

Fall 2016

Providing Adolescents with Outdoor Experiences to Deepen Nature Connection and Enhance Writing in Science

Amanda Ripa

Follow this and additional works at: <https://digitalcommons.usm.maine.edu/teacher-education-capstones>



Part of the [Curriculum and Instruction Commons](#), [Educational Methods Commons](#), [Junior High, Intermediate, Middle School Education and Teaching Commons](#), and the [Life Sciences Commons](#)

Recommended Citation

Ripa, Amanda, "Providing Adolescents with Outdoor Experiences to Deepen Nature Connection and Enhance Writing in Science" (2016). *Capstone Research Projects*. 2.

<https://digitalcommons.usm.maine.edu/teacher-education-capstones/2>

This Capstone is brought to you for free and open access by the Teacher Education at USM Digital Commons. It has been accepted for inclusion in Capstone Research Projects by an authorized administrator of USM Digital Commons. For more information, please contact jessica.c.hovey@maine.edu.

**Providing Adolescents with Outdoor Experiences to Deepen Nature Connection
and Enhance Writing in Science**

Amanda Ripa

University of Southern Maine

EDU 643; Fall 2016

Abstract

This action research study investigates the use of the nature journal with middle school students for three purposes: strengthen descriptive writing, engage observation and thinking, and bridge nature journaling and student's connection to the natural world. This study describes an interdisciplinary unit in science and language arts focused on the study of seasons, climate, and weather. Nature journals were used as a scientific tool by students to collect data and make observations of nature related to course content. Action research data was collected from a subset of students using the student's nature journals, direct observations, pre and post intervention surveys, and interviews to triangulate data and increase validity. Critical findings indicated that: nature journaling as a literacy strategy helped students practice and improve their descriptive writing using science content; using journals as a tool in collecting scientific data supported students in achieving learning goals in science, and through nature journaling students made a genuine connection with our outdoor place and the living things they had discovered there over repeated visits. In an era where children are

spending more time in front of a screen than in the outdoors, this action research presents a creative tool and evidence based support for educators to provide meaningful outdoor experiences for students connected to educational standards.

Keywords: nature journaling, environmental education, place based education, middle school science

Introduction

Modern children are spending less time outdoors and more time using technology, resulting in a disconnect from the natural world. “A virtual world of digitally transmitted pictures, voices, and scenarios has become more real to this generation than the world of sun, water, air, and living organisms, including fellow humans” (Ground Productions, 2010). Children are spending on average seven hours a day in front of a screen. The time children spend outdoors has decreased, while during the same time period childhood obesity, asthma, depression, anxiety and attention problems have increased; confirming recent research that spending time in nature is good for our health (Ground Productions, 2010). Richard Louv coined this modern phenomenon “nature deficit disorder” in his book *Last Child in the Woods* (Louv, 2005). His work has shaped the way I view childhood, nature, and my philosophy of science education.

Schools and teachers can play a pivotal role in shaping students’ connection with nature and helping students regulate their technology use. Teachers can use nature as

a classroom for students to gain experience in the outdoors, reduce their overall screen time, and even improve health and wellness. The focus of this action research project is to provide students with purposeful experiences in nature while employing literacy strategies to reach science learning goals. While my teaching relies heavily on technology, I hoped to take an unprecedented break from our one to one laptops and help students to improve their observation skills, build a connection to our local place, and also be successful in learning science content. I hoped that students would embrace the technology-free time, build lasting connections with the environment, and enjoy spending time learning in nature as I did as a child, adolescent, and continue to as an adult.

Review of Literature

Scientists, naturalists, and explorers alike have been using journaling to document observations and discoveries around the world throughout history. Journaling with students is also not a new strategy used by teachers in their classrooms however, nature journaling through combining narrative and art to record observations is a way for students to communicate their findings and build personal connections with their surroundings. As a classroom teacher of adolescents, I gleaned from and expanded on the work of others to use nature journaling as a literacy strategy effectively with my students as a means to build their connection to the local environment and meet science standards.

Two themes emerged from the literature review. First that nature journaling can be used at any age as documented in the literature and second that it can be used as a literacy strategy to support student achievement of learning standards. Three authors present action research focused on enhancing student connections with the environment through journaling. Preston and Griffiths (2004) used postgraduate students, Cormell and Ivey (2012) studied 6th graders, and Johnson (2014) focused on the early childhood age range of 2-6 year olds. These articles provide many strategies to connect students to their local environment through the use of nature journals which can be adapted to any age level. In addition, I found Leslie and Roth (2000) provided extensive strategies and supportive theory behind nature journaling and locally focused teaching. Another theme among the literature is the use of nature journals to meet content standards. Both Preston and Griffiths (2004) and Cormell and Ivey (2012) used nature journaling as a literacy strategy for students to achieve learning goals. The literature found can be summarized using these themes and connections.

Cormell and Ivey (2012) provided a program description study that included a purpose for, creative strategies, and exemplars of student nature journals used in a 6th grade science classroom. The authors also elaborated on the benefits of using journals to strengthen students reading, writing, and comprehension in a science classroom and to meet Common Core standards for science, language arts, and social studies. The authors used strategies with their students such as going outside to journal every Friday, reading aloud environmentally themed picture books, using prompts for journaling, honing observation skills through creating a micro-nature trail, using lessons

from Project WET and WILD to support literacy, using standardized test questions for discussions and prompts, and using poetry to develop voice in students' nature journal writing. Cornell and Ivey's action research study indicates that "after journaling students had increased understanding of the environment...better connections among science activities, writing, and the environment" (2012.) The authors also noted that students' knowledge about the environment increased and the quality of their journal entries increased over time.

To measure this, the authors used the students journals as artifacts as well as the Draw and Environment Test Rubric (DAET-R) as evidence for growth. This action research project provides replicable strategies for teachers to implement as a means of increasing students' connection to the environment, meet standards, and practice literacy skills. I used some of the strategies described in the study and used student nature journals as artifacts in my action research project. This study is most similar to my current classroom setting as far as age level, construct, and data collection methods.

At the postgraduate level, Preston and Griffiths (2004) used a collaborative action research approach to foster participants' connections with the natural world through exploring different perspectives and ways of knowing a natural place. Sixteen students visited the same outdoor location at least four different times for two hours each time, had assigned readings, and collaborative discussions over a three month period. The study was part of an outdoor and environmental education unit in a postgraduate course. Students' journals were called "autobiographies" showing the

students' individual connections with a natural place of their choosing. In their entries, students focused on the social constructs and cultural values relating to their outdoor place of choice. One way that the authors directed the students' journaling was through "frames" to focus on different "ways of knowing" a place: experiential, historical, scientific, and artistic. The students used these frames to guide their thinking while journaling. Most students reported a change in their connection or perception of the place. The authors concluded "purposeful and repeated experiences that encourage different ways of knowing a natural place seemed significant in deepening connections" with nature (Preston & Griffiths, 2004). In addition, the authors found a "transformative effect of spending regular time at a place whilst also engaging in reading and reflecting on person-place relationship" (2004). This study adds significantly to the body of knowledge on nature journaling and builds upon traditional journaling by providing different "frames" for the observer to experience their surroundings, which allows for an even deeper connection to grow. With my students, I usually focus on scientific and artistic frames, requiring the use of science vocabulary, species identification, and artwork to accompany their narratives. After reading this study I can see the importance of using different ways of knowing a place, how powerful this can be for the observer to provide a more holistic way of connecting with nature.

Finally, the authors stated a limitation with their pedagogy. Often as teachers we hope that students will extend their connection from one place to others, however, Preston & Griffiths (2004) observed that this is a struggle for students to apply the attachment they have to a place to their everyday lives. I too, have this hope as an

educator and realize the challenge. However, I feel that providing the experiences for students during their formative years helps to build a foundation from which they begin thinking and behaving differently, before they are adults.

Johnson (2014) truly embodies the passion behind the theory of nature journaling with children in her article. While Cormell and Ivey (2012) use adolescents and Preston and Griffiths (2004) use adults as their research subjects, Johnson (2014) delves into the importance of adapting nature journaling with 2-6 year olds which she states is often overlooked. Johnson (2014) applies environmental education theory, to early childhood and Montessori principles to enhance the naturalist intelligence and ecological literacy of young children. Using the nature journal as the primary tool, young children exercise their sense of wonder in the outdoors as teachers provide developmentally appropriate techniques to support language development. The nature journal provides a way to connect experience and words during a child's sensitive period for language. Johnson (2014) states that as outdoor time is increasingly being reduced in elementary and secondary environments, early childhood can more easily take advantage of using outdoor classrooms to motivate learners. Johnson (2014) stresses the importance of providing transcendent experiences in nature for young children to spark wonder and systems thinking during the child's assimilation of their naturalist intelligence, whereas this may be more challenging to do with adults as Preston and Griffiths (2004) found. Small nearby places for children to explore such as worm bins and butterfly gardens provide an outlet for development of motor skills, language and naturalist intelligence. My choice to pursue this action research project with my middle school students was

validated by Johnson (2014) who described the importance of children interacting with nature and continuing this practice through adolescence to foster ecologically literate children and adults.

Johnson (2014) provided a strong argument based on research for using nature journaling in early childhood. What I found very useful for my own action research project were extensive techniques for educators rooted in environmental education, Montessori, and early childhood education philosophy:

- Transforming the “playground” to an outdoor classroom as a prepared environment for children to use their bodies, minds and senses to explore, not just burn off energy
- Use circle sessions outdoors to focus on sensorial connection to the place
- Have journals readily available in the outdoor classroom
- Put care into preparing the outdoor environment to expect high quality results
- Prepare a journal based activity each week which should be in addition to regular designated journal times and free journal expression
- Allow children to share their journals and assimilate their findings
- The teacher should model and share alongside the children
- Provide a word bank on a chalkboard outside; record children’s experiences in their journals as age appropriate
- “Encourage children to think about why and how connections and how the bigger picture relates to the child’s life” (Johnson, 2014)

- Allow children to build on what they experience outdoors through research and discovery back in the classroom. Use technology as appropriate.
- Teacher can use the nature journal as an anecdotal assessment tool; a portfolio of “thought processes, systems thinking development, observation skills, nature connection, language development, and fine motor skills like writing and drawing” (Johnson, 2014)

Johnson closed with “Let nature be the guide and the child’s nature journal tell the story.” This research provided a strong basis for using nature journals as an assessment tool and artifact in research because of the many ways that children can express their learning and development over time, which strengthened my choice in using this as a literacy strategy with my middle schoolers and for my action research project.

Claire Walker Leslie has written numerous books on nature journaling and connecting to the world around us. *Keeping a Nature Journal* is a rich guide and includes a section especially for teachers (Leslie and Roth, 2000). Leslie and Roth (2000) provided many examples of journaling, different ways of setting up journals, drawing techniques, and how to combine narrative and artwork. In addition, Leslie and Roth (2000) described the benefits, skills and knowledge fostered by nature journaling: scientific observation, creative and technical writing, layout and presentation of ideas, reflection, greater appreciation of nature and place, questioning, inventiveness, synthesis and much more. What I found most useful from Leslie and Roth’s (2000) book is the descriptive examples I used to guide my students. It is full of tips and tricks for

individual journaling to enhance the results. The depth and focus on seasonal observations provides many strategies and examples I used with students to meet science learning goals. I also found the curriculum web for nature journaling helpful as I hope to make interdisciplinary connections in my action research project, especially in writing. Like Johnson (2014), Leslie and Roth (2000) also stress the importance of teachers journaling alongside students to demonstrate that journaling is an important activity, not just another task. Furthermore, the authors provide tips for assessing student journals, developing criteria for entries with students and using open-ended prompts in the beginning to focus student observations. Finally, providing students with a reflection page to review their own journals is another strategy I used with my students. *Keeping a Nature Journal* is an amazing resource. It can be used by educators at all levels to enhance their students journaling experiences and was invaluable as I planned for and conducted my action research project.

Research Questions

This action research study investigates the following questions in a rural middle school in Western Maine.

What effect does nature journaling with adolescents have on achievement of learning goals and connection with the natural environment?

1. *What are the effects of nature journaling as a literacy strategy in a science classroom?*
2. *What are effective nature journaling strategies/activities to use with adolescents*

to reach learning goals?

- 3. What are the effects of nature journaling and visiting the same location on student's connection to their local place?*

Research Design

This was a mixed methods research study with 80 middle school students in four classes over a month's time with four outdoor journaling experiences. All students kept journals and completed a survey about their experience. Embedded case studies were used to explore students' experiences and learning in greater depth with a representative sample of four students involving focused observation, interviews, and analysis of their journals.

Pre and post intervention surveys were conducted to measure the effects of nature journaling. The surveys were multiple choice and short answer and conducted using technology (Google Forms). Survey questions were developed to focus on the student's connection to nature and their knowledge of the science content learning goal in order to collect data focused on the constructs of my research question. The pre and post surveys had the same questions (the post-survey had additional questions based on the experiences) to allow for analysis of growth over time.

Observations were done while we were in our outdoor classroom and students were actively journaling. I used a premade observation sheet to identify characteristics I looked for in students' behavior including: focus, making observations of nature (both written and drawn), appearing to be thinking about the task at hand, appearing to be

interested in the subject matter, and remaining engaged for the entire activity. I intentionally chose students to observe for my case study as well as random students to observe during our journaling time but also made sure that I too, participated in the journaling tasks and shared my experiences as well.

The most important data collection tool I used was the students' nature journals as artifacts. As Johnson (2014) stated, the nature journal is an anecdotal assessment tool; a portfolio of "thought processes, systems thinking development, observation skills, nature connection, language development, and fine motor skills like writing and drawing." The students' nature journals showed growth and development over time and allowed me to assess the effects of this strategy in my science classes. At the end of the unit of study, I also used a writing assessment for students to demonstrate proficiency of the learning goals (See Table 1) where they used the information they collected in their journals as evidence to support their claim.

Finally, I used interviews to gain an in depth perspective from students' experiences during the intervention. I interviewed the case study subset group as well as select students based on the results from the other data collection methods. Choosing a variety of students to interview helped provide me with a deeper look into the effects of nature journaling with my students.

Interdisciplinary Unit Introduction

"Are Maine's seasons changing?" This was the essential question for the unit of study focused on seasonal changes, weather, and historical climate patterns over time

(not just within a year, but over many years). To investigate these topics, students conducted research, collected their own data in our forest classroom and stated a scientific claim based on the evidence they collected. To further develop their skills in science and ELA, students participated in nature journaling to practice with descriptive writing, sketching observations, and recording weather data. The culminating activity allowed students to practice their writing skills in science through answering the essential question in constructed response format. The interdisciplinary unit combined science content with ELA writing and language usage learning goals (See Table 1).

Table 1. Unit Learning Goals

Subject	Topic	Learning Goals
Earth Science	Universe	Understand that the tilt of the earth on its axis causes seasons.
Earth Science	Atmosphere and Weather	Understands the relationship between location on earth, weather patterns, and regional climate. Understands the factors that are used to predict weather.
ELA	Narratives	Is skilled at expanding descriptions that include sensory details
ELA	Use of Language	Understands figurative language enhances meaning beyond the literal meaning of words. Understands authors use figurative language and specific word choice to provide meaning and contribute to the overall tone/mood and message of the text.

Setting and Sample

The research was conducted in my seventh and eighth grade science classroom and the schools' outdoor classroom (benches near our pond and in our forest along our

school trails). I teach in a mid-sized (500+ students), rural middle school spanning grades 6-8 in Northern New England and have four separate science classes that meet daily for 50 minutes. The unit of study spanned five weeks and focused on science and ELA learning goals from our district curriculum. Families were provided a notice of research describing the study and assurances that data would remain anonymous. I conducted the intervention with all 82 students in my four sections of seventh and eighth grade science.

An intentional subset of five students were selected to create in depth case studies that followed the progress of specific students through all data collection tools. A representative sample of students' journals were selected for further analysis to show a range of characteristics and ability levels in science/nature journaling. Data from a subset of my team of 82 seventh and eighth grade students were analyzed for impact on learning.

Intervention

All students in my four science classes participated in nature journaling as part of an interdisciplinary unit. Students created their own journal using classroom materials and book bindings. I used a variety of instructional strategies to introduce nature journaling, practice the skills, and apply science content related to our learning goals to journaling activities. Students visited the same outdoor place and journaled during planned activities as well as journaled in our classroom. The following is a chronological outline of the students' activities relating to the intervention:

1. Students created their own nature journals.
2. Teacher provided students a template for journal entries and developed criteria together (from Leslie and Roth, 2000).
3. Explore Our Place Visit 1: Teacher provided students a prompt (What do you see? What do you think? What do you wonder? *See-Think-Wonder*) to guide thinking and observation for journaling in our outdoor classroom (prompts were recommended in all literature sources). Reviewed sensory details and descriptive/narrative writing techniques (ELA team teacher support). Students logged descriptive weather data.
4. Explore Our Place Visit 2: Students focused on a seasonal observation (Leslie and Roth, 2000). Prompt: How do you know the seasons are changing? Students logged descriptive weather data.
5. Explore Our Place Visit 3: Students focused on how weather and climate are related in a region (our science learning goal) after analyzing data in our classroom. Prompt: Is the weather typical of Maine's climate? Students logged descriptive weather data.
6. Viewed *Play Again* documentary by Ground Productions, 2010 with all 4 classes of students.
7. Explore Our Place Visit 4: Students focused on observing a tree and using creative writing to tell it's story ("Adopt-A-Tree"). Students were encouraged to use similes, metaphors, and personification in their writing. Students logged descriptive weather data.

8. Explore Our Place Visit 5: In our indoor classroom, students focused on “What’s Missing?” Prompt: What is missing when we journal indoors? Include sensory details and one simile or metaphor. Students logged descriptive weather data.
9. Final reflection: Students completed a journal reflection sheet looking back at their entries (Leslie and Roth, 2000). Students were invited to share their journals in a sharing circle (Johnson, 2014) and museum walk of their entry they were most proud of.
10. Essential Question: “Is Maine’s Climate Changing?” Students compared historical climate and weather data to current data they collected while using their nature journals to write a constructed response to answer the unit essential question.

Data Analysis Methods and Limitations

To increase validity, multiple data collection tools were used to address each research subquestion. The first tool I used to compile student data was Google Forms (pre and post surveys). I was able to analyze each question for all students in my classes and also focus on the students selected in my case study. From this data, I was able to see any changes from before and after the intervention. Next, I compiled the observation notes I conducted while students were nature journaling. These notes were mostly focused on the students I selected in the case study, or other students when those were absent from class. From the observation notes I was able to gauge student focus on the task and compare to the content of their journal entries. The third set of

data I analyzed were the students' nature journals. I provided feedback to all students on their first two entries so that I had a big picture of how students were progressing. At the end of the unit I analyzed the students' journals in my case study as well as a purposeful sampling of the entire group of students. I looked for growth over time, of their use of figurative language, their understanding of science concepts, and any clues that showed their connection to nature. I coded their journals for these specific data points. Finally, I compiled interview data from the students in my case study and a purposeful sample of other students and highlighted specific quotes to support answering my research questions.

The methodology of this action research study was limited by three factors. First, being time of year and weather conditions. Nature journaling in October through November proved challenging as we had more rain and cold, windy days. I had to plan instruction and nature journaling experiences around the weather, which is different from other types of interventions implemented in an indoor classroom which can happen regardless of what is happening outside. Because of this, I did not get to take students to our outdoor classroom as often as I would have liked to. Students had four experiences outside and two additional journaling experiences in the classroom. This limited how many outdoor experiences we had and thus the overall impact of the intervention. If the study was conducted earlier in the school year or in the spring I may have had more opportunities to bring students outside. Another aspect that limited the study is the traditional school day schedule and class size. I have four sections of science classes which are about 50 minutes in length. This class time provided about

15 minutes of focused journaling once we discussed expectations and gathered equipment, ventured outside, students got settled in a sit spot and journaled, then regrouped and shared in a circle, and finally ventured back inside. The intervention was doable but challenging with a group of 20 or more students in a short amount of time. Finally, this study focused on understanding the students' connection to nature. This "connection" proved to be misunderstood by the students themselves before this experience. Therefore, the data collection methods used over a months time, just skimmed the surface of what takes years to develop and continues to develop as children grow into adults.

Findings & Limitations

Sub-question 1: What are the effects of nature journaling as a literacy strategy in a science classroom?

To analyze the students journals, I coded each entry for the content I was looking for: use of sensory details (SD), similes (S), metaphors (M) or personification (P), relation to our science learning goal (CW), and indication of a connection to nature (NC). I also gave a rating of + or - if the writing enhanced the entry or the language was not used correctly. Table 3 contains the coding data for all eight students' journal entries in my representative sample. Of the four students in my case study group, three out of four (Students A, B, and D) completed all the prompts in their journals using descriptive language (sensory details, similes, metaphors, and personification). This type of writing enriched their journal entries and encouraged students to be more descriptive about

their experience and their surroundings. In addition, three of the four students started out using basic sensory details and then improved to incorporate the other types of figurative language in their writing (see Table 3). When asked “How did nature journaling affect your descriptive writing as you were learning about sensory details and figurative language in ELA?” Student A responded with:

“I think both classes influenced it because I never really thought of using the power of speech to help describe what you want to say while you are outside. I think I improved my skills very much. I think it helped me go above and beyond in my writing.”

Table 3. Journal Coding Data

Student	Entry 1	Entry 2	Entry 3	Entry 4	Entry 5
A	SD+	SD+	SD+ S+ CW NC	SD+ S+ P+ NC	SD+ S+ NC
B	SD P+	SD S+ CW	SD S+ P+	SD S+ P	SD
C	SD	SD	Absent	SD NC	Absent
D	SD+ NC CW	SD+ CW	SD+ S M	SD+ S M+ P	SD+ S+ NC
E	SD+ S	SD+ S+ CW	Absent	SD P+	SD+ NC
F	SD	SD	SD+	SD+	SD+

	S P	CW	CW	S+ P	S+ NC
G	DS CW	SD CW	SD S	P-	SD S
H	SD+ S+	SD+ CW	SD+ S+ CW	SD+ S+ P+ NC	SD+ S+ P+

The students used their nature journals as a tool to demonstrate knowledge of and practice skills using figurative language. Since students journaled multiple times, their journals had potential to show evidence of growth and development over time. For the majority of my students, this was true. Based on the content of the journals, I feel that the prompts provided students with a creative way to incorporate figurative and descriptive language into their writing while observing something tangible right in front of them. My students used descriptive, figurative language to enhance their observations of nature. Quotes from the journals that demonstrate the student's creativity and use of figurative language in their writing include:

"Pine needles on a branch tickle my back like a cobweb, gentle and soft."

-Student A, entry 3, simile.

"The water is calm and still, reflecting down the dawn sky, reflecting trees looking like it's learned a lifetime of history, such as an elder reflects on it's life." -Student A, entry 3, simile and personification.

"Like a spot of color in a monochromatic world." -Student H, entry 3, simile.

"The moss built homes along Rustle's trunk, clinging to Rustle for comfort, the

moss is like a small child nestling against its parent.” -Student H, entry 4, simile and personification

“The tree sits silently waiting for something to accompany him.” -Student B, entry 3, personification.

“The leaves are crumpled up pieces of paper in my mind.” -Student D, entry 3, metaphor.

Of the eight students in my case study and representative sampling, six students showed growth and proficiency of the ELA learning goal of focus: an understanding of using figurative language to enhance meaning and convey tone/mood. Based on their journal entries, these six students demonstrated an understanding of using sensory details, similes, and personification (see Table 3). However, crafting metaphors proved more challenging as only Student D used metaphors in their writing. When asked to rate their skills before and after the unit, two students indicated an improvement from a 2 to a 3 (Student C and D), and two students indicated no change from a 3 (Student A and B). However, based on their journal entries and interviews, it’s clear that these two students (Students A and B) were able to improve or apply figurative language in a new context. When asked “How did nature journaling affect your descriptive writing as you were learning about sensory details and figurative language in ELA?” Student B responded with,

“It helped me try to incorporate more descriptive writing in other types of writing.”

Based on the evidence I collected from the students’ nature journals, pre and

post surveys, and interviews, I can conclude that using nature journaling as a literacy strategy in a science classroom provided students with additional practice in developing skills in figurative language and descriptive writing through using natural experiences as a canvas for expressing their thoughts. In conjunction with Johnson's research (2014), the nature journal was a great assessment and portfolio tool to show the development of the students use of figurative language over time.

Sub Question 2: What are effective nature journaling strategies/activities to use with adolescents to reach learning goals?

During our interdisciplinary unit, I used a variety of strategies to incorporate nature journaling into science practices and learning both ELA and science content. First, students created their own low cost nature journals and were encouraged to decorate their covers. This allowed students to take ownership of their new journal and make it special. After this, we looked at exemplars of journal entries (from Leslie and Roth (2000), and drew comparisons for what qualities made them great: detailed sketches, labels, descriptive writing, and abiotic data. From this, we created our journal entry criteria sheet which we glued inside the journals and students used as a reference while journaling. These activities and strategies helped to "hook" students into journaling and get excited about what was to come in science class. I would highly recommend taking the time to set up the students for success through doing collaborative activities that involve the students in preparing to nature journal in class.

To measure student engagement in nature journaling I completed focused

observations in our outdoor classroom. Five out of six students that I observed displayed all positive behaviors I was looking for during the focused activities in our outdoor classroom (see Table 4). The five students were focused, making observations both written and drawn, appeared to be thinking about the task and interested in the subject matter, and remained engaged for the entire journaling task, about 15 minutes of focused writing. Other students who were more challenged to get settled during journaling had a hard time focusing on one thing, were restless, or just reluctant writers. As their teacher I tried to encourage and redirect them as much as possible. While some improved, a very small number of other students still rebelled and did not put the effort into the experience. All but two students (of the 78 students who responded) reported the nature journaling experience as enjoyable with 46% of all students rating the experience with 5 stars, 30% with 4 stars, and 16% with 3 stars. Overall, I think the majority of the students in my classes would agree with Student D when she stated,

“It was fun getting to get away from school and being able to go outside and draw and write information about the wilderness.”

Table 4. Observational Data

Student	Displayed positive behaviors while journaling	Quotes or notes about student while journaling
A	Yes	Shared her simile aloud with the group.
B	Yes	“Can I observe this tree?”
C	No, not consistent	“Which way is the sun?” “I think my grandmother is texting me.”
D	Yes	Very focused and writing the whole time, looking around and using her senses.

F	Yes	“Can I also include info from the farmer’s almanac we read in class?” “I want to focus my entry on improving my metaphors.”
G	Yes	Very enthralled with the “Adopt-A-Tree” prompt.

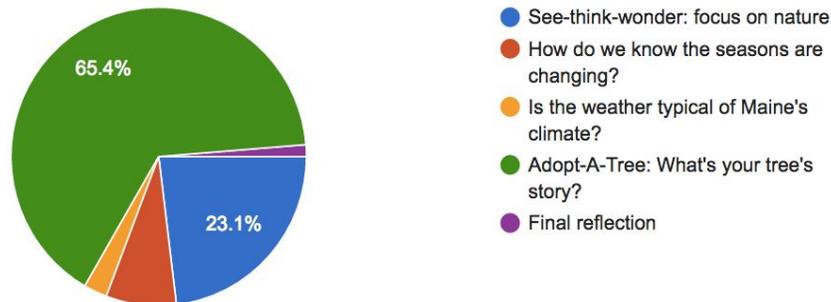
During the interdisciplinary unit, I also provided focused prompts to guide students thinking and relate their observations to our science learning goal on climate and weather. This strategy was concurrent with my literature review findings. Two of the five prompts were directly related to our learning goal on science while the other three prompts allowed for more creativity and reflection. The post survey data showed that the students favorite prompts were actually not content related but more broad and allowed for creativity (See Figure 1). The “Adopt-A-Tree” prompt was the most popular at 65% and the first journal prompt “See-Think-Wonder” which introduced students to nature journaling came in second at 23%. Both of these prompts truly encouraged students to connect with nature in their writing and experience and I think that is why they were preferred over the prompts that were based on our specific learning goals on seasons, climate, and weather. Based on the students journals, all but Student C incorporated writing that related to the content we were learning in class on seasons, weather and climate in at least one or two of their entries as assigned (see Table 3).

In addition to focused prompts, students also collected weather data in a weather log in their journals. This data included the date, time, temperature, wind speed and direction, and cloud cover. In the nature journaling post test, all four students in the case study indicated that the journaling and collecting weather data helped to connect their

learning to the content learning goal on climate. Based on the learning goal pre and post survey data, Students A, B, and D all improved in their knowledge of seasons, weather, and climate over the course of the unit. In addition, of the four students in the case study, three of the four students met or exceeded the standard on their unit assessment through using the evidence they collected in their journals to state a scientific claim and answer our essential question, “Are Maine’s seasons changing over time?” This data shows that using the nature journals as a tool in collecting scientific data supports students in achieving learning goals in science.

Figure 1. Student Preference on Guided Prompts

Which nature journaling prompt did you like the most? (78 responses)



To encourage students to practice using figurative language. I provided a “cheat sheet” for students to glue in their journal that illustrated the difference between similes, metaphors, and personification (see Table 5). This strategy scaffolded all students, especially those in special education or other classroom for language arts instruction

that did not get the instruction from our team teacher in regular education classes.

Based on post survey data, three of the four students in the case study indicated they felt they improved on all types of figurative language after the journaling experiences.

This ensured all students were well equipped to use the strategies in their writing in their journals and had the tools necessary to meet the learning goals.

Table 5. Figurative Language Cheat Sheet

Sensory details	Describe the environment, what you see, think, hear, smell. Use descriptive language and adjectives to convey your experience.
Similes	Comparison of one thing with a different thing using “as” or “like.” (Example: He is as brave as a lion)
Metaphors	Direct comparison of two unlike things without using “as” or “like.” (Example: She is a shining star)
Personification	Applying human characteristics to something nonhuman

At the end of the unit I used a reflection tool from *Keeping A Nature Journal* (Leslie and Roth, 2000, page 201) for students to look back on their journal entries. Students reflected on what they observed, big ideas they learned from the experience, improvement they would like to make and one journal entry they wanted to share with the class. Student F demonstrated an understanding of change over time and a connection to the changing seasons,

“One of the most interesting things I have been observing are the amount of leaves on the oak trees. Every time we go out it seems as though some more have fallen.”

Student G simply stated a big idea he had gleaned from the experience as,

“To explore the outdoors.”

Although Student F and H were proficient in their use of figurative language, they both stated they wished to improve on their use of metaphors in the writing. The reflection tool was both telling for the students and myself as their teacher. I gained great insight into what the students experienced and if I had hit the target in terms of connecting them with nature and improving their writing and content knowledge in science. Student reflection on their learning is an important tool to inform both the student and the teacher’s instruction.

Sub Question 3: What are the effects of nature journaling and visiting the same location on student’s connection to their local place?

After visiting our outdoor classroom in the forest four times over the course of a month and journaling with students, it was clear that some students had made a genuine connection with our place and the living things they had discovered there. I realized some students did not know our outdoor classroom with benches was there before I had brought them outside. After the first trip outside, students began asking me, “when are we going outside again?” which was encouraging to hear. Students also asked to bring in leaves to tape inside their journals. After “adopting” their trees, students referred to them and talked with each other about their tree’s creative story of how they came to be. This candor as well as data from student interviews, their nature

journals, and the pre and post surveys, indicate that visiting the same location helps to connect students to their local place. In their nature journals, all but Student C and G showed genuine connections with nature. I based this distinction on the student's richness of detail in their descriptions of nature and use of their senses to describe the environment (see Table 3). It was also evident from the effort and detail the students put into their sketches and writing that they were focused and observing our forest classroom and connecting with nature in a creative way (see snapshots of students journal entries below).

Nature Journal Artifact Snapshots

Figure 2. Student E Journal Entry 2

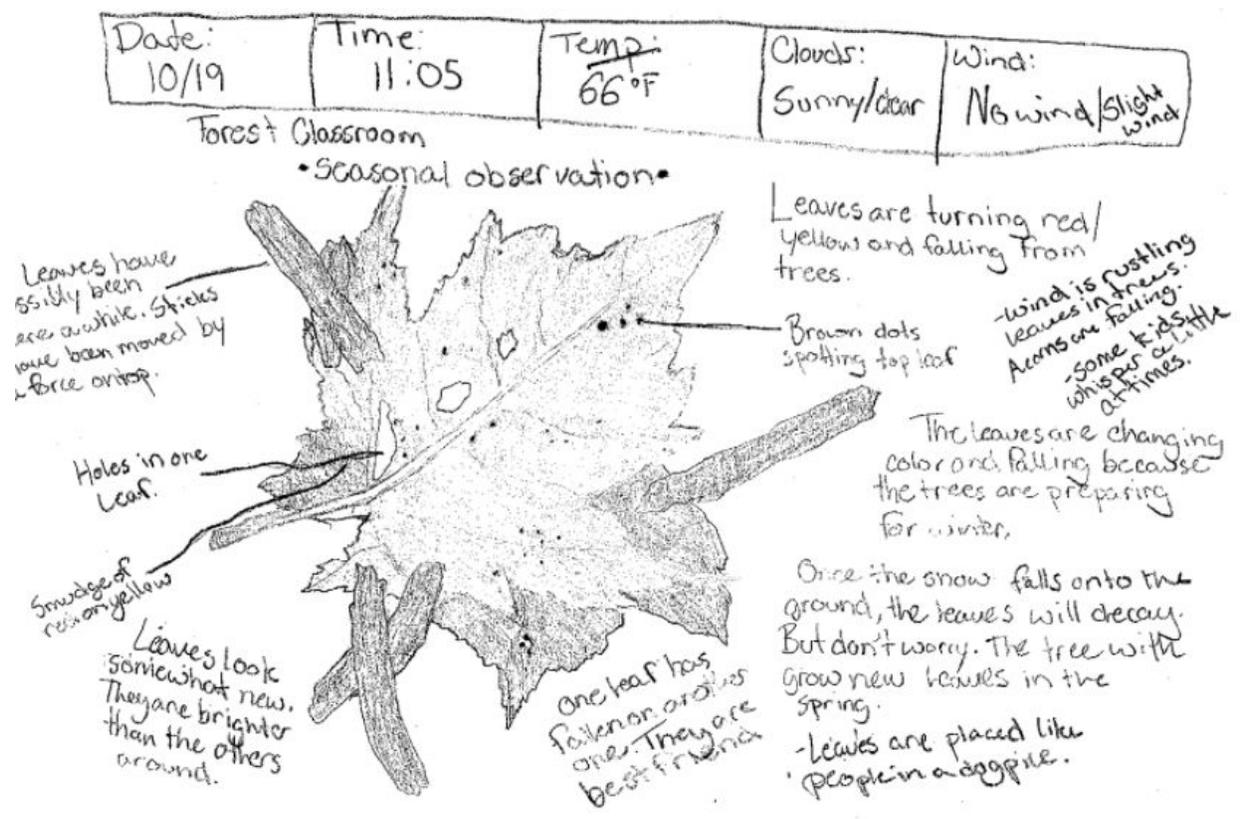


Figure 3. Student D Journal Entry 2

Date 10/11/16	Temp 72°F	Cloud clear sky no cloud	Time 1:18	Wind gusts per hour
------------------	--------------	--------------------------------	--------------	------------------------

Seasonal Observation

Hear - crunching leaves of people walking and ^{the big} acorns dropping down.

Smell - the air. I also can

Feel - the acorns under my shoe when I step on one and the breeze that is very light and is warm. I draw this picture of a: many plants of tree that is in the open. This mini tree

has no leaves the only leaves you see are the ones on the top where the leaves have not fallen yet. On this tree there are many thin brownish greyish twigs sticking out every where. I see the leaves falling from trees to the ground. Also I see the many many leaves on the ground that are mostly brown, red and orange. If you stare close there is some yellow and green.

The leaves are falling like birds wings in the air. The people are sitting and like they are

quiet as a school. The people sitting quietly they are as close. They are working

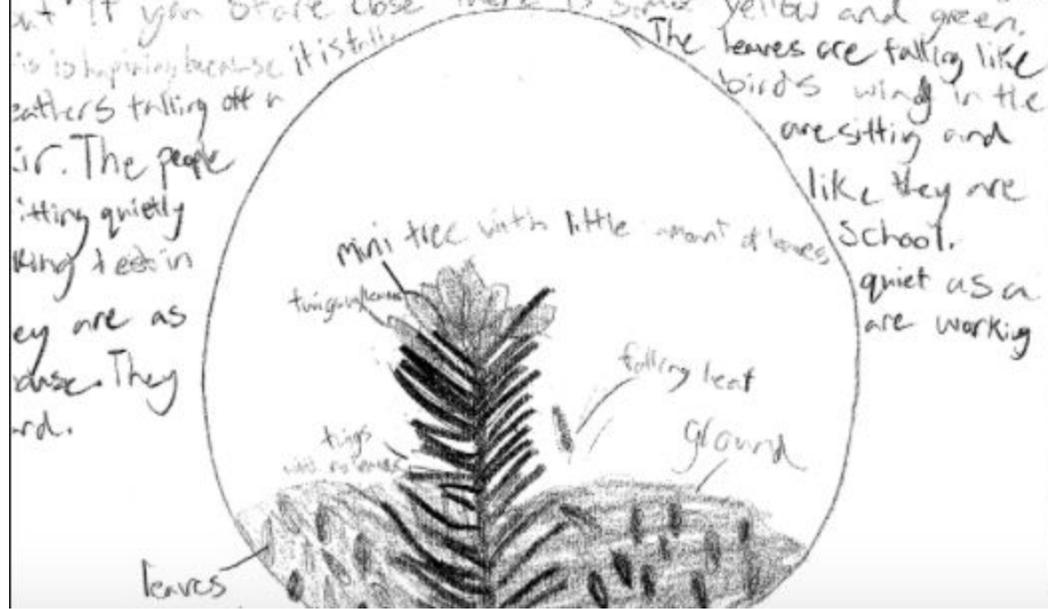


Figure 4 Student B Entry 2

66°	breeze	No clouds	Oct 19	11:05
-----	--------	-----------	-----------	-------

Seasonal observation



It is clearly fall here.

this leaf is red-yellow-and orange.

The very smooth stem leads into the colorful collage of beautiful vibrant colors. The top is

smooth yet bumpy in spots, seems like veins popping out at the back of the leaf

The leaf has rough rigid edges

Figure 5 Student H Entry 4

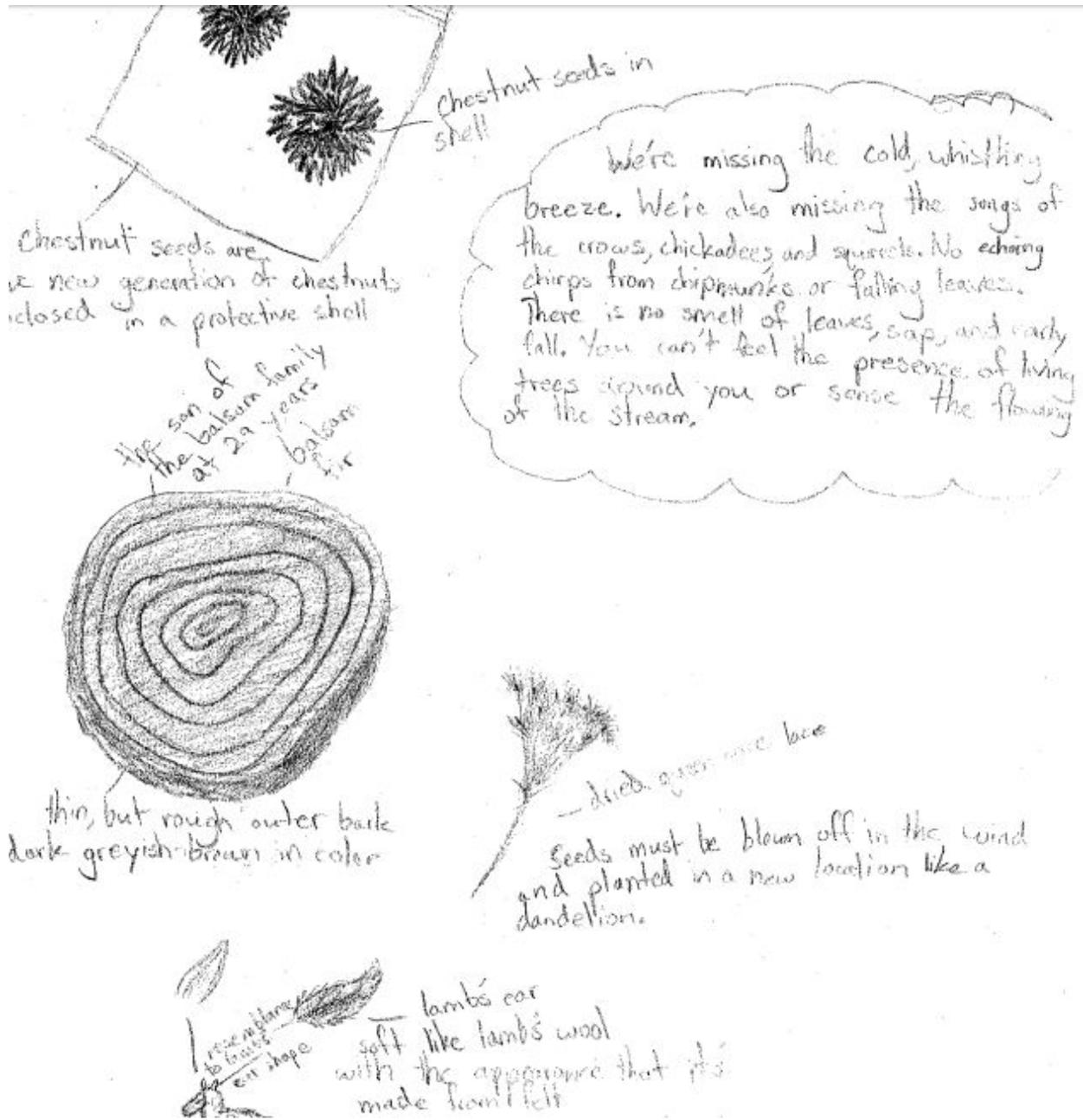


Figure 6 Student F Entry 1

Prompt:

See, Think, Wonder,

This tree has very what
look like rental armor. It also
has mossy green moss growing
on it. Other than that, its
artificial color seems
tree's primary color is squirrel grey. ^{dull} The

This tree looks like it is
a brother or sister to this tree

But the smaller sibling
looks more sad and leans
away. Maybe his or her sibling
drops too many leaves or smells bad.

From my view these trees are
about ten feet tall and the
bigger tree is about 2 feet wide.



Another key piece of evidence was in the students reflection on their journal

entries and the big ideas they had uncovered. These specific quotes show that the students learned the power of observing nature and making connections.

“The big ideas I have learned have to be: nature connections, learning, and exploring. I have learned that connecting with nature is important and contains learning experiences.” -Student H, journal reflection

“Nature is pretty and interesting when you focus more on it.” -Student E, journal reflection

Journaling Prompts

The “What’s Missing?” prompt was telling in that it showed the aspects of nature that students connected to while we journaled outside that they missed while focusing on a natural object in the indoor classroom.

“Inside you are losing your connection with nature and not receiving the same experiences...you are losing the most beautiful aspects of the outdoors.” -Student E, Journal entry 5 “What’s Missing?”

“We’re missing the cold, whistling breeze. We’re also missing the songs of the crows, chickadees, and squirrels. No echoing chirps from chipmunks or falling leaves. There is no smell of leaves, sap, and early fall. You can’t feel the presence of living trees around you or sense the flowing of the stream.” -Student H, entry 5 “What’s Missing?”

When asked how the focused prompts helped to connect them with nature, Student D responded with,

“By seeing different types of trees, plants, landmarks like hills or ditches and animals like insects or just knowing that you are outside connected with nature seeing the wildlife and feeling the cold or warm air.”

From interviewing students after our nature journaling experiences, I was also able to gauge their connection to the forest classroom and nature. When asked “what did you enjoy most about nature journaling in our outdoor classroom?” all students responded with some form of “just being outside” mostly because they have rare opportunities to be outside during the day in middle school. This unanimous response also goes to show the need for students to have more time during the day to experience nature in structured and unstructured environments.

When asked a two part question, “What connections to the natural environment do you have? How did nature journaling affect your connection to our forest classroom “place”? I received interesting responses that indicated that the students did in fact feel like they connected to our place and to nature through the journaling activities. Key words and phrases such as “closer,” “know the place,” and “notice and appreciate” indicate students connection to our forest classroom.

“I am connected to the natural environment because usually I spend time outside with my Dad. I like hiking too and nature journaling reminded me of that. I think the outdoor classroom was much nicer to be in because it helped me gather information fresh rather than old data from technology inside.” -Student A

“I guess it brought me closer to the environment because I don’t really go outside much.” -Student B

“Animals and insects and getting to touch them and study them. Nature journaling allowed us to examine features of trees. We went to the same place every time so we knew where we would go and could notice and appreciate things.” Student D

“Maybe just getting outside, smelling the fresh air, the trees. Sometimes if you see a chipmunk. Mostly the animals and the trees. I like how everything is nature based, we have wooden chairs, we don’t bring our classroom chairs outside.” -Student F

Conclusion: What effect does nature journaling with adolescents have on achievement of learning goals and connection with the natural environment?

The evidence I collected using multiple data collection tools (nature journal artifacts, pre and post surveys, observations, interviews, and unit assessments) from the students in my case study and representative sample helped to thoroughly answer my research question and sub questions. Although this study used a mixed method approach, the data I collected was primarily qualitative and required coding and deciphering in order to describe the results. Therefore, based on my analysis of the data, I can conclude the following:

Subquestion 1:

1. Nature journaling as a literacy strategy helped students practice and improve their descriptive writing using science content.
2. Descriptive and figurative language enriched their journal entries and encouraged students to be more descriptive about their experience and their surroundings.

3. The focused prompts provided students with a creative way to incorporate descriptive and figurative language into their writing while observing something tangible right in front of them.

Subquestion 2:

1. The preparative activities and strategies helped to “hook” students into journaling and get excited about what was to come in science class.
2. Nature journaling was an engaging strategy for the majority of students in each class based on observational data.
3. Nature journaling and collecting weather data helped to connect student learning to the science learning goal on seasons, weather, and climate.
4. Using the nature journals as a tool in collecting scientific data supports students in achieving learning goals in science.

Subquestion 3:

1. Through nature journaling, students made a genuine connection with our place and the living things they had discovered there.
2. Candor as well as data from student interviews, their nature journals, and the pre and post surveys, indicate that visiting the same location helps to connect students to their local place.
3. It was also evident from the effort and detail the students put into their sketches and writing that they were focused and observing our forest classroom and

connecting with nature in a creative way.

4. Based on their reflections, students learned the power of observing and making connections with nature.
5. The students excitement for going outside shows the need for students to have more time during the day to experience nature in structured and unstructured environments.

Limitations

This action research study was limited by two major factors: time and number of students. First, the time of year and the school schedule definitely limited the number of times I was able to take students outdoors to journal. As the weather got colder and precipitation began to fall, I had to plan around the weather as well as interruptions in our daily schedule such as parent teacher conferences, assemblies, and vacation or teacher workshop days. In addition to the time crunch, I collected a vast amount of data on all 82 students in four sections of science classes. Because of the sheer amount of data I collected, I chose to focus on four students in a case study as well as four additional students to create a representative sample. This sample allowed me to generalize conclusions based on the evidence I collected from this small subset of students. Despite these limitations, I was able to collect descriptive and revealing data to support my research and conclusions

Recommendations/Implications

My experience nature journaling with students was very positive, enlightening, and rewarding for myself as an environmental educator. Based on the students feedback and data I collected, I will continue to use nature journaling as a strategy integrated into my science curriculum. For educators looking to try nature journaling with students, especially in middle school, I have the following recommendations and applications in both formal and non-formal settings:

1. Use journaling as a science practice. Build students observation skills, descriptive writing, and for engaging data collection.
2. Find a natural environment close to school. It doesn't have to be large or anything official. A small wooded area, grassy field, runoff pond- somewhere kids can observe the smallest features of nature will still provide a big impact.
3. Journal through the seasons. We observed the transition period between fall and winter in my classes and we plan to continue journaling through the winter (either by venturing outside or looking out our large classroom windows). This continued observation will provide students with an understanding of change over time and a deeper connection to their place.
4. Encourage cross-curricular connections. I worked with my partner language arts teacher to connect our instruction on sensory details and figurative language. This strengthened the students prior knowledge before they applied what they learned in my science class. Any chance to bridge connections between subjects will strengthen the strategy.

5. Lastly, be a role model through journaling with students. Demonstrate good observation skills, focus, and wonder. Share your entries with students and have students share with their classmates. Celebrate their findings, their interests, and their budding enthusiasm for nature.

Nature journaling is a strategy and experience that can be used in all grade levels to benefit students and connect them with their surroundings. In future investigations, I would like to explore nature journaling with younger children as they are developing language and their connection to nature in its earliest stages. I am also interested in how these experiences provided by teachers in a school setting can change student behavior and perspectives about the environment, help to build bridges between experiences they have had at home and learning about the environment at school to help form and foster environmental awareness as they develop their understanding of the world around them and their place in it.

Summary Reflection

The action research process was an intense form of inquiry and self discovery through which I designed a study I am very passionate about in order to inform my instruction as an educator. Choosing a topic and research question based on my interests and professional background to pursue with students, motivated me to really base my instruction on research based strategies. Primarily, I learned that a student's connection to nature is an amorphous thing, it is difficult to measure at one time and is

always changing and developing with the child through different experiences. As with most topics you teach students, some have excellent background knowledge to build from and others have minimal experiences from which to access prior to learning. Students also do not have a clear grasp on what “connecting” to nature means- some thought it was merely being in physical contact with dirt or a tree. Other students had a more accurate understanding of taking part in observing and appreciating nature through connection. This understanding came near the end of the unit and will inform my instruction for the next time I conduct nature journaling with students; to try to clarify what it means to be connected to nature, not just physically but emotionally as well.

Through this action research process I also discovered how easy it is to collect too much data on your students! I was swimming in data from 82 students: their journals, pre and post surveys, observation notes, interviews, and pictures. I was very overwhelmed with the sheer amount of data I had collected and very glad that I had chosen to only include data from a subset of my students in my report. I did however, look over all the data I collected to get a better picture of student progression overall. Finally, what I enjoyed about this action research project was how well I could apply my background in science to the entire process. I am a very thorough researcher and writer and felt that these qualities served to my advantage as a researcher in education and in my current profession. I feel that this course and this project was highly beneficial to my professional development as I am in my fifth year of teaching and gaining more confidence each year.

References

- Cornell, J., and Ivey, T. (2012). Nature journaling: Enhancing students' connections to the environment through writing. *Science Scope*, 35(5) p. 38-43.
- Ground Productions. (2010). Play Again Film. Oley, PA. www.playagainfilm.org
- Johnson, K. (2014). Creative connecting: Early childhood nature journaling sparks wonder and develops ecological literacy. *International Journal of Early Childhood Environmental Education*, 2(1), p. 126.
- Leslie, C. and Roth, C. (2000). *Keeping a nature journal: Discover a whole new way of seeing the world around you*. Storey Publishing, North Adams, MA. Second edition.
- Louv, R. (2005). *Last child in the woods*. Algonquin Books.
- Preston, L., & Griffiths, A. (2004). Pedagogy of connections: Findings of a collaborative action research project in outdoor and environmental education. *Journal of Outdoor and Environmental Education*, 8(2).

Appendix A

Nature Journaling: Connecting with the Living Landscape

"The discipline of the writer is to learn to be still and listen to what his subject has to tell him." - Rachel Carson



Description: Nature journaling offers us the opportunity to observe and record information about the natural world. Sketches and notes do not have to be artistic, but should help the observer (you) focus on an object and notice the finer details. We will use our

observations to guide our scientific inquiry and build our connection with nature and our local place.

ELA Learning Goals that support our writing in science:

Narratives (Grade 5) Is skilled at expanding descriptions that include sensory details

Use of Language (Grade 7) Understands figurative language enhances meaning beyond the literal meaning of words.

JOURNAL ENTRY CRITERIA

Check the boxes for each entry you complete

Items to Include in each entry	Criteria	1	2	3	4	5	6
<i>Abiotic data</i>	Date, time, location, weather						
<i>Sketch</i>	Detailed sketch with descriptive labels (name, color, size, shape, known facts, texture etc.)						
<i>Descriptive writing</i>	Use sensory details to convey your experience. Use descriptive language and similes or metaphors to enhance your writing.						

Collecting Scientific Data:

Draw this weather strip at the top of your pages:

Temperature	Wind	Cloud cover	Date	Time
-------------	------	-------------	------	------

Appendix B

Explore Our Place Visit	Prompt
1	Direct students to spread out in the forest area and sit on the ground near something they may find interesting. Record the Abiotic data (place, date, time, weather conditions) in a weather strip. Prompt: As I sit here in the forest, I wonder... (sketch and use descriptive language) "See-Think-Wonder"
2	Seasonal Observations: Prompt: Make observations of

	environmental cues you see that indicate the seasons are changing. (Provide a figurative language cheat sheet)
3	Weather vs. Climate: Prompt: is the weather typical of Maine's climate? Focus on observing the change in weather and how the environment is changing. Simple sketch and focus on writing. (Pull in information we have learned in class about weather and climate). Expected to use at least one simile or metaphor in descriptive writing.
4	Adopt-A-Tree: Prompt: What's your trees story? Use personification in your writing and creative story about your tree.
5	(Inside journaling observing natural objects or could be done outside) What's missing? Prompt: Describe what you are missing when we journal inside using sensory details/or, while outside, what would you be missing if we stayed indoors? Use a nature object of your choice to sketch and label (leaves, seeds, tree circles). Record today's weather.
6	Journal Reflection: Read your 5 journal entries. Think about the questions below and <u>write or draw</u> your thoughts on a blank page with the Date, Time, Location . <ol style="list-style-type: none"> 1. What were the most interesting things I observed over the time period we have been keeping this set of journal entries? 2. What are the big ideas that I have learned from this set of journal entries? 3. What skills do I plan to improve upon over the next set, if we continue to journal? 4. Which of my observations and comments would I most like to share with others? Pick one to put on display for our museum walk!

Appendix C

Essential Question: Is Maine's Climate Changing? Unit Assessment

Learning Goals:

Level 3: Understands the relationship between location on earth, weather patterns, and regional climate.

Level 2: Understands the factors that are used to predict weather.

Your task: Use your nature journal evidence on weather and our research on climate to answer the essential question, "Are Maine's seasons changing?"

Step 1: Use the graphic organizer to plan your opinion/argument. Use three pieces of evidence from your nature journal and our historical data to support your claim.

Step 2: You may work independently or in a group

Step 3: Choose product: Google Slideshow or Podcast (Images with voice audio narration)

Scoring Guide

Criteria	Score 2	Score 3	Score 4
Seasons	Does not accurately explain why we have seasons.	Explains why we have seasons.	Explains why we have seasons and connects to the seasonal data we collected.
Regional climate and weather	Does not accurately describe Maine's regional climate and weather.	Describes Maine's regional climate and typical weather.	Connects our historical climate data to current data and observations.
Claim to essential question	Does not state a claim with proper evidence.	States a scientific claim and includes at least 3 pieces of evidence.	States a scientific claim and includes more than 3 pieces of evidence.

Appendix D

Student Interview

Name _____ Date _____

1. What did you enjoy most about **nature journaling** in our outdoor classroom?

2. How did nature journaling affect your **descriptive writing** as you were learning about sensory details and figurative language in ELA?

3. What **connections** to the natural environment do you have? How did nature journaling affect your connections? To our forest classroom “place”?

4. What connection do you see between our learning goals and nature journaling? In what ways are they related?

5. How might these experiences have **changed your perspective** about nature?

6. Will you start **reducing your technology use** and spend more time outdoors?

Appendix E

Nature Journaling Observation Sheet

Date _____ Block _____

Describe the activity students are engaged in:

Student's Name _____

Behaviors exhibited (answer Yes or No):

___ Focused

___ Making observations of nature, both written and drawn

___ Appears to be thinking about the task at hand

___ Appears to be interested in the subject matter

___ Remains engaged for the entire activity

Quotes from student during activity: