors. Art suggested “they do . . . something more physical. . . . It is better to go outside to work on an experiment; any science class would be more suited for going into the outdoor environment.” Mia recommended the outdoors because, “they [students] have the actual chance to do something, and they won’t complain.” Dave added, “The increased activity helped me to know [how] energy [is converted].” The students’ physical activity helped them to remember what they had done and learned, so they could refer to it later.

The following theme of psychological engagement relates the importance of the natural environment in how people live, and how the senses affect our sense of well being. The natural environment provides more than a useful space for learning; it provides many positive emotional influences that motivate students’ learning.

**Psychological Engagement**

Psychological engagement is related to how people think and feel about their learning in the outdoor environment. Emotions can reflect a decrease in stress as well as the influence of sensory, affective, and physical responses. Each of these areas emerged through observations and student responses.

*Reduced stress in response to nature.* The natural environment “connects material things, such as trees and parking lot, with emotional qualities, such as freedom and confinement” (Gislason, 2009, p. 31). Students perceive conventional school environments as “confining and out of tune with the natural world and healthy emotional
patterns” (Gislason, p. 31) When students were asked what they liked about their outdoor activities away from school, they all gave positive answers, such as, “It feels good”; “It is fun”; “It relieves stress.” Art explained, “They [outdoor activities] make me feel relaxed, and they give me a chance to think.” Seven students responded that they could focus better. Jeff mentioned he liked the peacefulness and, “it is easier to focus and read.” Four students referred to learning in the classroom as “cramped up” and confining. The outdoors was referred to as having open space, ease of movement, and freedom. One focus group student noted, “We got more freedom, and it was more fun.” At least three students related freedom to their activities outdoors. Al discussed how the choice of movement was important to him, “It helps me. You can move around a lot . . . the fact that you are not in one place . . . you can go there or over there. Inside you can’t do a lot of things. You are worried you will hit something over there.” Open space allowed for easier movement, and some students related this movement to an increased sense of physical freedom.

N. Wells (2000) found a relationship between increased green space and vegetation around the home and community environment and a decrease in attention deficit disorder factors. The students’ opinions about the outdoors included references to how green it is, the weather, the fresh air, and the breeze. Art described the experience: “It provided a nice open working environment, fresh air, and green surroundings.” Sue explained that the natural environment “makes me feel more at peace. I am able to work without talking much and getting off task.” Rick felt the breeze helped him to learn, “When you get a breeze, you can actually think better.” Students also liked the blue sky, the trees, and plants. Ron explained, “I think the trees are all good and relaxing. I can’t
think of anything that would make it more relaxing and calm.” When asked to describe outdoor activities students liked and why, two students directly discussed the relationship between the outdoors and its effect on stress. Mia explained, “It [outdoor activities] relieves stress from school. You’re still in school and it relieves the tension of the classroom.” Art also added, “They [outdoor activities] make me feel relaxed, and they give me a chance to think.” Students expressed positive remarks about the trees, grass lawns, and fresh air. Sue shared: “Activities outdoors, I find, may be easier because of the environment.”

Experiences in a natural environment are related to reduced heart rates and stress (De Kort et al., 2006). Ms. Reed incorporated the outdoor learning environment when students read an act of a play: “When we are reading a play, and it is about a place, the sensory detail helps them to envision it better, maybe pay closer attention.” She also felt “it is relaxing; it is sunny. It is really green. I think it has a calming effect. I think there is something calming about being outside.” One focus group student noted the experience of being in an open space helped her to learn, “You had more space to think and do work.” Another focus group student said, “I like it better. It is more peaceful. It is open; you don’t see [any] walls.” Open spaces and being close to nature helped some students to relax and that may have helped them to focus on their work.

*Sensory experiences.* Students’ senses are also integral to their experiences at school. Daylight and views (outside the classroom) are positively related to student achievement, even after controlling for school social-economic status (Tanner, 2008). The students mentioned their senses when they were asked what they liked about the outdoors. Six of 10 students who responded to what they enjoy about being in the outdoors
referenced the fresh air, breeze, or wind. Sunshine was also preferred as well as the sunlight. Dave noted, “The light is not artificial.” The students noticed other effects upon their senses, such as sound, space, and touch through the warmth or cooling from the weather.

The teachers also discussed the students’ senses as an element of their lessons. Mr. Deinae said, “The goal of the lesson [is] to help the students to visualize the idea of a large molecule being broken up. . . . Basically visualization.” Mr. Sum explained how he thought the students’ senses affected their memory as a reason for taking the lessons outdoors:

I think there is good research that ties senses into memory. Smells have been particularly helpful in informing memory. Maybe it was the day after a rain; those things find a way into people’s memories. The plane passing overhead and the boom of sound add to the memory. The students’ memory can constrain their ability to learn.

Mr. Sum also considered the senses when he planned lessons, “The learning modalities we have so far are visual, tactile, auditory, and kinesthetic.” Students and teachers noticed the effects of the outdoors upon their senses for a number of reasons. Some specific effects upon the senses are presented in the following paragraphs.

Research has shown a link between chronic noise exposure and reading skills. “Noise may have a major impact on important developmental processes related to both language acquisition and reading.” (Evans & Maxwell, 2000, p. 92). Children in high-noise areas can show evidence of poor persistence on challenging tasks (Evans et al., 1995). Five students mentioned the sounds outside, the quiet, or the absence of noise. Art
liked the outdoors because “there’s no loud noises that are distracting for the most part.”
When describing why she liked camping, Sue explained that the outdoors “feels peaceful,
and the only sounds are the animals and wind in the trees.” Jeff explained he liked “the
sound . . . at home people are talking on the phone or the TV is on. . . . It [outside] is a lot
more relaxing and easier for me to focus.” Roy liked the sound of the birds’ singing. Al
compared class sounds to those he experienced outdoors, “Because you are used to being
inside in a cramped up box, you could say it is musty . . . , it gets louder. Everyone talks
and the sound rebounds off the voices.” Dave explained that the outdoor lesson “is
actually a lot quieter than [in] our classroom. The noise did not echo, and it did not travel.
It is a more relaxed environment.” The students related the difference between sound
inside the classroom and outside, and they all preferred a quieter environment. The
teachers also related their concerns about sound. Ms. Reed explained, “It gets loud in the
classroom. That is an issue when you are doing group activities. Even though they are on
task, it gets noisy.” Mr. Sum noted that he takes the students outdoors “because the sound
dissipates.” He also remembered that he does not conduct classes in the outside covered
lunch court because the sound did not dissipate and actually disrupted a class. This
covered patio allowed the sounds to bounce off the hard surfaces, making it noisy with a
group of 35 talking students.

Mr. Sum also related that sounds and smells could hinder his focused discussions
at the end of an outdoor activity. He noted that because he does not control the sound or
light, the outdoors can sometimes make it difficult to get his students’ attention, “When
I’m outdoors the sound and smells get in the way. It is ideal to return indoors [for the
discussion].” Mr. Sum’s signal for his students to stop and participate in a reflective
discussion at the end of a lesson is when he dims the class lights. He has had to wait for students to gather when he is in the outdoor environment. Although Mr. Sum related he has less control over his students when outdoors, observations of his students showed they were very attentive during the reflective discussions at the end of outdoor lessons. Sound and smell did not appear to interfere with the students’ concentration during these discussions.

Environmental comforts related to climate control have been linked to student achievement (Cash, 1993). On warm days, the students experienced the natural air conditioning. Ron noted, “The temperature is cooler outdoors; it felt good.” Jeff related that “the trees provide shade for you depending what part of the school you are working in. It will make it cooler for you, especially in the summer.” Mia liked “the nature, such as the weather.” When the algebra students worked in the amphitheater on two warm days, most of the students sat under the shade of the trees. On a cold day, Sue noted, “It has been very cold, so getting some sunshine was great.” Sue also noticed that “it was sunny; it was rainy, so I think being out in the sun is great. I think after the rain everything seems cleaner.” Depending on the weather, the students either liked the sunshine for its warmth or they preferred the shade.

In addition to helping children develop intellectually, children’s relationships to the outdoors help their physical, emotional, social, and spiritual development (J. Johnson, 2000). Mr. Deinae related the students’ physical activity in a lesson to their positive attitude toward the concept studied. “I think if they have different presentations, they will be more alert, especially if they get up and walk. The heart rate gets up, so their blood will move. They will be more receptive.” Mr. Deinae also conducted the outdoor lessons
because, “it gets them out of their seats into a new environment. It helps them to change, and change helps them to [be productive]. They are moving around.” The lesson in which the students measured their breathing rates to study what happens when they increase their energy through activity had an effect upon the students. Dave reported, “Each breath we took, we could tell we were converting it [energy] into ATP and energy. The increased activity helped me to know how energy is converted.” Dave reflected upon the positive aspects of being active at school, “It [being outdoors] is another way to be active. If you don’t pass the fitness test, you have 4 years of P.E. [physical education class]. Getting us out of the chair is better; it gets you moving.” A focus group student added that the outdoor activity “is a healthier environment.” The focus group students agreed they liked “any of the activities, and all the students really had fun doing it.” The students’ physical movement was related to how they felt about the activity.

Affective responses. A growing body of research connects the relationship between the affective dimensions of in-school experiences and whether students achieve or leave before graduation. Yazzie-Mintz (2007) found that 73% of students who dropped out disliked school. Students escape (dropout) from an environment that is psychologically punishing (Alexander & Entwisle, 2001). Chan (1996) studied students’ attitudes toward teachers and school, and he found a strong correlation between the perceived quality of the physical environment with students’ attitudes. The teachers all shared that their students liked to go outside. Mr. Deinae said, “I do know they are eager to go outside when I space the activities so it is not routine.” The students’ responses to the outdoors included descriptions of the activities as “fun” and “cool.” Kia explained, “We got more freedom, and it was more fun.” One focus group student noted, “You don’t
keep wanting to look at the clock. It made it [time] go quicker than it does when you are sitting in class.” Eight interviewed students and four focus group students responded that the outdoor activity “is cool.” One student shared how he felt about being in the amphitheater for his lessons: “I love the amphitheater, and there are trees everywhere.” Al summed it up, “If you can get actual teachers to go out more, it would be amazing.”

The students and teacher also mentioned they liked to be outside on a sunny day. Ms. Reed explained, “It is nice to go out and enjoy it [the grass and trees outside].” The students, who competed in the tower building activity, shared positive responses about doing the activity outside. Art said, “It gives us a chance to get out and enjoy a nice day, not just staying cramped up in a room all day.” He also noted the space, “It [outdoors] gives us more room to work.”

Students liked seeing and being near the trees and lawn. Mia said “it would be the nature” that helped her to learn. Ron shared, “I like . . . a lot of trees, and in the quad there is the grass and a lot of trees around there.” Al liked the trees behind the football stadium, “In the back of the football field, you turn around and there is a wood. It looks like a forest. That’s a cool part about it.” Ron also related how being near the trees influenced his studying, “I think the trees give you a little breeze and a little shade. It is really relaxing when you work outside, so it is easier to think and write down whatever you have to do.” Rick explained his ideas about space, “I like the quad area, how the trees are placed like in a circle around the oval. It is not real boxy. It has circles and that . . . I like that it is not all boxed in; it is in an arc.”

The students and teachers related positive feelings about having space and being in a natural environment. Ms. Reed noted that in contrast to the classroom, the outdoors
“provides more personal space. . . . We need a large space where we can spread out, and they have privacy and room to work.” The relationship between the students’ and teachers’ positive feelings about the open spaces, room to move, and freedom to move about and the outdoor activities was evident in all the interviews and the happy faces captured on the students’ photographs.

Another aspect of the students’ outdoor learning that they liked was the increased social interactions in their pair and group activities. Social interaction is an important part of a teenager’s life, and the importance of their social engagement in their outdoor activities is presented below.

**Social Engagement**

Students’ feelings toward school are related to social support (Marks, 2000). The students’ activities all involved some social interaction, whether it was a group discussion, physical manipulation of tools, team work, or walking and climbing stairs. Most of the activities were planned with whole group and small group activities which added the element of social interactions. The students’ social engagement supported collaborative interactions that increased their learning about the subject, their peers, and/or themselves.

*Encourages collaboration.* Peterson and Fennema (1985) studied girls’ achievement, and they found it was positively related to participation and cooperation. The teachers had mixed responses to the social effect on student learning. Mr. Deinae explained, “It [the outdoor environment] makes it easier for a give and take. It comes quicker, more spontaneous because of the closeness.” Mr. Sum said, “I don’t perceive a large social effect. . . . Friends will socialize with friends. . . . Students will group with
their friends.” Mr. Sum did not organize his students into groups. His students chose who would be in their group. Mr. Deinae had students work in pairs related to how they were seated in the classroom.

Ms. Reed selected the student groups from the personality profiles for the tower project. She wanted a mix of student leadership styles to help the groups’ team work. Ms. Reed planned a lesson to improve her students’ social relationships when she organized them by personality type into groups to compete in the tour building project. She reflected, “Oftentimes, students have a hard time engaging. In the group dynamic they took a leadership role. I wouldn’t have predicted that.” Roy discussed the team building activity saying, “It shows team work and people trying to strive for a common goal.” Roy also liked working with different students, “Normally I would not talk to those people. It helped because I got to meet new friends. It was fun.” Ron said, “If we had done it [the assignment] individually, I could not have done it. It was fun to work with other people, and it was helpful.” Don also discussed how important the activity was for him to meet new people, “It was interesting. I could interact with whomever I sat with.” Rick explained his thoughts about the group work, “I like working in groups better because I can interact with others and I won’t get in trouble. . . . The work is then spread out instead of doing it all on my own.” Only one student, Art, found his group to be unhelpful, and he added, “That is just them.” Overall, the students preferred to work together on their outdoor activities.

Providing open gathering areas for students has increased support from the research. From Gislason’s (2009) research, students felt the open plan environment, including outdoor learning, helped them socially connect with a larger number of peers.
than would be possible in a more enclosed environment. The many open areas at Paul Revere High School helped students to gather and have space, from areas in front of the classrooms, the fire lane, parking lots, quad, stair areas, and amphitheater. Each area was adapted to the lesson’s needs and provided space for students to work together as groups. For example, the planters in the quad provided a privacy screen for the tower building project. As well, the benches in the amphitheater provided easy grouping areas that kept the students close to one another to be heard within the group. The conversations did not carry to disrupt the separate groups. The open spaces helped groups to communicate, reduced the effects of noise, and a result, increased collaborative interactions.

*Learning about themselves and others.* The outdoor learning environments of schools, when used as an instructional facility, have the potential to help children to learn about their world, themselves, and their relationships to others and the environment itself (Sobol, 1996). The students who participated in the outdoor lessons interacted with other students across all of the activities. The two science demonstration lessons also had some student interaction during the modeling of cell mitosis and the group discussion about the energy project. The stair activity had one student observe and record the number of breaths the partner took during three different physical activities. They plotted the results of their data, and they discussed what the data revealed about how energy (ATP) is produced. Their outdoor activity was planned for each student to learn from his/her partner.

The goal of Ms. Reed’s paired lessons in which the students completed the personality profile and the tower project was first, for the students to learn about themselves, and second, to use their knowledge about their leadership styles to participate
in a group challenge. One focus group student discussed learning from fellow classmates, “The activity actually did involve being in a group, and I would say it helped me to work with other students because it shows how everyone can be helpful in every activity and how everybody can contribute something to what we are trying to accomplish.”

The students in the English class also learned about themselves from completing their personality profiles, recognizing their strengths and weaknesses as leaders and group participants. Students learned if they were more likely to be a leader, a thinker, or a follower. Natalie explained that she was a leader, and she acted as one in her group. One focus group student explained, “It helped because, like, if I didn’t get something, then someone else in my team would help me; [it helped] if I didn’t understand.” The students completed their tower project by working together to solve the problem. Each group worked together to test different ideas to make their tower the tallest.

The math students learned from each other during their group activities. The pi lesson in which the geometry students had to measure the number of times a radius of different lengths would go around a circle revealed similar answers for different sizes of circles. The students discussed why this was true and came to an understanding together about the meaning of pi. Because the lesson began with each group taking physical measurements of the circumference of each circle and then comparing each group’s results with those from the other groups, the students each brought information to share with the other students. The whole class discussion led them to develop jointly the concept of pi instead of being told by the teacher that pi is a constant. The process of learning from each other after physically measuring the various lengths of circles’ circumferences provided a greater understanding of pi. Field notes from the lesson
indicated that in addition to the discussion of the value of pi, the students discussed how pi is an irrational number, taking the concept to a higher level of understanding. Collaboration in this lesson led to the students’ building understanding from each other’s data, information, and discussion.

The data have provided a variety of information about the four kinds of student engagement. Some of the activities could have been conducted indoors on a smaller scale with similar results. And likewise, some activities could not have been conducted at all because of the level of noise they would have produced within a classroom. Academic engagement in an outdoor environment is related to how the lesson is designed to teach a concept through student involvement and helping students to complete the required class assignment. Behavioral engagement encourages positive, focused learning that is interesting, different, less controlled, and strategic in supporting multiple learning modalities. Psychological engagement is revealed through the students’ feelings of reduced stress in a natural environment that is also a fun, sensory experience. Students find pleasure in being able to move more freely in open spaces, to speak without interrupting others, and to socialize easily with their peers. The students’ social engagement is reflected in the collaborative lessons which support conceptual learning through interactions that help students to learn about themselves and their peers as well as from their peers. Outdoor learning activities help students to build understanding while doing something they perceive as being fun.

The next research question discussion will address how students leveraged the qualities of their outdoor environment and how the teachers used their specific locations to increase their student learning and what specific strategies they used.
Research Question: In What Ways Do Teachers and Students Leverage the Qualities or Elements of Outdoor Learning Spaces to Support Teaching and Learning in High School Math, English, and Science?

Teachers chose different outdoor locations on the school campus for specific reasons. Sometimes the teacher wanted a large space for the students to spread out, and at other times the teacher chose to have the students actively using the outdoor environment as part of the learning activity.

Teachers Leverage Outdoor Learning Spaces

Because of the diversity of outdoor lessons the teachers planned, many areas of the campus were used for a number of instructional purposes. Table 6 presents the main outdoor learning spaces the teachers selected as well as the main reasons they chose each as a location for their outdoor lessons. The teachers chose distinctly different locations for different purposes and access from the classroom. The Algebra Explorations class was the only class that went to the amphitheater on the opposite side of the school; however, on warm days, it was the coolest location in the shade of the trees and against the hillside. Most of the English classes took place in the main quad area and sometimes on the lawn in front of the teacher’s classroom. Mr. Sum used the fire lane and staff parking lot because they were isolated from the rest of the school, and a lawn area beside the parking lot doubled as a mini-classroom. Mr. Deinae used open spaces outside his classroom, larger spaces behind the next building of classes, and the stairs leading to the athletic facilities.
Table 6

*Different Purposes for Outdoor Learning Spaces by Class*

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Quad area</th>
<th>Fire lane</th>
<th>Outside classroom</th>
<th>Open space</th>
<th>Parking lot</th>
<th>Amphitheater</th>
<th>Stairs</th>
<th>Lawn area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstration</td>
<td></td>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student experiences</td>
<td>MG</td>
<td>S</td>
<td>S</td>
<td>MG</td>
<td>S</td>
<td>S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classroom lesson/reflect</td>
<td></td>
<td></td>
<td>S</td>
<td></td>
<td>MA</td>
<td>MA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase student focus</td>
<td>E</td>
<td></td>
<td>S</td>
<td></td>
<td>MA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide more space</td>
<td>E</td>
<td>MA</td>
<td>S</td>
<td></td>
<td>MA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Space for group work</td>
<td>E</td>
<td>MG</td>
<td>S</td>
<td>MG</td>
<td>MA</td>
<td>S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spread out to read/write</td>
<td>E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduction of noise</td>
<td>E</td>
<td>S</td>
<td></td>
<td></td>
<td>MA</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. S = science—Biology 1-2; E = English 1-2; MA = math—Algebra Explorations 1-2; MG = math—Geometry 1-2.

Each space was selected and effectively used to support the class lesson. The reported purposes for the selected locations included providing demonstrations (science), student exploratory experiences (science and geometry), and class lessons that included time to reflect upon the learning (science and algebra). Instructional strategies the outdoor locations supported included increased student focus, more space to move around, space for group work, room to spread out while reading or writing, and a reduction in noise.

Mr. Sum wanted “the students to experience physically the size [of the circles].” He chose settings where he could “bring the class together on the grass, and it provided a relaxed academic discussions.” He also recognized that the sound does not carry when
students are working in a large space, “The noise dissipates, so they can tinker and play, and they can find separate places to be away from each other and work.”

Both Mr. Sum and Ms. Reed wanted a large area. When the students did the tower project, Ms. Reed selected a location that was large enough, so each group could spread out and work in privacy. “We need a large space where we can spread out. Students need privacy. They need room to work, to manipulate objects.” Her focus, as well as Mr. Sum’s, was upon supporting student group work.

Mr. Deinae used the outdoors as a way to support individual learning. It helps to get students “up and out of their seats into a new environment. It helps them to change, and change helps them to get up.” He also has years of experience in using different locations on the campus for class lesson. “We have a lot of variation of built spaces, asphalt, grass areas, decomposed granite, canyon for environmental issues, a lot of areas to access depending on what is needed. Even stairs are available.” Mr. Deinae noted that he has used other locations on the campus for various lessons, including the football stadium when presenting the size of the solar system to his earth science class.

Mr. Sum thought about how natural elements would influence his instruction. He used the fire lane three times and the parking lot at least twice because they were covered in black asphalt, a contrast to the colored chalk.

The parking lot’s black top is extremely helpful, like a slate. The grass is helpful for students to sit on. It gives a sense of what is natural. It is not typical of a school to be on the grass. Trees provide shade. Sometimes we go to the covered patio, but the cover makes it more noisy. Benches in the amphitheater provide places to sit. I think hedges help to define a space.
Mr. Sum used the fire lane and parking lot areas because the black surfaces contrasted the brightly colored chalk, and they allowed the students to draw large objects.

The teachers did not mention the weather conditions as a primary reason for moving their lessons outdoors, although the days were dry and mild. During a lesson when the algebra students were in the amphitheater, the temperature was above 80 degrees, and they located themselves in a shady area. One day, when the English students were in the quad, the temperature was approximately 65 degrees and windy. Ms. Reed noted that “it is nice and the skies are blue after it has been a rainy day.” Mr. Deinae recommended allowing students to stand in the outdoor learning environment, “as long as the weather is appropriate.” Ms. Reed also considered the shade provided by the trees when she planned her outdoor lessons, “The fact that it [the quad] provides shade; there are shady areas.” Ms. Reed mentioned, “It is kind of nice because it [the quad] is spread out enough that the noise is not a factor. It is close enough, so I can see each student.”

*Students Leverage Outdoor Learning Spaces*

The students also discussed the important aspects of their outdoor learning environments and how they interacted with the natural elements. Each of the interviewed students agreed that their activities in an outdoor environment were different from what they did in the classroom. Dave stated what helped make the experience meaningful was “that we actually got to participate in the activity, be a part of the activity instead of just sitting there trying to absorb it.” Mia said it was “different from in the classroom where you just listen.” From observation notes, the geometry students drew geometric constructions to study concepts of what parallelism means, how do to know a triangle is
isosceles, and how a circle’s diameter relates to its circumference. The algebra students repeated class lessons outdoors in the amphitheater, worked in groups, and reviewed for a final exam by moving from table to table every 3 minutes answering review questions. The biology students stood around their teacher to observe a demonstration, participate in a demonstration, and participate in a physical activity to understand how ATP is converted into energy. The English students read, completed a personal profile, and participated in a group team building activity. The students stood, used tools to draw geometric constructions, measure circle circumferences, participate in a class reflection, work in groups, walk across campus, climb stairs, watch demonstrations, move from table to table while solving problems, and sit and recline while reading and writing. The student photographs of their classmates in the quad area show the students sitting on or reclining against tree planters and seating walls, lying down, and relaxing in the shade under trees.

Students had flexibility in choosing where they stood, sat, or worked together. Al explained, “It was different because . . . of all the space outside. You can move around a lot . . . the fact that you are not in one place.” Rick noted the limitations of the classroom environment, “In a classroom you’re not able to do that because . . . you have to be next to this person . . . it’s cramped in there.” Mia noted that “outside you have, I guess, more freedom.” Student photos of their activities show their creativity in where they sat on lawns, in the amphitheater, on walls and planters. The students also used planters as a barrier for privacy from other students when they built their towers in the English class. When the students moved to a lawn after a geometry lesson, the students sat on the lawn, sidewalk, their jackets, and so forth. They spread themselves out, so everyone could see
the teacher and white board. Al also explained the flexibility he had, “That’s what I like, the fact that you can go there or over there.” Rick explained, “What I like is the option, you can do what you want.”

In addition to valuing the flexibility the outdoor spaces offered, the students related that they liked the group work and not doing the regular class work. Mia shared it was “different from the classroom where you just listen. The students also shared the concept of control in their activities; there was less direct teacher control when they were outdoors. In Mr. Deinae’s class, Don said “there were two jobs they [students] could choose from.” Dave explained, “I climbed up and down the stairs, and my partner counted the number of breaths I took. . . . it was a more relaxed environment.” In each lesson, except the two demonstrations, the teachers were not directly in contact with each student. Most of the time the teachers were at a distance, and they worked briefly with separate groups, which left most of the student groups to work independently and at their own pace. While asking a group of geometry students who were explaining their proofs in small groups outside a building, one student stated that their group presentations were conducted without the teacher present. He liked not having the teacher present during each presentation. The teacher, Mr. Sum, observed some of the presentations, but most of the time, he watched at a distance. Another student, Rick, discussed why he liked being in the amphitheater, “You’re outdoors . . . and you’re paying attention. It’s like you don’t have to be in the classroom to pay attention. . . . I guess they put you in a classroom because they think that you can pay attention better indoors, but I really have to disagree.” Rick worked with two other students as they completed their assignment, and his teacher worked with one student at least 20 feet away.
Both the teachers and students thought about their learning environments and found a number of ways the outdoors helped students to learn. The teachers valued open spaces that supported their lessons’ specific needs. They also mentioned that the decrease in noise helped their students to focus more on the lesson. The students valued the flexibility in the outdoor learning environment which provided ease of movement, social interactions, and less direct teacher control. Student groups could work in locations they chose, at their own pace, and with their friends.

The next research question examines how the outdoor learning spaces encourage the positive responses from the teachers and students. These new data further confirm the earlier data about the psychological effects the natural environment has on the teachers and students.

**Research Question: How and to What Degree Do These Learning Spaces Encourage a Sense of Motivation and Enthusiasm on the Part of the Teachers and Students?**

Students’ motivation and enthusiasm for learning are important in helping them to stay focused and interested. The teachers each recognized the importance of varying their lessons and providing activities that increase student interactions and positive behavior, so their academic performance improves. Combined with the benefits and enjoyment both teachers and students experienced while working in a natural environment, outdoor learning represents some important values to students, including freedom and trust. This research section concludes with some recommendations from students to improve and increase their outdoor learning experiences in the future.
All three teachers planned lessons that would provide a new and more interactive learning experience for their students. Each of the three teachers had experience conducting class lessons outdoors, and each planned to continue this instructional strategy with changes they identified from their experiences with these outdoor lessons. Each teacher also shared that the experience was a change of pace for their students, was motivational, and helped their students to stay focused and to complete the task.

Mr. Deinae explained, “Academically, it is a complex idea I was trying to get across. . . . That’s why we went to the stairs, so they can experience it, and then we can draw upon it when we discuss.”

Ms. Reed explained, “I think it [outdoor activities] affects them academically. It helps them complete the task to stay focused. I think it increases reading comprehension.”

Student achievement and understanding were the main purpose for the teachers taking their classes outdoors.

Data from Environment as an Integrating Context (EIC) programs showed students earned higher grade point averages, better standardized test scores, and had more positive behavior (Lieberman & Hoody, 1998). Mr. Sum used the outdoor experiences to develop his students’ empirical understanding of mathematical relationships,

As a teacher I can tell them or appeal to their experience, and they can later turn it into something mathematical. . . . I think it is improvement to see them rely on empirical evidence that they can deduce. . . . I could use a computer program, but it would reinforce the authoritative proof.
The students in the geometry class discussed mathematical relationships, such as the relationship between a radius or diameter and a circle’s circumference. Their experiences and study of the data collected supported a discussion of how the constant pi related to every circle they drew. Art explained, “Instead of telling us why it was correct, he was showing us why it was correct. . . . We were expected to find the relationship between the diameter and the circumference of a circle.” The students spent time drawing circles, measuring, and looking at the relationships in their outdoor activity before they had a discussion about the mathematical formula.

The teachers also shared that student behavior was one reason for taking their English and math classes outside. Mr. Sum used the outdoors as a learning space when the students could not complete the first Algebra Explorations lesson in the classroom the previous day. Mr. Sum stated that in the classroom the students would not stop talking and did not focus enough to complete the activity. Ms. Reed noted that work in the outdoors, “definitely helps with the behavior. The class you observed are ninth graders. . . . They are going from class to class and sitting a lot. I see a huge decrease in behavior problems being outside. They are staying on task.” Mr. Deinae recognized that “behavior can depend on a lot of things in the morning. The constraints are the same indoors as outdoors. Make sure they are focused and learning will take place.” The teachers mentioned student behavior was an element in their class lessons, but from observations of all their lessons only positive, interactive behaviors were observed.

Trust and Respect

From the data presented in this chapter, the students shared a variety of reasons for why they liked learning in the outdoor environment. A couple of students articulated
that their teachers’ relationship with their class was based upon trust. Mia felt her teacher’s decision to go outside or not was based upon a teacher’s trust of his/her students when she made a recommendation for other teachers to take their class lesson outdoors:

“Trust your students and take them out because they would learn more outside than inside. . . . outside they have the actual chance to do something, and they won’t complain.” Rick had difficulty finding the words to express his feelings about his teacher taking the class outside. He said he thought his teacher must think a lot of his students to do so. “I can remember in middle school, they did not do that. It [outdoor lessons] helped me. . . . I can’t explain.” Other students liked that their teachers were involved in the lesson, “Mr. Sum even participated. He is the one who helped us learn it and showed us what to do [with] the two by four.” Other students, like Riley, related that they “got more freedom and it was . . . more fun.” The students interviewed in this research spoke respectfully about their teachers, and they had positive comments about their outdoor experiences.

*Nature Is Fun and Provides Space*

Students and teachers liked being outdoors because the outdoor environment is fun, close to nature, and provides the space needed for learning. Mr. Deinae acknowledged the relationship between student learning and motivation, “Academics are measured in success in a lot of things. Most of it is motivation. If they are motivated they will learn. So you get them up outside of the four walls, they will be more receptive.” The students all expressed a positive response to going outside, saying it was “fun” or “cool.” Students shared that they thought being outside was better than being inside the classroom. Mia said it was “better than in class because when you’re outside, you have, I
guess, more freedom.” Dave said, “I liked that we got to go outside, and go somewhere
different than we’re used to. Being inside the classroom makes it dull.” The students had
many reasons for why they liked working outside the classroom, and if it was fun, they
indicated they were more motivated. When asked what fun meant, at least one student
said it was fun because of the space he had and being able to work in a group. Most
students had a number of reasons for why the lesson was fun.

Learning outdoors also allowed the students to experience the content in a natural
setting, and every student had something positive to say about the natural environment.
Al was enthusiastic about his experience of studying in the amphitheater because of “the
fact that it looks amazing. You go up a hill and look down, and it’s amazing . . . there are
trees everywhere . . . looks cool.” The students mentioned the importance of the campus
having trees and space. Dave noted, “It’s clean for the most part and there’s a lot of green.
I know we replaced the bushes we had with grass. It’s a friendly space.” Don liked the
“big, open space. We got to do different activities in a safe space.” Another math student
related that the environment was less built, “I do dig the lack of halls. Like, it is not just a
maze of halls. It has a nice courtyard and stuff.” The students also mentioned more than
once that they liked the blue sky, sunshine, fresh air, and breeze.

There is a relationship between increased green space and vegetation around the
home and community environment and a decrease in attention deficit disorder factors
(N. Wells, 2000). The students also used the terms freedom, relaxing, nice, and peaceful
to describe their experience. Ron summed it up, “It is really relaxing when you work
outside, so it is easier to think and write down whatever you have to do.” Mia added, “It
relieves stress from school. You’re still in school, and it relieves the tension from the
classroom. I guess you have more air than in a classroom.” Don, who did not care for the outdoors, conceded, “I’m not a big nature person; I just like fresh air.” Sue liked the outdoors because of “the way it looks and sounds . . . it feels peaceful, and the only sounds are the animals and wind in the trees.”

The teachers also liked the change of pace and being close to nature. Mr. Deinae used the example of camping and roasting marshmallows as a common experience the students could all relate to. Sue made a similar comparison when discussing why she liked the outdoors, “I have always loved camping, so doing the class outside is fun.”

Ms. Reed recognized that activities inside her classroom produced too much noise:

It gets loud in the classroom. That is an issue when you are doing group activities, even though they are on task. It gets noisy. The groups distract each other. It [the outdoors] gave them room, the physical room to manipulate the objects for them to construct the tower.

The teachers recognized the many physical locations the campus had to offer from lawns, hardscapes, a football stadium, and canyons for environmental issues. When describing the main quad area, Ms. Reed related, “It is kind of nice because it is spread out enough that the noise is not a factor. It is close enough, so I can see each student.”

Outdoor Learning Recommendations

The students and teachers both expressed their enthusiasm for being actively involved in an outdoor activity. Sue explained, “You are actually doing something and listening. [It was] different from the classroom where you just listen. I was active, and I wasn’t bored.” Mr. Deinae recognized that by changing the learning environment, “you get the students to focus. . . . They won’t be bored. They will be intrigued.” Ms. Reed felt
her students “stayed more focused. I think they comprehend more.” She also stated from her group activity, “the kinesthetic learners increased attention.” Mr. Deinae believed that varying the routine helped students to pay attention as well as varying his instructional strategies. “Everyone has different learning styles, and I try to vary my teaching styles for different students.” Ms. Reed also felt that kinesthetic learners benefitted from doing their work in an outdoor environment, “For some students the physical movement, trying to remember to recite lines, I think kinesthetic learners, increase attention.”

Both the teachers and students also recommended the need to provide more outdoor learning activities. Each student recommended outdoor lessons as a way to help students learn. Dave reflected that having classes outdoors, “should vary depending on what the subject is and if it can benefit from teaching it outside or not.” One focus group student suggested that outdoor lessons would make him want to come to school. Sue thought a fountain would help. Al thought having tables on the lawns near the classrooms would help, “so you can sit down and think or do something.” Other students recommended providing more natural environments, such as lawns and trees, near the classrooms. Each of the students recommended his/her teachers should include some outdoor lessons either one or more times per month.

The teachers also reflected upon their lessons, and they each contemplated specific ways to make their activities more engaging. Mr. Deinae explained, “In the future, I’m going to split them [students] up into small groups, so they have to be a part of the activity [mitosis of a molecule].” Ms. Reed recognized some students were off task, but she thought their off task behavior was because she “did not define the time limit. I need to tell them the questions.” Each teacher felt he/she had not changed how he/she
planned class lessons because of the experience of these outdoor lessons. They said they planned lessons just as they would have if the lessons were conducted indoors, but each of them explained how they would adjust their lesson plans in the future. Each teacher explained how he/she would conduct outdoor lessons to increase student attention and understanding. In addition, the teachers’ post-observation interviews emphasized teaching their students concepts and how to integrate the environment more to increase student interaction. Ms. Reed’s comment is more about her students, “For some students the physical movement [helped], trying to remember and recite lines. I think the kinesthetic learners increase attention. It helps with comprehension.” Mr. Sum reflected, “I think the kind of knowledge they acquire is different. In the outdoor activity, at least the geometry ones, they learn a story, so everything has a history.” Mr. Deinae also focused more on his students, “Everyone has different learning styles, and I try to vary my teaching styles for different students. I don’t know if there is an advantage or not.” The teachers’ pre- and post-interviews showed a change from short explanations of the learning environment to more detailed discussions of how students learned.

Both the students and teachers share their enthusiasm for participating in outdoor lessons. The teachers first considered the academic benefits from increased student focus and understanding and then planned around student behavior considerations. The students were motivated by being close to nature, having space and freedom to move around, and learning by doing. A few students shared that teachers need to trust their students and take them outside, and every student recommended outdoor learning as a way to motivate students. The teachers also reflected upon their lessons and through the experience of
these outdoor activities, they did change their thinking about how to engage students in learning.

The next research questions will examine why and how teachers plan their lessons in an outdoor learning environment. Some of the findings reported in the first research question data also address the teachers’ choices in planning outdoor lessons, the ways teachers and students leverage outdoor learning areas, and their motivation and enthusiasm for using such spaces. The upcoming sections will further substantiate these findings with additional data.

Research Question: Why Do Teachers Choose to Include Outdoor Learning Activities in Their Instruction?

Teachers plan lessons aligned to state content standards that will engage students in the learning. The three teachers in this study shared their lesson planning process. They first considered the broader concepts defined by the standards that they wanted their students to understand. Then they thought about the location and student activities to help them gain a greater understanding. The class lessons were more developed than simply giving the students a worksheet to complete. Each lesson began with a preview of what they were going to learn, and then they were organized into groups or as a whole class activity and provided instruction on what they would complete in the outdoor environment. Some data would be collected or a class activity conducted which would later be shared and discussed to add reflection and clarity. In some cases, as presented in the first research question, the activities provided the students with a physical understanding of the concept. The three main reasons teachers chose to take class lessons outdoors were: first, the outdoors helped students to learn about the concept through an
activity; second, to stay focused on the activity; and third, to support the group interaction.

*Conceptual Learning Experiences*

Data from the outdoor class lesson observations, teacher interviews, and lesson plans analyses revealed teachers’ emphasis upon teaching a concept. The science and math teachers planned lessons that included physical experiences to help their students better visualize and understand concepts. Mr. Deinae held a demonstration outside his classroom in a large open space, so students could watch and physically participate in the process of cell mitosis. The students began by standing in a circle around the teacher who placed a rope representing the nucleus of a cell in a large circle. He had six students stand inside the rope nucleus. The students physically moved through the phases of interphase and mitosis as he explained the processes. The first six students, representing chromatids, aligned with six more chromatids, using a ruler as a bond or centromere to form a chromosome. The chromosomes lined up, broke apart, and a new nucleus was formed around each new group of six chromotids with a surrounding rope nucleus, and the cell divided around them. Later, Mr. Deinae would refer back to the activity as the students discussed the process they had observed and participated in, saying, “Remember when we were out doing our model?” Mr. Deinae also chose to use an outdoor learning environment because it was a different experience. “It is easier for them to focus and mimic, to help them to draw upon the experience as they learn chemistry.”

Providing a physical experience is an important aspect of Mr. Deinae’s instruction. He reflected upon his physical demonstrations, “The goal of the lesson [is] to help students to visualize the idea that a large molecule can be broken down . . . basically
visualization.” Mr. Deinae also focused on the students’ engagement, and later he explained how he could improve the activity, “In the future I’m going to split them up into small groups, so they [all students] have to be part of the activity . . . then do sets of chromosomes instead of one group and watching, to get them engaged.” Mr. Deinae’s lesson plans emphasize how the outdoor demonstration will be conducted, the process of cell division or mitosis to be presented and discussed as a sequence of events, and when to introduce the new vocabulary. He noted in his lesson plan that he would “introduce the formal phases of mitosis by mentioning the names in correct sequence, so they [students] will become familiar with them before the classroom discussion.” Mr. Deinae did not address the specific needs of the outdoor environment probably because he only used a large open space not far from his classroom, an area for which he did not need to make any specific plans.

Mr. Sum planned outdoor geometry lessons in which the students had experiences with tools, including a 2” x 4” board to complete the task. “I like the outdoors, so they can focus on the concept that is more abstract. . . . So my attempt is always to necessitate geometric concepts. By necessitate, I mean Harel’s concepts of necessity, duality, and repeated reasoning.” Mr. Sum explained that he tries, “to necessitate measurement, and [he feels] the size of the object helps student to see the need for communication, computation, collaboration. . . . The tools also frame a challenge for the students. . . . They can walk around a circle when they are drawing it, and it can help them to embody the concept.” Mr. Sum’s lesson plans include an emphasis upon using the tools. He wrote in his first lesson about parallelism, “The students will use various tool to determine if two given lines are parallel.” The tools included a magnetic compass, a tape measure, a
protractor, and chalk. His note about what he would emphasize stated, “Focus on the magnetic compass as implicitly using a transversal to determine if two lines are going in the same direction. This is an intuitive way of thinking about parallel lines.” In his second geometry lesson about constructing perpendicular bisectors, he mentioned that “the students have already investigated this topic indoors using the Geometer’s Sketchpad.” This lesson’s emphasis was to encourage the students to question whether their methods of constructing an isosceles triangle actually worked. He wrote, “Connect to a conjecture that every point along a perpendicular bisector is equidistant from the end points of the segment.” During the outdoor lesson, he gathered the class two times to ask questions about how they knew their methods were correct and to provide the reflective time for them to think about how they know their answers are correct. He also established the practice of questioning and proving that would be included later when they wrote their first proofs. In each of Mr. Sum’s outdoor geometry lessons, a concept was at the center of the activity that the students learned.

Mr. Sum’s algebra classes participated in outdoor lessons to learn concepts they struggled with indoors. He moved the students to the amphitheater to change the learning environment and to teach the concept in a different manner. During the class activity in which the students practiced a symbolic way to check if the answers were correct, the students learned how to evaluate numeric representations with triangles and squares. They learned the concept prior to learning the mathematics, and they practiced it in small groups.

Ms. Reed used the outdoors to provide a physical space for an activity, such as the tower building project, that would help students to learn about themselves and how they
interacted with their group members. In her lesson plans she framed the purpose of the personality profile and tower building project as developing team relationships. She wrote that she would “discuss the vision of the skills necessary to be a successful employee (problem solving, ability to work in a group and understand how you function in a group).” After the two activities she included a discussion of how the groups worked together and “how that relates to the expectations of future employees.” Her goal in building effective teams was also in preparation for the students’ upcoming group work in conducting a research project.

In addition to team building activities, Ms. Reed included outdoor lessons to help students to learn and recite lines, “I think physical movement . . . helps them to remember. Sometimes students will re-enact a play; they will walk back and forth.” She provided more weekly outdoor lessons, particularly reading outdoors on Fridays. Although she did not necessarily plan her lessons specifically to teach a conceptual idea, she had a purpose in developing their teamwork and literacy skills. She felt the physical movement and space helped her students to memorize and to re-enact a play. Ms. Reed also used the Friday outdoor reading as a reward to help every student to remember to bring a personal reading book, and she noted few students forgot to bring a book on Fridays, especially when there was nice weather.

The teachers’ lesson plans emphasized their conceptual goals in developing the students’ learning. Mr. Deinae developed lessons that continued his conceptual instruction about DNA, energy, and ATP production. Mr. Sum’s lessons laid the early foundations for students to question and prove their mathematical thinking in preparation for learning how to create geometry proofs. Ms. Reed prepared her students through
teambuilding activities for a future group research project. She also provided ongoing access to the outdoor environment to strengthen students’ reading skills.

*Location Increases Student Focus*

Each of the three teachers thought about their students’ learning environment when they planned student lessons. They chose their outdoor environment to provide space to support student group work, to experience nature, and for noise dissipation. Mr. Deinae’s philosophy is “to use something new to move students outside. Anytime you can change the location, you get the students to focus. It holds their attention any time you can vary the way it [instruction] is presented.” Mr. Deinaes’ lessons took place where there was a large open space (the mitosis demonstration), where there were stairs for increasing student energy (respiration activity), and where he could break up a piece of wood near his classroom safely and with less noise (the ATP lesson). Any open space where the class could stand provided a demonstration area.

Ms. Reed noted that studying outdoors “helps them [the students] to complete the task, to stay focused. I think it increases reading comprehension.” The students themselves also mentioned “focus” seven times in their interviews as a description of the effect of outdoor learning. Ms. Reed’s lesson plan included her description about how the students will use the outdoor environment during the tower activity, “The students will spread out in the quad, so they cannot see each other’s work.” She checked that each group could not see what the other groups were doing. The secrecy and competition also added to the excitement during the activity.

Ms. Reed also shared that her students were calmer and more focused when they worked outdoors, “It [the outdoors] is conducive to reading and writing. The trees provide
shade. I think sometimes just being out feels like a change in routine.” During the class lesson in which the students read an article and took notes, Ms. Reed said she could not have done the assignment because in the classroom, “the students who are easily distracted would be inattentive.” From observation notes, the students were not distracted while they spent 45 minutes reading and taking notes, even when a custodian was picking up trash a few feet from the students and the crows cawed in the trees. Her students demonstrated that their attention was on their work, and some finished the assignment early.

Supports Group Work

When the teachers were asked if they thought outdoor learning affected their students socially, they had different opinions. Mr. Sum and Mr. Deinae responded that the students would group themselves with their friends. Mr. Deinae considered whether or not to regroup the students if it made a difference in the learning experience. He also felt that when the students worked closer, it was easier for them to discuss: “It comes quicker, more spontaneous because of the closeness.” He cautioned that teachers needed to “watch out for those who are hiding.” Mr. Sum said he did not perceive a large social effect; however, all his lesson plans for the geometry and algebra students included some group activities in which the students had to work together. Ms. Reed, however, planned her lesson to learn more about how her students interacted with each other socially in order to prepare for a future group project when the students would work together on a research project. Ms. Reed considered how the students would interact in groups. She reflected, “Oftentimes the students have a hard time engaging. In the group dynamic they took a leadership role.” The teacher also noted that being outdoors helped students to work
together: “Normally in the classroom, it is about them. I have a lot of extroverted students. It [group work] gave many of the students an opportunity to stay on task and to finish the assignment.”

Providing time for students to reflect upon their learning was important to all the teachers. Mr. Sum included time for his students to gather at the end of the lessons in order to discuss their learning. When his students finished measuring the number of radii that went around the circumference of a circle, they moved to a lawn nearby and the teacher guided them to understanding the constant pi and its relationship to the diameter of a circle. Although Mr. Sum felt that students paid more attention during discussion time when they were in the classroom, observations of his students on the lawn indicated they were all attentive during this time when they were outdoors. During the pi lesson at least one-third of the students participated by answering questions and making predictions. Mr. Sum also noted on his lesson plan that from the class discussion of pi they would then derive the formula for the circumference of a circle. The key points for Ms. Reed’s students came during their reflection as they related their group interactions to the expectations of future employees. Mr. Deinae also noted that the class discussion after the demonstration would “relate the activity level to respiration level.” His goal written in his lesson plans was for the students to “relate Oxygen consumption to ATP production [and] ultimately to cell respiration.” Each teacher considered the reflection time with their classes was important for the students to build a greater understanding from their outdoor activity.
Supports Individual Work

Open spaces allowed students to spread out and provided easy movement. Each teacher observed in this study sought outdoor spaces in which students had room to physically move around, draw geometric shapes, or separate into small groups. Ms. Reed liked the quad with the planters, “because they provided seats and privacy and shade. They are spread out, and they have privacy and room to work.” She also explained, “We need a large space where we can spread out. The students need privacy. They need room to work, to manipulate objects.” Her tower lesson plan also stated, “The students will spread out in the quad, so that they cannot see each other’s designs.” The students did work well individually and together as a group when they had room to spread out. Mr. Sum liked “the grass, open spaces, the amphitheater itself,” as places for students to learn. Mr. Deinae said, “I think about what the students know and don’t know, and how I am going to cover the material in the curriculum.” He also considered the concept and location of his lesson when planning his instruction.

Sometimes the outdoor lesson does not provide for a lot of student movement, but it is still effective in supporting the instructional goal. Although Mr. Deinae’s two demonstrations meant that most or all of the students were standing and watching either a group of students or their teacher, they did help the students to remember the activity and to understand the lesson. Dave said when the wood was broken during the ATP demonstration, that “the block is a physical model to show an energy model being broken down. Just seeing it helped [me] learn the subject we were learning.” The teacher also related that he could not have performed the block splitting activity inside the classroom because of the noise of the hammer and the safety distance needed between the students
and the demonstration table. Don shared his photograph of the ATP lesson, “It [the lesson] got to the idea of what we were thinking” (see Appendix F, Figure 2).

Sound was also a consideration in the teachers’ lesson planning for individual learning experiences. Ms. Reed often moved her class outside to the quad lawn to support student reading and writing. “If we have had three rainy days, and I can feel the mood of the class, we can move outside. . . . Then I can use it as a reward on Fridays.” Her students could be separated when they sat on the curved wall or around the planters, making it difficult for students to speak to each other. One focus group student said, “It is kind of better because you weren’t inside the classroom; you had more space outside to think and do work.” Dave noted there are “no noises that are distracting for the most part.” Sue said she was “able to work without talking much and getting off task.” The students’ photographs showed them reading or writing assignments in the quad. Some students reclined against a planter, under a tree, or on the seating wall.

The data revealed teachers planned their outdoor lessons to support the students’ conceptual learning and group team building as well as to increase student space, focus, and social interactions. Their lesson plans indicated that the conceptual learning or literacy skills were the primary purpose for their lessons, but the locations were essential in reaching that goal. Each teacher indicated specific lessons could not have been effective indoors, and that by taking the class into the outdoor environment the students could participate in an activity that would bring them to a higher level of understanding.
CHAPTER 5—DISCUSSION

More than just field trips or playgrounds, outdoor environments offer hands-on, integrated, and thematic learning and help students gain an appreciation for the natural environment. (Tanner, 2001, p. 64)

Chapter 5 summarizes study findings, provides recommendations for educators and education policy makers involved in making decisions about school facilities and instructional supports, and makes recommendations for future research. This study explored the relationship between student engagement and outdoor learning environment. Chapter 4 discussed the findings from the data collected during class observations, student photo interviews, a student focus group interview, teacher interviews, and lesson plan and student photo analyses. A profile of the students, classes, and teachers involved in the study was also included to provide background of the students placed at risk and the curricula in which they were engaged. Chapter 5 will review the study, its problem, and major findings from the data. The discussion of findings and how these relate to literature helps to extend the current body of research on student engagement and outdoor learning environments. Unexpected findings and implications further suggest how the findings can effect change in instruction, facility planning, and education policy. Recommendations for future research offer possibilities for further research that may guide educators in their efforts to take their students and their instruction outdoors. The recommendations will also provide direction and needed supports to school designers, educational leaders, teachers, principals, and policy makers to create appropriate outdoor learning facilities and implement professional development in these often overlooked instructional strategies.
Summary of the Study

This qualitative study was designed to better understand how taking class lessons outdoors affects student learning. Research indicates that outdoor learning and positive outdoor environments are related to higher student achievement (Lieberman & Hoody, 1998; Tanner, 2000). Students placed at risk need instructional supports to help them stay engaged in class instruction to earn essential credits that will help them to meet graduation requirements (Marks, 2000). Fourteen of these students were observed participating in outdoor class lessons. They were given cameras to take photos of what they thought was significant about the outdoor lessons, and later the students were interviewed individually or in a focus group. The students’ photographs helped them to recall their class lessons, and they served as artifacts about what was important to their learning and their feelings while engaging in the outdoor environment. The teachers were also interviewed before and after the student observations. Their lesson plans were also reviewed to determine if involvement in this study affected how they planned their lessons and thought about their students as learners.

Major Findings

Increased student engagement is an important step towards engaging students in a school community and increasing student achievement (Yazzie-Mintz, 2007). The findings from this study substantiate much of the research related to increased student engagement to encourage students to stay in school and graduate. The findings also supported the research about the relationship between student engagement and environmental psychology, design, and learning environments, including the school’s outdoor learning environment.
The data collected from the observations of the outdoor lessons and interviews with the student and teacher participants in this study provided insight into a variety of instructional strategies, outdoor locations on the high school campus under study, as well as the thoughts and feelings of teachers and students who were involved in the experiences and places. The major findings concerning student engagement in outdoor learning at the high school level are presented as responses to the research questions with the goal to inform school designers, principals, teachers, and policy makers about the benefits of providing outdoor instructional facilities, along with appropriate guidelines as instructional supports for all students.

**Student Engagement**

Outdoor learning experiences facilitate academic learning, cognitive development, environmental stewardship, and safety (Education Development Center, Inc. and the Boston Schoolyard Funders Collaborative, 2000). In addition, place-based education provides a real-world context that is missing in strict adherence to textbook lessons and rote memorization (Yager, 2003). From the extensive research in the fields of student engagement, school learning environments, and environmental psychology, the students’ and teachers’ responses to the outdoor lessons in this study reflected and further substantiated research findings. Students gained conceptual understandings they could not have experienced from reading a textbook or by taking notes in a classroom.

The main focus of the student observations and student and teacher interviews was to learn how student outdoor learning experiences encouraged student academic, behavioral, psychological, and social engagement. In addition, the teachers’ lesson plans and student photographs were studied to further understand these four areas of student
engagement within their outdoor learning experiences. In addition, the researcher’s field notes and observation rubric helped to provide an observer’s viewpoint of the teachers’ lessons and the students’ engagement in the outdoor activities.

*Academic Engagement*

Student engagement is defined in terms of participation in school life, the affective and behavioral participation in the learning process (Marks, 2000). Marks’ seminal study of student engagement revealed the highest correlations to student engagement in school came from a student’s feelings toward school, authentic instructional work, and social support. Assignments that were cognitively challenging showed the strongest influence upon students’ engagement in learning. The finding from this study reflected these conditions for high student engagement. The students who participated in outdoor learning activities were engaged in authentic work that was challenging, conceptually-based, and purposefully planned by their teachers. Authentic instructional work included the students drawing their geometric constructions, measuring circles, monitoring student breathing, building a tower, and taking a personality profile. The students used tools in the biology and geometry classes to collect their data, which would be used to build a greater understanding of curricular concepts. The tower activity in the English class also provided a hands-on activity in which materials were used to build the tallest tower.

Studies of the relationship between students engaged in outdoor learning environments, described as Environment as an Integrating Context (EIC), and student academic achievement found that students earned higher grade point averages, better standardized test scores, and had more positive behavior (Lieberman & Hoody; 1998;
Lieberman et al., 2000). The researchers found all EIC programs “generated enthusiastic and engaged learners” (Lieberman & Hoody, 1998, p. 19). Changes in student performance were not a primary focus of this study, although most students earned satisfactory grades or higher on their semester report card. All teacher research participants reported that the outdoor learning activities helped their students gain a greater understanding of the concepts taught. They also described the ways their outdoor learning activities improved their students’ engagement in the curriculum and learning. The student research participants reported experiencing a decrease in classroom management issues, increased engagement for learning, and greater pride and ownership in class-related accomplishments.

According to the observation and interview data reported in this dissertation study, students stayed focused on their activities, completed their outdoor learning assignments, and made connections between the activities and the main concepts the teachers were teaching. Most students earned passing grades, although a few still did not pass because of their lack of homework completion. The outdoor activities helped all students to earn class activity credit.

The teachers under study planned activities with their students’ specific learning needs in mind, involving them purposefully in the learning opportunities in the outdoor environment according to these needs. These lessons were designed for the students to learn conceptually, as well as from the physical experience themselves. The evidence suggests that teachers’ purposeful planning of activities increased their students’ interaction with peers and the environment, thus resulting in increased engagement with concepts taught. The students also shared that they were better prepared for their tests,
because their activities made an impression on them, and they remembered the concepts assessed on their tests. Each student said he/she was better prepared academically because of their outdoor learning.

Throughout these outdoor lessons, and within the context of individual and focus group interviews, the students demonstrated evidence of their engagement in learning, as well as the understanding of complex concepts that resulted. They reported a sense of accomplishment in completing their tasks whether it was reading, writing, drawing large objects, solving problems, or physically engaging in a demonstration activity. In addition, every student interviewed recommended additional outdoor learning activities. In fact, one student shared that he would want to go to school more if he had more opportunities to learn in the outdoors. Increasing student interest in school is important in motivating students to work hard and to meet graduation requirements.

Behavioral Engagement

Student behavior is also positively related to improved structural conditions (Cash, 1993; Hines, 1996), and during the study no inappropriate behavior was observed. Students walked, climbed stairs, completed worksheets, drew geometric constructions, built towers, solved problems, read, and wrote. The observation rubric identified the students’ involvement in their activities and their academic conversations. A high level of student focus on the assignment, along with significant levels of academic language use, was observed and recorded for every student activity. Students spoke about mitosis, ATP, glycolysis, and respiration in the biology class; bisectors, isosceles triangles, and pi in the geometry class; and symbols, checking for understanding, equivalency in the algebra class. The students in the English class discussed the different names for their leadership
styles, as well as vocabulary relating to the personality profile and their article about zero tolerance. The students’ positive, on-task behavior was one reason teachers chose to take their students outdoors for their lessons. The teachers related that their students’ focus on learning increased when they were outside the classroom walls.

The students’ positive responses to the outdoor learning activities also reflected the novelty of outdoor environment. Students reported that they had hardly ever engaged in learning in the outdoors, and that they enjoyed the chance to move away from the classroom. The students described the indoor classroom as a confining space, and they described the outdoor learning environment as one that is fun, different, and relaxing.

The students also benefitted from teachers who thought about how they would learn best. Their lessons were planned to actively engage the students in an activity that also increased interaction with other students. The students’ learning was at the center of the teachers’ lesson planning, and as a result, the students’ lessons provided for more interactive activities that encouraged focused discussions, participation, physical movement, or reading and writing.

Within these student-centered learning activities, the students’ participation was often more physical. The inclusion of activities that supported multiple learning modalities provided differentiated instruction for all students to engage in the learning and to increase interaction with the environment, tools, and other classmates.

_Psychological Engagement_

Research results suggest that the highest increase in academic performance occurred when students experienced activities in which they concentrated, experienced enjoyment, and provided immediate intrinsic satisfaction that supported future learning
(Shernoff et al., 2003). The students in this study experienced these feelings and felt the immediate satisfaction of having completed important work that increased their understanding of geometric constructions, pi, respiration, mitosis, and leadership styles. Every outdoor activity was a preliminary learning experience in support of concept(s) to be revisited in future assignments.

Previous research found a relationship between student affective performance (feelings) and the physical conditions of the school and classroom (Cheng, 1994). A quality learning environment was one which provided space and was neat, clean, and free of pollution. The students expressed enjoyment in being able to participate in outdoor learning activities, saying it was “fun” and “cool.” They noted different outdoor features that were important to them, such as the green lawns, number of trees, well kept vegetation, and well planned seating areas.

The students were motivated by their positive feelings about the outdoor learning environment and the social supports provided through the group work. Finn and Cox (1992) found that students who participated in learning activities had distinctly higher academic performance. The students in this study participated in outdoor learning activities that involved physical movement, use of tools, group work, individual personality profiles, reading, and writing. Students experienced increased physical movement as they moved to their learning environment on the school campus, and most lessons provided for the physical use of tools or interactions with the built environment such as the stairs, fire lane, and amphitheater. The students sat on lawns, seating around planters and lawns, and under trees. They used the open spaces to separate their groups and sometimes to bring the class together for a demonstration or discussion. Students
could easily move around, and often they walked to areas on the other side of the large campus. Often the students were surrounded by trees, vegetation and lawns, and even in a parking lot, they felt surrounded by the trees and planted hillsides as they participated in activities.

Environmental psychologists have studied children’s interactions with nature, determining that the natural environment played a significant role in the children’s attentional capacity and cognitive functioning (Hinds & Sparks, 2007; N. Wells, 2000). Additional studies have found a decrease in stress related to how immersed a person was in the natural environment (De Kort et al., 2006). During interviews the students described their outdoors experiences as being relaxed or relaxing. In addition, the students said that learning outdoors resulted in less stress than being indoors, acknowledging their own physical and affective responses to the natural world. The students talked about the sensory experiences they had when outside, such as breathing clean air, feeling the sun on their face, or in hot weather, sitting under the shade of the trees, and hearing sounds such as the wind, birds, and insects.

The students’ physical activity also appeared to increase their focus on their work. The biology and geometry students stood and moved the most. The English and Algebra Explorations students walked to their outdoor learning area, and then they sat most of the time, but they could move where they wanted, and they tended to spread out across a large space. When they worked in groups, they moved around, so they were active then. The students all said they appreciated the physical movement because they did not feel confined, and they liked being active.
Research results recommend learning that is experienced, challenging, and relevant while allowing students to feel in control of their learning environment (Shernoff et al., 2003). Student research participants made frequent references to the increased levels of freedom they were afforded when learning took place outside. The students could choose where to work had ease of movement, and were allowed to determine how to solve their problem. The students noted how their freedom to discuss, move, and work autonomously gave them a sense of control over their learning.

Social Engagement

The students and teachers valued the collaborative activities in the outdoor environment. Researchers have found student achievement is positively related to participation and cooperation (Peterson & Fennema, 1985). All three teachers in this study planned group activities in which the students worked collaboratively to complete assignments. The students said they learned from their peers, as they were able to talk freely, and appreciated having the group’s help in completing all the tasks. Students who shared that they were not normally social within the class context also said they liked meeting other students and getting to know them during their outdoor activities. In addition, students learned more about themselves as they worked with tools, participated in the respiration activity, and completed the personality survey.

Students who are at risk of not graduating from high school also need support that addresses their social-emotional needs (Pickett, 2007). The students shared a sense of belonging, particularly students who did not know many other students prior to the outdoor activities. The social interactions helped all the students to complete their outdoor assignments, and their academic success helped to influence the students’ sense
of belonging in the school, important factors in keeping students engaged in school (Dei, 2003; Finn & Cox, 1992).

In addition, high quality discourse, including authentic questioning, was related to increased student engagement (Newmann, 1992). Observations of the students engaged in collaborative work revealed they were on task most of the time, and their conversations with peers contained a high level of academic language. The students applied the academic language their teachers modeled. Students who worked individually during reading or writing lessons in the English class also interacted informally when they were seated near a friend. Sometimes they quietly asked a clarifying question. Group work increased the students’ focus on their activity and added to the enjoyment they felt when working outside the classroom.

Teachers purposefully planned for this social engagement as a means for students to learn from each other as well as about themselves. Social engagement helped the students to complete their assignments, and it increased students’ enjoyment of the activities.

Leveraging the Qualities and Elements of Outdoor Learning Spaces

Tanner (2000) found that freedom of movement related to increased student achievement. The open design of the outdoor spaces at Paul Revere High School provided students increased freedom of movement and autonomy from ongoing direct teacher supervision. Increased space per child resulted in more child-centered activities that increased student engagement and encouraged closer student-teacher relationships.

Because the students had more options in how they moved, worked in groups, and discussed their activities, they felt they exerted more control over their learning. Students
who were engaged in individual reading and writing activities could choose where to sit in the open quad area, and they could stretch out on the seating wall, lean against a planter, or sit beside a friend. They could quietly talk to a partner if they had a question, and their teacher was not standing over them during the activity. The students could spread out in the fire lane, park lot, and amphitheater activities. They could stand close to their partners during breathing counts in the respiration activity, and they could form a circle around their teachers during biology demonstration lessons and geometry discussions. The students also used the planters and seating areas as tables to write on. When the students did interact with their teachers, it was less formal. They stood close to each other and shared impressions of the activities as they unfolded. The teacher’s role was more as a facilitator, answering questions or giving advice.

The teachers leveraged the qualities of the outdoor learning environment to take advantage of the open space as described above, supporting students’ conceptual learning and group team building as explained in detail in the previous research question. The biology teacher chose open spaces and physical features like the stairs to engage the students in the outdoor environment. The math teacher used the fire lane near his classroom for both geometry and algebra students because of its proximity to the classroom and ease of moving equipment and tables back and forth. The large space allowed his students to spread out when drawing the geometric constructions on the black asphalt and for a long line of tables when the algebra students were preparing for their final exam. The algebra students also used the amphitheater as a large classroom in which they could listen to and observe the teacher’s lesson before breaking into groups to complete the activity. This variety of locations reflected the teachers’ many ways of
engaging students in the learning. The teachers usually supported their students’ learning with lesson guides, questionnaires, and rubrics. One geometry lesson did not provide a clear guide for the students’ use of equipment to draw geometric constructions, but by following ongoing instructions provided by the teacher, the students gained the experience and questioning of congruency that the teacher intended. The researcher also observed other teachers leveraging different elements and qualities of the campus in other classes, such as when students used the planter areas for speech practice or measured speed and velocity of different students’ running activity on the main quad lawn.

All the outdoor spaces were large areas that provided flexibility, supported the lessons’ purpose, and allowed the students to spread out and enjoy the outdoors and weather. The only drawback was that sometimes the weather was rainy, and then the lessons had to be rescheduled. From observational data, hot or cold weather was not a deterrent for the students. They chose to sit under the shade of trees on very warm days, and said they were glad to be out of the hot classroom. On cool windy days, they said if felt good to be in the sunshine. No complaints about the weather were reported during the class observations.

Both the students and teachers were creative in how they used the outdoor environment to support the completion of various activities and assignments. The students relaxed in the open spaces as they worked individually or in groups. The flexibility and freedom of movement and speaking the students experienced helped them to work together and to stay focused.
Encouraging Student and Teacher Motivation and Enthusiasm

Marks (2000) found school climate affected engagement because students who feel good about their learning environment will engage in their learning. In this study, the opportunity to work close to nature motivated both students and teachers. The teachers were also motivated by the practical aspects of planning novel lessons to engage their students. The students were most appreciative of trust and respect their teachers demonstrated by allowing them increased freedom in the outdoor environment.

Findings from the growing body of research that examines the influence of different aspects of school facilities such as light, sound, movement, colors, and classroom design (Cash, 1993; Earthman et al., 1995; Hines, 1996; Lackney, 1996; Tanner, 2000, 2001; Tanner & Lackney, 2006; Weinstein, 1979) were also reflected in the students’ responses to outdoor learning spaces. Interview data revealed that the students enjoyed working in the outdoors, particularly because they could enjoy fresh air, sunshine, shade, seating areas, and open spaces in addition to the proximity to the natural environment, including trees, lawns, vegetation, birds, wild animals, insects, open landscape view. Air quality was important to the students. The shade of the trees provided cooling on days with hot outdoor temperatures, and the sunshine on cool, winter days provided warmth. The students were surrounded by natural light, and their views of their surroundings extended hundreds of feet to many miles of space and the natural environment. The students took photographs of the lawns, trees, views, and clear skies.

The students’ enthusiasm for their outdoor learning experiences was often summed up in their descriptions that it was “fun” and “cool.” The students were enthusiastic about the physical movement that is very limited indoors, as well as the
increased space and social interactions. Trust, freedom, and independence within work
groups helped to increase the students’ positive feelings about learning in the outdoor
environment.

Teacher Decisions

When asked why they chose to take their students outdoors for class lessons,
each of the teachers in this study shared they wanted to teach a concept, and the outdoor
environment would provide the necessary space and environmental elements and supports
to do so. The teachers also chose the outdoors because it provided an opportunity for
students to experience physically the lesson’s concept. In addition, each of the study
teachers planned lessons outdoors was to facilitate the students’ group work. Although
the teachers did not immediately state that noise was a reason for choosing to take their
classes outdoors, it was a factor in every lesson. The lack of noise supported the students’
focus on the activities and subsequent discussions. Both students and teachers mentioned
the quiet surroundings as a significant advantage to working outside the classroom.

Planning for purposeful social interactions allow for high levels of participation,
encourages students to initiate questions and dialogue with the teacher (Finn & Voelkl,
1993). The teachers’ inclusion of group work in most of the outdoor lessons supported
student engagement in the activities and allowed the students to learn from each other.
Each teacher planned lessons designed to provide group interactions. Space, privacy for
groups, and reduced sound interruptions were the main reasons these group activities
were taken outdoors.

The teachers also planned lessons that would support the students’ understanding
of state standards while creating experiences that integrated the students’ learning and
their outdoor environment. Learning by doing was a significant theme in the teachers’ lesson plans and was a common focus of the students’ photographs.

Research has revealed a link between chronic noise exposure and reading skills (Maxwell & Evans, 2000). Noise is also related to poor persistence on challenging tasks (Evans et al., 1995). In addition, control of internal and external noises was one of the school design factors correlated with student achievement (Tanner, 2000). The teachers mentioned they could not conduct some of their activities inside the classroom because of noise levels within a confined space.

Primary findings presented by the data collected during the observations and interviews, and from the photo and lesson plan reviews, reflect and support previous research findings across a growing body of research. Students manifested both cognitive and affective responses to the natural environment. They demonstrated understanding of the concepts taught and expressed enthusiasm for the freedom of movement, closeness to the weather and natural environment, and positive, caring interactions with their peers and teachers, especially the sense of trust and respect afforded them. The next section will further address some of this study’s findings, particularly those that were unexpected.

Unexpected Findings

This study began as an inquiry into the ways in which outdoor learning environments influence high school students’ engagement in academic learning. The study sought to gain a greater insight into how students engage in their learning activities, and the class observations did provide evidence of a high level of student engagement in their learning. Unexpected findings include the high level of enthusiasm the students
shared in being able to participate in outdoor activities and their sense of pride and ownership in their subsequent accomplishments.

Every student liked being outdoors away from the four walls of the classroom because it was different, interesting, and fun. When pressed to explain why they liked the outdoor learning, the students shared that the open space it provided gave them a physical freedom they did not have in class, as well as the freedom from the direct supervision of the teacher. When students had greater space between groups or individuals, the teacher could not stand near and observe or listen to every comment. The students shared that they occasionally discussed topics that were off task, a behavior that is common to the natural rhythms of most adult work environments. Observations of student discussion revealed that they were almost always focused and on task. The students’ sense of freedom was also reflected in comments made about their teachers’ level of trust in them. Students who had never experienced a lesson outdoors had a hard time finding words to express the appreciation they felt for their teachers’ respect and trust in them. Students took an ownership in their activities, had more control over what they did, asked questions as needed, and completed their tasks. They related positive responses to activities and had a sense of accomplishment in what they completed. Each student shared that he/she completed the task from the outdoor learning activities.

In addition, it was surprising to discover the ways in which teachers’ lesson planning was influenced from their experiences in this study. Prior to beginning the class observations the teachers were interviewed about how they planned their lessons. They reflected upon test scores, state standards, how engaged their students were in one class activity or another, the social interactions of their students as they went through the day,
and the design and limitations of their classrooms. During the outdoor class observations, the teachers tried out various locations and ways of engaging their students in their learning activities. The students’ level of interaction with their environment increased in the biology, geometry, and algebra classes. The biology and geometry students moved more and used more tools. The algebra students moved from table to table every 3 minutes as they solved problems in preparation for their final exam. The observed lessons were not overly complicated or cumbersome to implement, and yet the students appeared to gain so much in their understanding of the concepts and positive feelings about their engagement with their class learning and school.

When the teachers were asked at the end of the study how they would have changed any of their lessons, they each discussed how they would have increased their students’ physical involvement in activities, describing the specific physical features of the lesson, both context and action. The physical location and activities became a primary focus of their planning as they explored ways to include similar and extended activities in future lessons. They thought out loud about how the physical attributes of the learning spaces, as well as the physical actions that might take place within them, influence student engagement and, thus, learning.

The researcher gained a deeper understanding of how complex the lesson planning process was, as well as how creative and thoughtful the teachers were in putting the students’ conceptual learning first. The students also reflected upon their outdoor lessons as “interesting,” “helpful,” and “not the usual stuff.” Their high level of engagement was, in part, due to their teachers’ high quality planning.
These unexpected findings and reflections included the great enthusiasm the students felt for their outdoor learning activities and the changes in teacher planning and thinking about student engagement as a result of this study. Most important was the affective responses the students shared in which they felt enjoyment, pride, enthusiasm for learning, and a greater sense of trust in their teacher’s relationship as a caring adult. For students who may be at risk of school failure, such positive feelings have the potential to help them engage and persevere until graduation. The next section discusses some of the limitations of this study and directions for future research.

Delimitations, Limitations, and Suggestions for Future Research

This study focused on students who may be at risk of failing to stay engaged in school long enough to graduate. The purpose of this study was to learn about the relationship between student engagement and learning in an outdoor environment. The significance of this study relates to the current urgency for educators to decrease the high number of students who are disengaged with school and may not stay to graduate with a diploma. Teachers, working to provide the most engaging lessons to increase student interaction, completion of course requirements, and mastery of state standards, are in need of ways to motivate and maintain students’ enthusiasm in learning. In addition, this study examined one school’s experiences with outdoor learning activities as a readily available and inexpensive way to encourage student engagement in learning.

Delimitations

The delimitations identified in Chapter 1 included the use of case study of one high school during one quarter of the school year. The focus on one school did not allow for any comparisons or contrasts with other schools to gain a broader understanding of the
relationship between student engagement and outdoor learning. Still, the study did provide opportunity for deep and rich description of individual student and teacher experiences. Future studies could include a selection of schools across the nation and at different times during the school year to understand better the effects of location, season, and weather in addition to the influence of the scope and sequence of the courses taught throughout the school year.

Another delimitation of this study included the researcher’s role as participant observer and as the school’s principal. The working relationship with the teachers remained positive and collegial with the researcher throughout the study, and provided opportunities for in depth discussions, increasing the researcher’s respect and appreciation for the teachers’ thoughtful, creative, and caring work with their students. The researcher reviewed the findings with the study teachers, the research assistant, and research advisor. The researcher kept ongoing field notes, and continuously reviewed the interview transcriptions, teacher lesson plans, and student photographs as part of the analysis to establish triangulation and maintain objectivity and validity.

**Limitations and Suggestions for Future Research**

Several limitations should be considered in interpreting the results of this study. First, student research participants were not fully representative of the school’s diversity due to the absence of any African-American students within the research study. Although African-American students were recruited to participate, none returned their Parental Informed Consent or Student Assent forms. This student population accounts for 9% of the school’s student body, and data about these students would have added to this study. This study did include four students identified as current English Learners or recently
transition to Fluent English Speakers. Future research might study groups of African-American students and English Learners for a deeper understanding of the relationship between student engagement and learning in an outdoor environment for these two student populations.

Teacher research participants included only one science, math, and English teacher. Observations of more teachers and students in these core subjects as well as observations of participants in elective curricular subjects and social studies would help to gain an understanding of student engagement in outdoor learning activities across the curricula allowing for increased variety and broader understanding of outdoor learning activities and their influences on student engagement. Further studies might also take place on different kinds of school campuses, including alternative education school campuses where more students attend who are at risk of not graduating. Observations on campuses in other parts of the country would also help to validate these findings.

The conclusions from this study include implications for action, recommendations for improved practice, and final thoughts on the outdoor learning experience for students.

Conclusions

This study is important to teachers and school leaders who are under pressure to increase graduation rates and to increase student performance on high stakes standardized achievement tests. To the degree that high school students stay engaged in their learning, they increase their likelihood of meeting academic performance requirements and earning a diploma. Evidence from this study underscores the value of positive outdoor learning
environments as a means of supporting students’ academic, behavioral, psychological, and social engagement.

Implications for Action

The findings from this study have implications for teachers, principals, educational leaders, school designers, and policy makers who are interested in increasing the degree to which high school students engage in their learning, feel a sense of belonging within their school community, improve their academic performance, and persist long enough to earn a high school diploma.

Teachers who understand the relationship between student engagement and outdoor learning environments may be more likely to take their classes outdoors, even for simple activities of reading outside in the sunshine. Targeted professional development about how to apply outdoor activities as a basis for conceptual learning may increase teachers’ confidence in utilizing outdoor activities as the foundation for deeper student understanding of their curricular concepts. In addition, teachers who understand the affective relationship between student engagement and enjoyment in their learning will be encouraged to provide outdoor learning activities that are child-centered, authentic and academically challenging, as well as physically and socially engaging. Teachers who experience the dynamic that develops between teacher and student in the outdoor learning environment may gain comfort with, and competence in their role as a facilitator of the learning. As they release control and encourage students’ ownership over their own learning, they also communicate a heightened level of trust in, and respect for, their students. Teachers would see that the freedom students experience in the outdoor learning environment increases their participation in discussions and individual and group work.
Principals who are inclined to support their teachers in planning outdoor lessons, encourage learning about nature and engender an environmentally aware school culture. As principals give permission, and provide professional development, they increase the likelihood that teachers engage their students in the outdoor environment. Principals are also wise to pay more attention to the quality of their school’s landscape and seek ways to provide more lawns, trees, vegetation, and seating spaces. Creating outdoor classroom areas near the built classrooms would help to provide easy access and supervision by the teachers. To the degree that principals gain a greater understanding of the adaptability of various outdoor features already available on their school sites, including blacktop as a contrasting background for mathematical constructions, stairs for action experiments, courtyard and lawns as mini-classrooms, concrete circles in lawns as stages for presentations, open quads for physics velocity experiments, and football fields to measure out the solar system, they are able to include landscape design in their facility study, as a means to support student learning and make their landscape needs known to central office leaders and school designers.

Central office education leaders might use this study’s finding as a rationale for a district wide vision of landscape and school site elements to support outdoor learning. Outdoor classroom standards of quality would ensure that all students have access to a minimum level of outdoor learning support including lawns, seating areas, and vegetation and trees, as well as small outdoor learning areas near the built classrooms, eliminating the need for principals to appeal for funding to plant trees or provide outdoor seating.

Further understanding of the ways in which teachers engage students in outdoor learning activities informs the work of educational facility planners and designers as they
envision possible built and natural structures and features that can serve as outdoor classrooms, group learning areas, and individual learning spaces. Furthermore, as educational facility professionals begin to include student engagement as fundamental criterion for design decisions, they encourage educator’s creative thinking about building and site design elements.

Findings from this dissertation study have potential to inform the appropriate design and maintenance of school landscapes as tools of teaching and learning. Research has highlighted the value of authentic, relevant, academically challenging, and social learning, and these elements can be effectively integrated within the outdoor learning experiences. Understanding the connection between instructional practices and quality learning environments may help educators better support students placed at risk to stay engaged in learning and to graduate from high school in substantially higher numbers.

Final Comments

If a child is to keep alive his inborn sense of wonder, he needs the companionship of at least one adult who can share it, rediscovering with him the joy, excitement, and mystery of the world we live in. (Carson, 1965, n.p.)

The above quotation is as meaningful as it was when Rachel Carson wrote *The Sense of Wonder* in 1956 for Woman’s Home Companion under the title “Help Your Child to Wonder.” As educators, we seek to instill a sense of curiosity and wonder in our students, so they become lifelong learners. Sadly, too many high school students disengage, losing the love of learning that motivates adolescents to achieve academically, graduate, and pursue postsecondary options. This study was motivated by an urgent need to identify ways in which educators can increase and sustain high school students’ active
engagement in their learning. Student research participants shared that outdoor learning activities increased their interest, enjoyment, and enthusiasm for learning. The students responded positively to engaging in an interesting experience that expected them to record data, graph it, and draw conclusions that supported a concept they were studying. As Dave reflected, “We actually got to do something.”

According to Mia, “You have . . . more freedom. You are actually doing something and listening. [It’s] different from in the classroom where you just listen. I was active, and I was not bored.” Students spoke about their freedom of movement, freedom to talk with their friends, and a freedom from direct control of the teacher. Rick, an English Learner, concluded that his teachers must care a lot about his students to take the students outdoors. Al shared his joy in being in the natural environment when he described the football stadium and the amphitheater, “You turn around and there is a wood. It looks like a forest; that’s a cool part about it.”

The familiar words of Henry David Thoreau (1999) continue to have meaning for students and teachers alike:

I went to the woods because I wished to live deliberately, to front only the essential facts of life, and see if I could not learn what it had to teach, and not, when I came to die, discover that I had not lived. (p. 72)

Students do notice the natural environment around them, and they want to interact with it whenever they can. In paraphrasing Thoreau, our students wish to live deliberately, to learn what nature can teach, and to discover what no textbook or computer-based curricula can pass along second hand—the outdoors.
REFERENCES


Marks, H. (2000). Student engagement in instructional activity: Patterns in the
elementary, middle, and high school years. *American Educational Research
Journal, 37*(1), 153-184.

Martin, S. H. (2002). The classroom environment and its effects on the practice of
teachers. *Journal of Environmental Psychology, 22*(1-2), 139-156.

experience.* Scottsdale, AZ: Council of Educational Facility Planners,
International.

Maxwell, L., & Evans, G. W. (2000). The effects of noise on pre-school children’s pre-

Merriam, S. (1998). *Qualitative research and case study applications in education.* San
Francisco: Jossey Bass.

environmental schoolyard.* Berkeley, CA: MIG Communications.


education: Creating high performance schools and students.* Washington, DC:
Author.

Newmann, F. M. (1989). Student engagement and high school years. *Education
Leadership, 46*(5), 34-36.

Newmann, F. M. (1992). *Student engagement and achievement in American secondary
schools.* New York: Teachers College Press.


Appendix A

Observation Protocol

Student____________________ Date____________ Teacher______________________

This observation instrument is designed to record the level of engagement of a student in
an instructional activity in the outdoor environment, as well as how the student interacts
with peers and the outdoor environment itself. Student engagement items are based on
observable student behaviors while participating in the instructional activity in the
outdoor environment (Newmann, 1992; Norris, Pignal & Lipps, 2003).

<table>
<thead>
<tr>
<th>Level of Involvement in Activity</th>
<th>Always</th>
<th>Sometimes</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student works well with other students.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student is interested in the activity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student conversation is high quality and focused on the activity.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student listens attentively.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student follows directions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student completes work on time.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student stays focused on the activity.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student works carefully.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Describe the class or student activity:

How engaged is the student in the activity?

How does the student engage in the outdoor environment?

What built structures are used?

Is there anything significant about the student, engagement, activity?
Appendix B

Student Interview Protocol

Description of the strategy:

The purpose of the interview held outdoors in the area of the observation is to be physically present with the student or teacher and to ask them to share their thoughts about the outdoor learning activity and their feelings about it and their relationship to the natural environment. Being in the same environment will allow the student or teacher to make easy reference to the immediate natural environment and manmade structures involved or in close proximity to the location where the learning activity occurred.

Thank you for agreeing to meet with me today, and thank you for allowing me to conduct this study of outdoor learning activities. Learning outdoors is an interest of mine, and I would like to ask you a few questions about the activity I observed and your thoughts about it and learning in the outdoor environment. Your comments will be kept confidential. By sharing your experiences and thoughts, you will help me to better understand how learning outdoors influences how students learn.

Interviews with a student: I have brought the photographs you took when you were participating in your class’s recent outdoor activity. Please take a couple minutes to look through your photos and pick some out that you might like to share as you answer some questions. You may want to group them together by what you thought was significant about your learning activity in the outdoors. This interview should take about 15-20 minutes.

I would like to ask your permission to tape record our interview. The tape will help us more accurately represent your ideas and views. The contents will only be shared with members of the research team. Comments from the tape used in reporting study results will be shared in a way that protects your identity.

(After a couple minutes when the student has had a chance to review his/her photos.)
Are you ready? Do I have your permission? May I begin?

What is your role here at this school? (e.g., teacher or student) _____________

Student Questions:

1. Please pick one of the lessons you have participated in the outdoors to share. Tell me about an activity you participated in took place in the outdoors?

2. Tell me about the lesson in which you took photos, and please share your photos that show what you thought was significant about the learning activity.

3. What were you expected to do?

4. Did you complete the assignment?

5. What was your part in the activity?

6. How do you think you did participating in this activity?

7. Describe what you did?

8. Who else participated in this activity?

9. Tell me how you completed the activity?

10. What was helpful about doing this activity outdoors?

11. What about the outdoors did you notice during your outdoor activity? Do you have a photo of something significant about the activity? Would you please share it with me?

12. How often do you participate in outdoor learning activities often? How many times in the last week or month?

13. What do you like about this activity?
14. How did this activity help you to learn about the subject you were studying? Did you get a good grade on your activity? Did it help you to pass a test?

15. How did you like working with your classmates while doing this activity?

16. What do you like about participating in an outdoor learning activity?

17. What features do you find most attractive about your school’s outdoor landscape?

18. How do these physical features help you to learn when you are outdoors?

19. What other physical features in the outdoors would help you to learn?

20. What do you enjoy about being in the outdoors?

21. What do you like about being in the outdoors?

22. What activities outside school do you participate in that involve the outdoors?

23. What do you like about these activities, and how do you feel when you do them?

24. What would you suggest I recommend to teachers about class activities in the outdoors?

25. Is there anything else you would like to tell or show me about this learning activity or how you relate to the outdoor environment?

Thank you for telling me about your experiences in this activity and other outdoor activities.
Appendix C

Teacher Interview Protocol—Pre-Outdoor Lesson Observation

Description of the strategy:

The purpose of the teacher interviews before the class lessons are observed and the student interviews is two-fold: to gain a better understanding of how the teachers plan their lessons, their motivations and decision-making process in creating their lesson plans, and to answer any questions the teachers may have about the research prior to beginning the study as well as to put the teachers at ease about our relationship with respect to my role as a participant observer and school principal. I will emphasize my respect of the teachers’ work and objective interest in observing the students’ engagement in learning when they are outside the classroom in the natural environments on campus.

Thank you for agreeing to meet with me today, and thank you for allowing me to conduct this study of outdoor learning activities. Learning outdoors is an interest of mine, and I would like to explain what this study will entail as I observe three of your class lessons, interview some of your students, and later interview you. I want to give you an opportunity to ask any questions you may have, so you are comfortable with the methodology of my research study and my relationship in this study as a participant observer. I want to share that everything I observe or hear will be kept confidential. You and all the students involved will have their names coded, so everyone’s identity will be kept confidential. At any time you or a student does not wish to continue in the study, you may discontinue your participation. I am conducting this research to gain a better understanding of how students engage in learning while in an outdoor environment, and I would be glad to share my research with you upon request when I have completed my study. Again, your comments will be kept confidential. By sharing your experiences and
thoughts, you will help me to better understand how learning outdoors influences how students learn. First, I will discuss my research methodology and how you and your students will participate in it. In addition, I will ask you some questions about how plan your class lessons.

This interview should take about 20-30 minutes.

May I begin?

Teacher Questions and Discussion Topics:

1. First, let me explain the different parts of my research methodology and how it will involve both you and your students. Be sure to ask any questions you may have, so you are comfortable with how I will observe the students during three class lessons, how the students will have cameras to photograph their activities, and how I will conduct interviews later.

2. Tell me how you plan your student lessons. What are your objectives? What do you expect the students to know and be able to do to show they have met the objectives?

3. What aspects of the learning environment to you consider when creating your lesson plans for your classes in your classroom?
Appendix D

Teacher Interview Protocol—Post-Outdoor Lesson Observations

Description of the strategy:

The purpose of the interview held outdoors in the area of the observation is to be physically present with the teacher and to ask him/her to share his/her thoughts about the outdoor learning activity and feelings about it and his/her relationship to the natural environment. Being in the same environment will allow the teacher to make easy reference to the immediate natural environment and manmade structures involved or in close proximity to the location where the learning activity occurred.

Thank you for agreeing to meet with me today, and thank you for allowing me to conduct this study of outdoor learning activities. Learning outdoors is an interest of mine, and I would like to ask you a few questions about the activity I observed and your thoughts about it and why you selected to conduct the learning activity in the outdoor environment. Your comments will be kept confidential. By sharing your experiences and thoughts, you will help me to better understand how learning outdoors influences how students learn.

This interview should take about 40-45 minutes.

I would like to ask your permission to tape record our interview. The tape will help me more accurately represent your ideas and views. The contents will only be used by me for taking notes for this study. Comments from the tape used in reporting study results will be shared in a way that protects your identity.

Is it ok for me to begin?
Teacher Questions:

1. Tell me about one of the learning activities you conducted outdoors that I observed. For which class did you plan this lesson? What was the goal of this lesson?

2. What were the students supposed to do during this lesson? How do you think the students did?

3. How do they know that they have met the expectations of this learning activity?

4. Why did you choose to use an outdoor learning environment?

5. How does the outdoor learning environment help the students to learn?

6. Were the students involved in the activity engaged in the learning?

7. Would you change anything about this outdoor learning activity?

8. Why did you choose to take this activity outdoors?

9. What structures in the school’s landscape help you to support outdoor activities?

10. What do you find most useful about your school’s outdoor landscape in supporting student learning?

11. What other areas on campus do you use for outdoor learning activities?

12. What other outdoor activities do you participate in?

13. How do you think your students learn in the outdoor environment compared to how they would learn in the classroom?

14. How do you think it affects their behavior?

15. How do you think it affects them socially? How do they work together?

16. How do you think if affects them psychologically?

17. How does if affect them academically?
18. Tell me about an outdoor activity you planned that went really well, and how did you know it went well?

19. Tell me about an outdoor activity you planned that did not go well, and why do you think it did not go well?

20. Did you notice anything different in how you plan your lessons now from before I observed your students engaged in a lesson outdoors?

21. Is there anything else you would like to tell me about this outdoor learning activity, the students’ learning, how you feel about conducting outdoor learning activities, or how you plan your class lessons in the natural environment?

Thank you for taking the time to answer my questions and help me to understand your outdoor learning activity.
Description of the strategy:

The purpose of this focus group interview held outdoors near the area of the observation is to be physically present with the students and to ask them to share their thoughts about the outdoor learning activity and their feelings about it and their relationship to the natural environment. Being in the same environment will allow the students to make easy reference to the immediate natural environment and manmade structures involved or in close proximity to the location where the learning activity occurred. The students will sit around a table or on one of the main lawns or seating.

*Thank you for agreeing to participate in this focus group discussion today, and thank you for allowing me to conduct this study of outdoor learning activities. Learning outdoors is an interest of mine, and I would like you to share your feelings and ideas about your experiences in this kind of activity in which you are learning outside the classroom. I have observed your lessons, but it would help if I knew more about your thoughts about the activities and learning in the outdoor environment. Your comments will be kept confidential.*

*The focus group interview is really a discussion among all of you as participants, and it should take about 20 minutes. I would like to record your discussion, so it will help me to take notes of your thoughts. The tape will help me more accurately represent your ideas and views. The contents will only be shared with members of the research team or just by me. Comments from the tape used in reporting study results will be shared in a way that protects your identity and all information will be confidential. Ok, let’s begin with the question sheet in front of you.*

1. *You have all had an experience of being outside when you have participated in a learning activity. Think about and describe one activity you participated in that was conducted outdoors. What did you do? How did this activity help you to learn*
the concept your teacher is teaching? What did you learn about math, English, or
science? What was good about this activity or bad about it?

2. Did it help you pass your test or other assessment on this subject you were
   studying? How?

3. How was your learning activity different from what you would do in the
   classroom?

4. Did the activity involve doing a group or pair activity? How did this help you
   work with other students?

5. What do you like about learning in the outdoors? In what ways does it motivate
   you to learn?

6. What kinds of physical things helped you when you to participate in the activity
   when you were outdoors? This can be plants and/or physical things nearby or you
   were in contact with.

7. Would you recommend this kind of activity to other teachers? Why?

8. Is there anything else about these activities or being in the outdoors that you
   would like to share?

9. What would you recommend to your teachers and school leaders about class
   activities in the outdoors?

Thank you for your participation today, I appreciate the ideas you have shared.
Figure 1. Ms. Reed’s lessons: Tower project and personality profile.
Figure 2. Mr. Deinae’s respiration demonstration and stair activity.
Figure 3. Mr. Sum’s algebra students solve problems before finals.
Figure 4. Mr. Sum’s geometry class discussion and drawing constructions.
Figure 5. Mr. Sum’s geometry constructions and class discussion.
Figure 6. Mr. Sum’s algebra class and group work in the amphitheater.