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Examining Pre-Service Teachers' Integration of Science and Literacy through Trade Books

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ABSTRACT

The purpose of this investigation is to examine how teacher candidates create and teach lesson plans that include trade books and the 5E model of inquiry science. Specifically, this study examines how elementary school teacher candidates, enrolled in a science methods course, intended to use trade books to teach interdisciplinary science and English/Language Arts lessons using the 5E Model of Instruction (Bybee, 1997). Inductive qualitative analysis reveals that science trade books can be used to increase the amount of class time spent on science. Implications for elementary pre-service teacher preparation programs are discussed.

Keywords: science trade books, *Giverny Award*, inquiry instruction, integration, elementary

Introduction

In today's steady climate of high stakes testing in the United States, elementary teacher candidates are finding themselves underprepared to teach science in comparison to other subjects (Santau et al., 2014; Trygstad et al., 2013) and instructional time dedicated to science in elementary schools is on the decline (Allen, 2006; Blank, 2013; National Research Council [NRC], 2011). To illuminate this issue, research conducted in the San Francisco Bay area by Dorph et al. (2007) found eighty percent of multiple-subject teachers in elementary grades reportedly spent 60 minutes or less per week on science with 16% of teachers admittedly spending no time on science instruction. Meanwhile, time spent on math instruction is nearly double that spent on science, and reading instruction is nearly three times as much (Blank, 2013). We find these trends to be alarming and urge elementary teacher educators to consider solution strategies that successfully integrate marginalized subject material through carefully constructed unit or lesson plans.

One such solution at the elementary school level is the integration of quality science *trade books* (defined in this paper as books published for general consumership by the public) to teach science with other content areas, like English/Language Arts (ELA; Bradbury, 2014). Several researchers have argued for the integration of science and ELA in the elementary school classroom (Akerson, 2001;

Akerson & Flanigan, 2000; Calo, 2011; Rice, 2002). Although beneficial, successful integration of science and ELA content presents a unique challenge as it begins with identifying texts that are grade appropriate and scientifically accurate (Abd-El-Khalick, 2002; Ford, 2004, 2006; Rice, 2002; Schroeder et al., 2009). As a result, teachers need to be critical when selecting science trade books for their classes. While resources such as *Science Books & Films*, *The Horn Book Guide to Children's and Young Adult Books*, and *Outstanding Science Trade Books by Science & Children* can support teachers in this endeavor, we recommend trade books that have won the *Giverny Award* (Appendix A), which is presented annually to the author and illustrator of a chosen children's science picture book.

During teacher preparation programs, elementary education teacher candidates were introduced to the practice of evaluating children's literature. However, historically, once candidates graduate and become teachers, they have limited resources to support the integration of science and literacy (Williams & Bauer, 2006). Thus, there is a need for candidates to be exposed to multiple resources to support science and literacy integration during their teacher education program. As Peacock and Gates (2000) found, if teachers are not taught the potential of incorporating trade books into their instruction, those teachers will see texts as "peripheral to science learning" (p. 160). The new teachers in their study indicated text materials, or trade books, were presented to them "as backup for other kinds of science learning, either to extend their own knowledge, for extension of pupils' learning after an activity had been completed, or as reference material for library research" (Peacock & Gates, 2000, p. 160). Instead of viewing literature as a secondary supplement of students' scientific inquiry, teacher candidates should be prepared to enrich science learning through the intentional use of high-quality literature.

This article examines elementary education teacher candidates' use of science trade books during an integrated elementary inquiry-based lesson. The books made available for this assignment hailed from a category that was not widely known by teacher candidates, the *Giverny Award*, an annual children's science picture book award established by Jim Wandersee and Elisabeth Schussler. The purpose of this investigation is to examine how teacher candidates create and teach lesson plans that include trade books and the 5E model of inquiry science.

Literature Review

Integrating Science and ELA

Elementary school teachers in the United States are expected to integrate literacy into all content areas, including science (Common Core State Standards Initiative [CCSSI], 2011). Specifically, the Common Core State Standards in Literacy, which at one point adopted by 43 states before states have modified them called for an increased emphasis on informational text. Specifically, anchor standard CCSS.ELA-LITERACY.CCRA.R.10 requires all students from Kindergarten through Grade 12 to "Read and comprehend complex literary and informational texts independently and proficiently." In the Next Generation Science Standards authors included multiple connections between Science Standards and the Common Core Literacy Standards (NGSS, 2013).

To successfully integrate science and ELA content, Akerson (2001) suggested that teachers select a common theme, use ELA teaching strategies to explore students' ideas and misconceptions, and focus on meeting both language arts and science objectives. Rice (2002) suggested using trade books to address students' misconceptions. When trying to integrate science and ELA, teachers should focus on the literacy aspects of science, such as predicting and organizing, and incorporate trade books with the 5E Model of Instruction to engage students. According to Forsythe, Jackson, and Contreras (2018), reading science trade books can support young students' understanding of science principles since "many aspects of science practice parallel metacognitive reading strategies" (p. 80) such as making observations, predictions, and inferences. Teachers who use trade books to engage students

also provide them with opportunities to learn about the interconnected world around them (Calo, 2011). In her report on how two inservice teachers incorporate texts into their instruction, Calo (2011) reported that both teachers in the study focused on using trade books to make cross-curricular connections in multiple subjects, including science.

Several other educators and educational researchers advocate for the use of science trade books to integrate science and ELA in the elementary classroom (Ansberry & Morgan, 2007, 2010; Butzow & Butzow, 2000; Fries-Gaither & Shiverdecker 2013; Morgan & Ansberry, 2013). The *Picture-Perfect Science Lessons* series, published by the National Science Teachers Association (NSTA), provide detailed 5E Model lessons for science trade books (Ansberry & Morgan, 2007, 2010; Morgan & Ansberry, 2013). Butzow and Butzow (2000) provide several suggested activities that teachers could use in their classrooms associated with particular trade books. While they do not provide as much detail as Ansberry and Morgan (2007, 2010), their lists of activities are extensive and could be used by inservice teachers.

Impact of Integration

In addition to looking at the ways science and ELA are integrated, others have studied the impact of this integration on students' achievements (Bradbury, 2014). In her review of literature on integration, Bradbury (2014) found integration between science and ELA led to greater student achievement in both areas as well as improved attitudes towards science and reading. Guthrie et al. (1999) found some promising results using the Concept-Oriented Reading Instruction (CORI) program that focused on the integration of reading/language arts and science instruction using trade books extensively in place of textbooks. Guthrie et al. (1999) reported that CORI students showed high levels of conceptual learning with respect to life science topics. Additionally, they reported that students' reading engagement and conceptual learning were transferred to new areas of knowledge. Finally, CORI students did better with respect to word recognition speed, reading comprehension, and their ecological knowledge (Guthrie et al., 2009).

Romance and Vitale (2001) reported on their integration program, In-depth Expanded Applications of Science (IDEAS). The purpose of this model was to replace time allocated for traditional reading/ELA instruction with a daily 2-hour block of time dedicated solely to the integration of science and ELA instruction. Their results showed that the model improved science understanding and reading achievement. Additionally, participating students also held more positive attitudes and self-confidence toward both science and reading. More recently, Vitale and Romance (2012) found similar results using the IDEAS model in a different setting.

Several researchers have explored the impact of integrating science and ELA instruction. In each case, students participating in the integrated instruction outperformed their classmates in the traditional groups with respect to literacy measures (Morrow et al., 1997), science conceptual understandings (Cervetti et al., 2012; Girod & Twyman, 2009; Morrow et al., 1997), science literacy (Fang & Wei, 2010), and understandings of the nature of science (Girod & Twyman, 2009). Additionally, Morrow et al. (1997) found that roughly 80% of students in the integrated group said they liked science versus 40% of students in the literature-only and control groups. Cervetti et al. (2012) concluded that, based on their research and earlier studies, integrated approaches for science and ELA "not only benefit student science learning outcomes, but also support student literacy development" (p. 652).

Selecting Trade Books

Another area of literature that needs to be considered is the selection of trade books. Strategies for analyzing and selecting trade books have been established in the literature (Atkinson et al., 2009;

Donovan & Smolkin, 2002; Ford, 2002; Rice, 2002; Rice et al., 2001; Saul & Dieckman, 2005; Sudol & King, 1996). Although criteria for examining how trade books address reading skills differs in the literature, the importance of maintaining scientific accuracy is stressed throughout (Atkinson et al., 2009; Ford, 2002; Rice, 2002; Rice et al., 2001; Saul & Dieckman, 2005; Sudol & King, 1996). Meanwhile, Saul and Dieckman (2005) suggest trade books need to be further analyzed by teachers for their ability to motivate, engage, and inspire students.

However, as indicated earlier, teachers may not have sufficient time to analyze potential trade books to use in the classroom. Rice (2002) and Rearden and Broemmel (2008) recognize this limitation and advocate for teachers to use published resources that already analyze trade books such as NSTA's *Outstanding Science Trade Books for Children* and the *Teachers' Choices* list published in *The Reading Teacher*.

As a result, we focused on award winning trade books in this project with an emphasis on *Giverny Award* winning books. The list is smaller, but similarly points teachers to award-winning lists for children's literature, such as the Caldecott, Newberry, and Coretta Scott King awards. By focusing on the *Giverny Award* winning books, teacher candidates in this study could be assured that a text that has literary quality and scientific accuracy. The use of *Giverny Award* books ensured that teacher candidates would plan and teach lessons that would integrate science and literacy using quality resources.

From the synthesis of literature, teachers are expected in their standards to integrate literacy across the content areas. Further, studies indicate that the most likely time that teachers will teach integrated lessons are when they are exposed to quality resources and support, such as the culture of science education courses in teacher education programs. Given the use of quality resources, *Giverny Award* winning books, and inquiry-based lessons this study's purpose was to examine the following research questions:

1. How do elementary education teacher candidates use a trade book to teach an inquiry-based science lesson?
2. What are elementary education teacher candidates' reflections about their experience of planning and teaching a lesson that integrates trade books into an inquiry-based science lesson?

Methods

This qualitative study purposefully focused on three elementary education teacher candidates during their elementary science methods course and how they planned to use trade books to teach both science and ELA concepts while using the 5E Model of Instruction (Bybee, 1997). Candidates developed inquiry lessons that integrated *Giverny Award* trade books to teach in their clinical placements during their elementary science methods course.

Participants

This study included two undergraduate teacher candidates from one institution and one candidate from a different institution. Candidates from the first institution completed their clinical experience in pairs, while candidates at the second institution completed their clinical experience individually. These participants were purposefully selected because they chose to teach from the lessons they developed, while the rest of the candidates in the courses chose to teach lessons they adapted from previously written lessons. Participants were given pseudonyms. Two participants, Melissa and Alison, were from the first institution and taught together in a rural school. The third participant, Karen, was from the second institution and taught by herself in a suburban school. All three participants were female. Although the three participants were from two different institutions,

the elementary science methods course was taught by the same professor in two different semesters. Additionally, the course objectives, topics, and lessons were similar for both courses.

The Assignment in the Science Methods Course

The BSCS's 5E Model of Instruction is the primary approach to science teaching that is introduced and used in the elementary science methods course taught by the first author. At the beginning of the semester, the first author modeled two 5E lessons using science trade books for his students. These lessons were based on the *Picture-Perfect Science Lessons* books (Ansberry & Morgan, 2007, 2010; Morgan & Ansberry, 2013). Along with science content, the lessons from these books also emphasized the importance of integrating science and ELA.

The course assignment consisted of three main parts. First, students developed a 5E lesson plan integrating science and ELA based around the science concept presented in a randomly selected book from the list of *Giverny Award* winners. Second, the students analyzed the book using a list of questions. The questions focused on areas like the story of the book, potential reading challenges, the accuracy of the science content, and assessment strategies. Finally, students developed a presentation about the book and science content for their classmates. Students presented the integrated lesson they developed around a scientific concept in the text, the ELA standards introduced by the texts, and a shortened version of the main activity from their lesson. The activity component helped students develop realistic lessons that could be reproduced in any elementary science classroom. Additionally, the students shared their lesson plans with their classmates so each teacher candidate received a collection of potential lessons for their own instructional toolbox that highlight how these books can be used for an integrated approach to teaching science and ELA.

Data Collection

Data collection for the project consisted of the participants' lesson plans, analyses of the science trade book, their class presentations, reflections, student artifacts, and a final interview. The researchers also took notes on the presentations and then compared their findings. Interviews were conducted via email during their student teaching semester. We focused heavily on the reflections and final interviews of the three participants. These three were chosen because they took the initiative to plan and then teach their respective lessons in their clinical experiences in the same semester they completed their elementary science methods course. These particular participants' lesson plans provide evidence of the elementary teacher candidates' understanding of the possibility of using trade books to enhance integrated science and ELA instruction.

Data Analysis

Data analysis focused on answering each research question using inductive qualitative analysis. Data from the interviews and reflections were analyzed using an open coding scheme, and the first and fourth author used a constant comparative methodology to systematically examine and refine the codes (Patton, 2014). The results presented focus on the three participants' responses to teaching their respective lessons.

Findings

Question One: Participants' Trade Book and Lesson Plan

All three participants developed complex and dynamic lessons based around the science content of their selected *Giverny Award* trade book. The lessons illustrate the integration of inquiry-based science and ELA instruction using a science trade book. Additionally, the participants also integrated art instruction into their developed lessons. It is important to note that each participant, when given the opportunity, chose to teach the lesson. The results section is organized by participants. A description of the book as well as their developed lessons is included in each section. Finally, their reflections of integrating science and ELA are shared.

Melissa and Alison

Melissa and Alison completed their clinical placement together during the spring semester in the same third grade classroom located in a rural district in the southeastern United States. As indicated earlier, Melissa and Alison were students at the institution that required students to complete their clinical experience in pairs. Both indicated that during their three weeks at the school (two days a week for a total of six days), they only observed one science lesson. Alison stated that the particular lesson was teacher-centered and not very engaging or interactive for students.

Book Description. For their lesson, Melissa and Alison used *Daniel and His Walking Stick* by Wendy McCormick and Constance R. Bergum (2005). The story is about a young girl, Jesse, and her personal struggle growing up without a grandfather. On a family vacation in the country she meets her deceased grandfather's friend, Daniel. Together they go on walks through the countryside, where Daniel teaches Jesse about the nature around her. Jesse learns how to connect to nature using a walking stick in a variety of ways: hiking, pointing to different items, moving objects to the side, measuring the depth of water, etc. Throughout the story their friendship blossoms during their nature walks. As Jesse prepares to leave for home, Daniel eventually gives a walking stick to Jesse. Upon returning home, Jesse demonstrates some of the uses of the walking stick to her parents. The story ends with Jesse telling her parents that Daniel is her third grandfather.

Lesson Description. Melissa and Alison's goal for their lesson was to teach students about science process skills and vocabulary and character development for ELA. They started the lesson by reading *Daniel and His Walking Stick* to the students. While reading, they engaged students in reading comprehension strategies by asking them to make predictions and observations about the story. Additionally, they included question prompts such as: *Why does Daniel use a walking stick?* and *Have you ever been on a nature walk?* Melissa and Alison then set up four stations with the following items: cups of orange juice, seashells, cooked oily noodles, and pine cones. Students made observations at each station. The goal was for students to learn that observations involve all of your senses, not just sight, igniting a student-led discussion on their observations and the definition of observation.

The activity for the elaborate phases of both lessons were interesting as they tied the content of the book to the scientific concept of observation. In this activity, they lead the students on a nature walk around their school grounds. Students recorded observations about the items they saw on the nature walk. Upon returning to the classroom, the students were asked to describe their observations in writing. For example, one student wrote the following about his experience: "Today we went on a nature walk. I could smell the buttercup flower. I could feel the wind blowing. I could hear the birds chirping. I could see the yellow flower and green clover." To conclude the lesson and extend their experience, each student made their own walking stick out of cardboard. They decorated their walking sticks using different items they observed while on their nature walk. Figure 1 is the walking stick that Melissa and Alison made for their presentation.

Figure 1. Sample of a student walking stick.

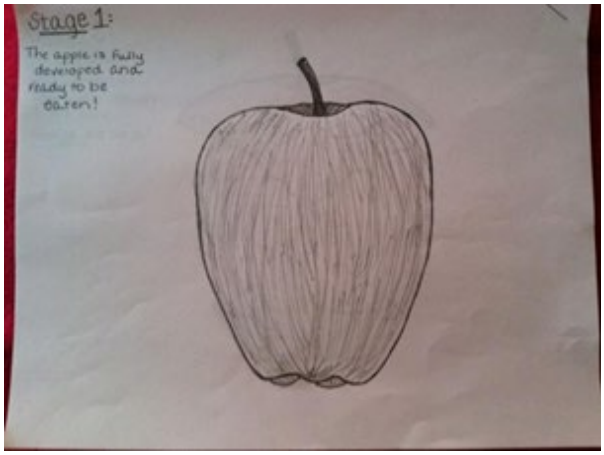
Karen

Karen completed her clinical placement during the fall semester in a fourth-grade classroom in a suburban school. As indicated earlier, Karen was a student at the institution that required students to complete their clinical experience individually. Karen's placement lasted two full weeks. She was expected to go to the school each day over those two weeks. Karen reported during her interview that in her placement, science was "only taught twice a week, whereas mathematics and reading was taught every day." When asked about her observations of the types of science lessons the students experienced, she indicated that the science lessons were "not very active or high energy. The students read from their science textbooks and completed different worksheets and questions provided by the teacher."

Book Description. Karen used *A Log's Life* by Wendy Pfeffer and Robin Brickman (1997) for her 5E lesson. It is a story about the life cycle of an oak tree. The story starts with a description of an oak tree and the different organisms that occupy the various parts of the tree, such as a family of squirrels, a woodpecker, and slugs. The tree is struck by lightning during a storm, falls to the ground, and becomes a log. Several new organisms, such as ants, a spider, termites, beetles, and a salamander, move in and make the log their home. After many years the log decomposes and turns into dirt as earthworms work to fertilize the soil. Finally, an acorn sprouts and grows into another oak tree. The life cycle of the oak tree then repeats itself.

Lesson Description. Karen's goal for her lesson was to teach students about life cycles for science and vocabulary and reading comprehension for ELA. She began by asking students questions related to the fall season, such as: *What happens to nature during the fall?* and *What type of changes occur?* She then read *A Log's Life* to her students. After finishing, Karen asked several comprehension questions. For the main activity, Karen challenged her students to illustrate the life cycle of an object of their choice. She told them that they could select anything from a plant, to an animal, or insect. The students had to demonstrate the important steps of the object's life cycle with descriptions, drawings, and symbols. She shared an example of the life cycle of an apple with the students (Figure 2). After completing the activity, the students shared their life cycles and why they chose their object.

a.



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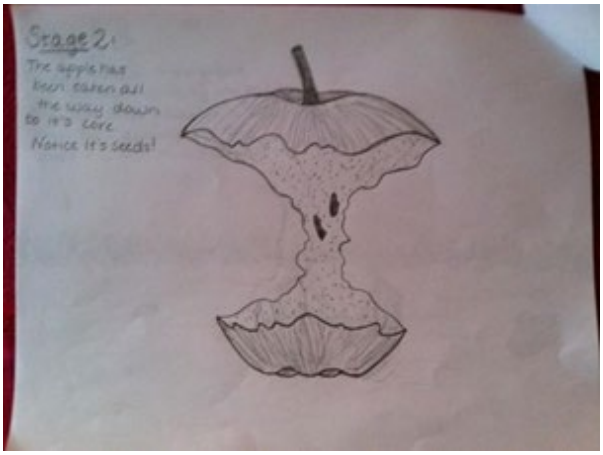

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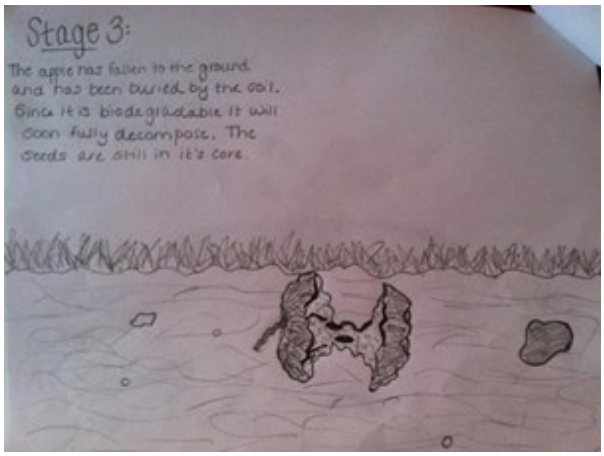

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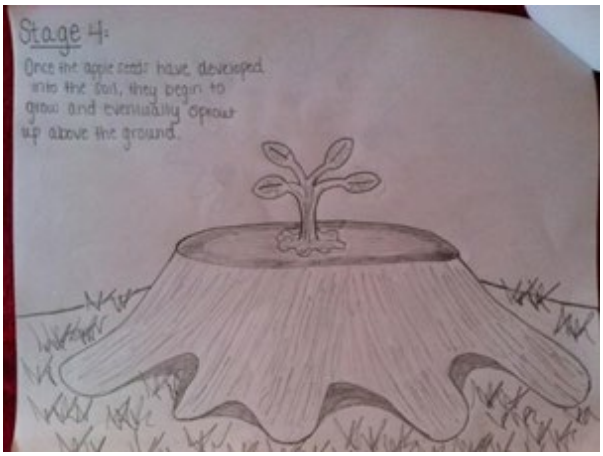

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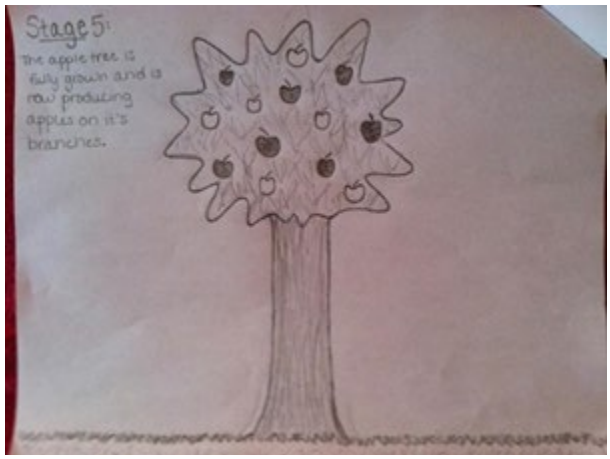

Figure 2. Sample drawings from Karen showing the life cycle of an apple (a is the full apple, b is the eaten apple, c is a discarded apple, d is the beginning of a new apple tree, and e is a new, grown apple tree).

Question Two: Participants' Reflections on Integrating Science and Literacy

When sharing their experience teaching their lesson, Melissa, Alison, and Karen all emphasized how well their science lesson went. Melissa stated that because of the science trade book assignment, they "were able to incorporate science content during the language arts period of the school day in order to enrich the students with content that usually would not have been addressed."

All three participants reportedly felt the students were more engaged and excited about the lesson they provided than the science lessons they observed. Melissa stated that the students "were very engaged and enthusiastic" during the lesson. She also noticed that students were more excited to share their observations and walking sticks they created for the lesson. Alison said that "the students were responsive and she was surprised to see how much the students enjoyed the read aloud activity." She indicated that during the few weeks they were in the classroom the students were not engaged in read aloud activities with the cooperating teacher.

Additionally, both Melissa and Alison indicated that "the students were more engaged during this lesson than any other time they were in the classroom." Karen similarly expressed noticing an increase in her students' participation during her lesson than those lessons she had observed. Alison and Karen noticed some interesting actions from their students. Talking about the students' work in the interview, Alison stated:

> I do remember one student's walking stick. The students were allowed to draw items they observed outside from their nature walk. This particular boy decided to draw his own version of the character from the book, Daniel. I remember that in the book, Daniel was an older man, but the boy's drawing was his interpretation of himself, or a younger character.

She noticed that while all other students chose to just draw pictures of items they observed outside their school, this student seemed to really connect with the story itself. Not only did this student learn about making observations and nature, he felt an attachment to the main character, Daniel. In her reflection, Karen stated that another student expressed that he was "amazed at how many things in our environment that we pass by everyday go through a repeating life cycle such as what we read in the book."

The three participants similarly discussed how they integrated science and ELA into their trade book lessons. Melissa stated that the students made inferences about the book based on the cover and the pictures, defined words using context clues, summarized the book, and used a graphic organizer to help them write a descriptive paragraph. Alison addressed the descriptive paragraph and added that the students were able to focus on their listening skills and reading comprehension. Karen felt that the lesson required her students to "stretch their prior knowledge more than other lessons they had done in class."

Melissa, Alison, and Karen also reported that by completing the science trade book assignment, they were more confident that they could find ways to incorporate science in future lessons. For example, Melissa shared how this assignment has helped her instruction during her year of student teaching. She stated that she always makes an effort for her science lessons to be "exploratory and hands-on in nature." While this was stressed throughout the entire science methods course, she also addressed how this project, in particular, has influenced her instruction:

> I attempt to always incorporate some aspect of writing or language arts into a lesson. In my previous semester of student teaching I used a trade book to teach students about constellations and their meanings. Students then created their own constellations on black, Styrofoam plates and wrote accompanying myths.

This science trade book project helped Melissa better understand the importance of integrating science and ELA in her instruction and that it is fairly easy to accomplish through a strong knowledge of curriculum goals and planning. She felt that this notion of integration was important enough to continue using it during her student teaching.

Discussion

In this paper we report on how three elementary education teacher candidates taught integrated inquiry-based science/ELA lessons using an award-winning science trade book in their clinical experience during their elementary science methods course. The results show that the elementary teacher candidates can develop and teach integrated inquiry-based science/ELA lessons. This aligns to the goals of the Next Generation Science Standards (NGSS, 2013) which provides a vision for integrating science and literacy. It also aligns with the goals of the Common Core State Standards in Literacy (CCSSI, 2011), which has been modified to be the North Carolina State Standards (North Carolina Department of Public Instruction, 2017).

As noted earlier, these three participants chose to teach these lessons on their own. Additionally, the participants indicated that their students were engaged during their lessons and connected with the story and the characters in the trade book. Finally, one participant even indicated that because of this assignment, she understood the importance of integrating science and ELA in her classroom during her student teaching. They all indicated an increased confidence in their abilities to incorporate science into future lessons. While these results are just for three participants, they are promising in that they show that science trade books can be used to increase the amount of class time spent on science. This is especially important when many low performing schools are required to constantly increase time on reading and math instruction. One of the results of this trend is less time on science, social studies, and other curricula.

Peacock and Gates (2000) found that new teachers did not understand the potential of texts in their instruction. The findings from the present study indicate that when taught how to effectively use trade books to teach inquiry-based science lessons, elementary education teacher candidates can develop and teach integrated inquiry-based science/ELA lessons and continue to use them during their student teaching. As suggested by Rice (2002), the elementary education teacher candidates in the present study incorporated their trade books with the 5E model of instruction and used them to engage their students. This also aligned with Calo (2011).

Our study revealed that these particular trade books have the potential to motivate and inspire students (Saul & Dieckman, 2005) and provides students with opportunities to learn about the world around them (Calo, 2011). A student in Alison's class drew a representation of himself on his walking stick because of the reading of *Daniel and His Walking Stick* (McCormick & Bergum, 2005). It is unclear how the story related to this student specifically, but he left with a connection to the book that he would not have had if the lesson was just on making observations about nature. Karen's lesson that included a reading of *A Log's Life* (Pfeffer & Brickman, 1997) made one student aware of how other aspects of nature experience a similar life cycle to the log in the story. As with the student in Melissa and Alison's class, the student in Karen's class connected with the story.

Implications and Future Directions

The findings from this study have important implications for elementary education teacher preparation programs. Our research illustrates how elementary education teacher candidates can successfully use science trade books to integrate literacy and science into an inquiry-based lesson. The implications here are especially important for programs that are currently attempting to cover multiple subjects in integrated methods classes or for those programs looking to do more cross-curriculum

work. Additionally, our research shows the potential for these award-winning trade books to engage and inspire students about science. Introducing elementary teacher candidates to the list of *Giverny Award* winning books also provides them with a reputable source of excellent science trade books that incorporate science and ELA successfully. This, in part, solves the difficulty that many teachers cite about not having the time to search for appropriate titles in an already busy schedule (Rearden & Broemmel, 2008; Rice, 2002).

Future research needs to focus on increasing the number of teacher candidate participants in a variety of contexts (e.g., urban, rural, and suburban), multiple grade levels, and with a variety of science concepts. Further, follow up studies with teacher candidates could include data collection at multiple points in the experience, including but not limited to: before learning about trade books in science, after participating as a learner in model lessons, after selecting a trade book, after planning a lesson, and after teaching the lesson. By examining teacher candidates at these various points in the process, researchers will be able to get a clearer sense about which activities are more likely to lead to teacher candidate growth. This line of research with teacher candidates includes investigating how they use the lessons they created with these trade books during their clinical experiences, what successes and barriers they report, as well as the impact of these lessons on students' interest in science and literacy, as well as the impact of these lessons on student learning outcomes.

Another line of research includes introducing trade books to inservice teachers through professional development workshops or planning, and then examining the extent to which they integrate science and literacy in their classroom with trade books. Similarly, to research teacher candidates, data should include multiple data points including teachers' lessons, reflections through surveys, interviews, or focus groups, and student learning outcomes.

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Appendix A

List of *Giverny Award* Winning Books

Award Year	Title	Author & Illustrator
1998	*Common Ground*	Molly Bang
1999	*Sam Plants a Sunflower*	Kate Petty & Axel Scheffler
2000	*A Log's Life*	Wendy Pfeffer & Robin Brickman
2001	*Henry Hikes to Fitchburg*	D.B. Johnson
2002	*Rare Treasure*	Don Brown
2003	*The Hidden Forest*	Jeannie Baker
2004	*Lonesome George*	Francine Jacobs & Jean Cassels
2005	*Squirrel and John Muir*	Emily Arnold McCully
2006	*Daniel and His Walking Stick*	Wendy McCormick & Constance R. Bergum
2007	*The Snail and the Whale*	Julia Donaldson & Axel Scheffler
2008	*The Prince of Butterflies*	Bruce Coville & John Clapp
2009	*Forest Bright/Forest Night*	Jennifer Ward & Jamichael Henterly
2010	*Redwoods*	Jason Chin
2011	*A Tree for Emmy*	Mary Ann Rodman & Tatjana Mai-Wyss
2012	*Eliza's Cherry Trees*	Andrea Zimmerman & Ju-Hong Chen
2013	*Green*	Laura Vaccaro Seeger
2014	*Maple*	Lori Nichols
2015	*Up in the Garden and Down in the Dirt*	Kate Messner & Christopher Silas Neal
2016	*Frog in the House*	David Mather & Stephanie Mirocha
2017	*The Tree Lady*	H. Joseph Hopkins & Jill McElmurry
2018	*Bat Count: A Citizen Science Story*	Anna Forrester & Susan Detwiler
2019	*Counting on Katherine: How Katherine Johnson Saved Apollo 13*	Helaine Becker & Dow Phumiruk