

INTEGRATING SCIENCE CONTENT WITH  
LITERACY IN THE ELEMENTARY CLASSROOM

by

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**ABSTRACT**

Fourth grade classrooms in Virginia only take state assessments in reading and mathematics. Science instruction often gets pushed to the side in favor of spending more time on reading and math instruction. This research sought to integrate science content with literacy instruction so that students would not miss out on vital science knowledge they would go on to need in fifth grade. Fourth grade students in one classroom read science content books during small group guided reading instruction that focused on the current science unit of study. Students also visited the classroom science literacy center weekly to explore science books and practice reading comprehension skills taught in the classroom. Student surveys and interviews along with classroom and district assessments were used to measure students' science content knowledge, nonfiction reading comprehension skills, and interest in science literacy throughout the research.

## INTRODUCTION AND BACKGROUND

### Project Background

Students in fourth grade in Virginia take SOL, or Standards of Learning, assessments in reading and math. Students in third and fifth grade take SOL tests in reading, math, science, and social studies, and fifth grade also takes a writing assessment. Pressure by administrators is generally placed on tested subjects. Therefore, fourth grade teachers are pressured to spend the most instructional time on reading and math, while cutting down time on writing, science, and social studies. This negatively affects fifth grade teachers who have to then make up time in those areas, especially since the science and social studies SOL's include content from fourth and fifth grade. As a fourth grade teacher, I never want to send students to fifth grade unprepared or behind in their content knowledge.

Another struggle for students in our school is reading comprehension, especially of expository texts. My aim was to improve the use of reading strategies to comprehend expository texts, specifically texts about science content areas being studied. Students spend a great deal of time in guided reading small group instruction, which they generally spend practicing reading strategies with books and passages. By incorporating science texts, I hoped to not only increase student comprehension of expository texts, but also increase their knowledge of the science content.

Students tend to be more excited about science than other content areas since they can do more "hands-on" activities and experiments. I want to not only encourage their interest and curiosity about the world around them, but show them real-world

applications of science through literacy and writing. I hope to increase their interest in science through science literacy centers and provide students with more access inside the classroom to interesting science related texts.

### Teaching and Classroom Environment

For the past three years I have taught fourth grade at Coleman Place Elementary in Norfolk, Virginia. The school has an overall population of about 800 students ranging from pre-kindergarten to fifth grade. The students in fourth grade receive instruction from the homeroom teacher in all core subject areas, which are reading, writing, math, science and social studies. Students visit another teacher for forty-five minutes a day to receive instruction in computer technology, art, music, or physical education.

There are generally four to six classes in fourth grade each year with about 20-25 students. This year my classroom had between 23 and 25 students. I also had an inclusion and gifted-cluster classroom. This means I had students who received special education services as well as students who received gifted services. There were four students with Individualized Education Plans and one with a 504 plan. These five students had accommodations to frequently receive instruction in small group settings, receive more instructional time from the special education teacher or paraprofessional, and two of the students also had all work and assessments read aloud to them. There was another teacher in the room at all times with me to help these students. The special education teacher alternated with the special education paraprofessional between my room and the other inclusion classroom in fourth grade. The special education paraprofessional was in my room during the morning for reading and writing instruction. The special education teacher was in the room during the afternoon for math, science, and

social studies instruction. The four students with IEP's also left the room for a twenty minute period to meet with the special education teacher during our guided reading small groups.

I also had 10 children who were classified as gifted. They met with the gifted-resource teacher once a week for reading and once a week for math. The gifted-resource teacher was only in my classroom during those two days for about 30 minutes each time. The school also has other interventionists that come into classrooms to meet with struggling students. The math interventionist met with a small group of students in the afternoon, but there was no other interventionist meeting with students for literacy instruction.

The instructional time during the year changes as the state SOL assessments approach. At the beginning of the year, approximately 80 minutes a day is spent on reading instruction and 45 minutes is spent on science instruction. Science and social studies were rotated every other week so one week was spent on science and one week was spent on social studies. Thus, in the first half of the year, approximately 225 minutes are spent on science instruction every other week. In past years, instructional time changed toward the middle of the school year. More instructional time was allotted to reading and math and time was taken from writing, science, and social studies. Science instruction was generally reduced to 30 minutes a day, or 150 minutes every other week.

This year, we were instructed by administration on March 19 that we were to eliminate science and social studies from our instructional time. We were to teach reading for the entire morning period, except on Fridays, when we could teach writing for twenty minutes. Our afternoons were to be solely devoted to math instruction. This meant the

students only received reading and math instruction during the school day. Any other science or social studies was to be incorporated into homework, projects to be completed at home, or into work stations during reading time. We were to stick to this schedule until the SOL assessments took place towards the end of May. I implemented this schedule beginning March 26, after the intervention was completed.

Reading instruction was broken up into whole group shared reading and small group guided reading. Whole group reading lasted for 20 minutes and revolved around a story from a Harcourt textbook. Reading comprehension strategies were introduced and modeled by the teacher during whole group shared reading. In general, there were two focus reading comprehension strategies a week. After whole group reading, small groups lasted for 70 minutes. There were four rotations, each lasting approximately 20 minutes. In small group guided reading, students had a chance to read different types of texts and practice the focus reading strategies of the week.

While the teacher met with one reading group, the other groups met with the special education teacher or paraprofessional, or visited a literacy station. The time spent at literacy centers varied depending on how often the student met with the teacher, the special education teacher, or the gifted-resource teacher. Students with lower reading levels met with the teacher and special education teacher more often and hence, visited the literacy centers less frequently. Students who had higher reading levels met with the teacher less frequently and visited literacy centers more often.

Literacy centers generally included three different centers. One center, called Word Study, was mandatory throughout the Norfolk district. It was a spelling program that students began each Monday when they met with the teacher to receive spelling

words for the week based on their spelling feature group. From Tuesday through Thursday students completed activities in their notebooks with these words to practice using them and spelling them. On Friday, students were given spelling tests on these words. One of the other centers was the computer station in which students had specific sites they could visit to practice reading comprehension, research, vocabulary, and spelling skills. The last station was the library station, which included books from many genres and activities to do with these books. This station was the one manipulated for the intervention.

### School Demographics

The student population is predominantly African-American or multi-racial with a small population of Caucasian, Hispanic, and Asian students. Coleman Place is a Title-One school since the majority of students are considered economically disadvantaged. About 75% of students are currently on the free and reduced lunch program. Parental support and involvement tends to be low with many students. Many students have not been exposed to much and do not come into elementary school with a lot of background knowledge since they tend to be from low-income households. The student population also tends to fluctuate quite a bit through the school year. Norfolk is home to several military installations which causes a high number of students to move in and out of the area each year. Figure 1 summarizes the student demographics at my school.

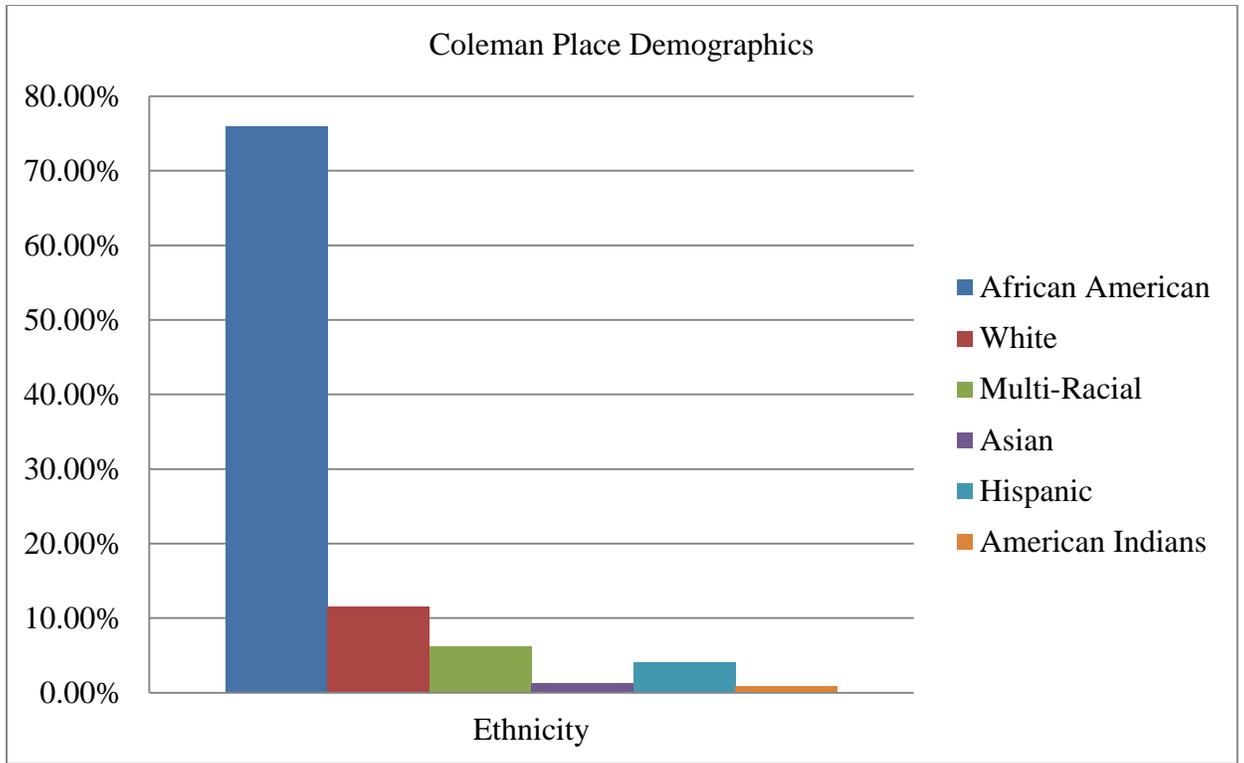


Figure 1. Coleman Place Elementary Demographics, 2010.

## CONCEPTUAL FRAMEWORK

Elementary school teachers are under tremendous pressure to help their students pass state achievement tests every spring, but not all grades are required to test in all subjects. All students from third through eighth grade are required to be tested in language arts and mathematics, but not all students have to take tests in other subject areas, including science (Marx & Harris, 2006). For example, in the state of Virginia, third through eighth grade students take state assessments in reading and math. However, only third, fifth, and eighth grade students are tested in science and social studies (Virginia, 2011). Teachers and administrators are pressured to pass all tests to maintain or achieve accreditation, so more resources and time are spent on tested subjects (Marx & Harris, 2006). This means all grades spend time on language arts and math, while it would seem that science is often pushed to the back-burner. This is especially true in underperforming schools, where teachers tend to spend more time on test preparation and tested subjects than high-performing schools.

As accountability pressures have grown since the 1980's more studies have been done on how schools and instruction change with increased accountability measures. Even prior to the No Child Left Behind Act of 2001, state governments across the country were developing accountability programs. In 1996, North Carolina implemented "The New ABC's of Public Education," an accountability program that emphasized reading, writing, and mathematics (Jones et al., 1999). The state even said "principals are free to focus additional instruction in other subject areas as they wish," effectively leaving science, social studies and arts instruction out if administrators wanted (Jones et al., 1999, p. 200). Researchers interviewed teachers in several different school districts

and discovered that teachers were significantly changing instructional strategies and time because of the new accountability plan. Most were focusing more on the tested areas of reading, writing, and math, as well as including more test practice and preparation. Changes in instructional strategies were across the board as teachers tried to figure out effective ways to prepare students for state tests.

Science is of course not the only subject to feel the effects of the accountability measures. Teachers have also reported not being able to teach history and social science at all during the school day or for a minimal amount of time (Hutton & Burstein, 2008). In several Southern California districts, 81% of teachers were teaching language arts for “at least four-to-six hours per week with many spending well over ten hours” (Hutton & Burstein, 2008, p. 98). For 61% of those same teachers who were interviewed, they were also teaching math for four-to-six hours a week. On the contrary, 70% of kindergarten through grade five teachers taught social studies for less than two hours a week, “with 49% of those teachers spending less than one hour” (Hutton & Burstein, 2008, p. 98). Whether this time allocation is because of accountability tests or not, it is clear that science and social studies are not a large piece of the school day curriculum for most elementary schools.

Not all studies have shown that science is being crowded out by language arts and math because of state testing, but rather that science has always played a smaller role. One study was conducted in Florida, where an aggressive accountability program grades schools based on their test scores (Winters, Trivitt & Greene, 2010). Schools may receive an A+ through an F depending on how many points they received through a variety of academic performance values, like student test scores and progress from the

previous years. If a school receives a failing grade twice in a four-year period, students have the option to leave for a better school and the school is labeled as “failing.”

Therefore, schools that had earned one F had a large motivation to avoid another. The study discovered that as low performing schools focused on bringing up their high stakes subjects, math and reading, which they earned more points for, science scores also increased. The science scores did not increase as much as math and reading, but enough that researchers concluded that science was indeed not getting crowded out of the curriculum as thought.

Andersen (2009) also argued that even though common thought is that schools focus more on reading and math, their tested areas, schools are still spending time on science. However, this time is very small compared to the time spent on language arts and math during the school day. Using data from the Jones et al. study in 1999 and data from teacher schedules, Anderson (2009) showed that language arts accounts for about 34% of the school day and math takes up about 16%. These percentages have remained fairly steady both before and after accountability tests. Science has also remained steady at about 5% of the school day. Maybe accountability has not pushed science out of the curriculum; it just has always struggled against the pressure and backing for more language arts time in schools. One notable change to instruction since accountability measures have taken place is the increased time spent on test-taking strategies and the memorization of facts to help students pass all accountability tests. So while science may not be suffering because of testing, teachers are indeed changing their instruction to meet testing and accountability standards.

Regardless of why science is not an integral part of elementary curriculum, teachers have to find time to teach scientific content and skills. Even if there is not a specified science time during the day or that time is short compared to reading and math, teachers can and do find ways to integrate science and content and skills with other subjects. As Andersen (2009) and Winters (2010) showed, science and other subjects like history do not necessarily have to suffer because of time and resources spent on reading and math. Hutton and Burstein (2008) found that teachers found ways around time constraints and administrative pressures in a variety of ways. Many integrated social studies into reading units and themes, rearranged time during the day, alternated between science and social studies, or ignored administrative mandates altogether. Over a quarter of the teachers integrated social studies into language arts instruction or other subjects like science and the arts, but many felt that it still wasn't adequate.

With limited time and resources in elementary classrooms, integrating science into language arts or mathematics instruction may be the solution for many teachers. Not only does it increase the amount of time spent on science content, but integrating science with language arts also helps students see that reading and writing are not skills to be used in isolation, but skills with real-world applications. When students read expository texts they are analyzing data, making inferences, drawing conclusions, summarizing information, using context clues to determine word meanings, and creating arguments based on information read, all important reading skills (Pearson, Moje & Greenleaf, 2010). What teachers want to avoid though, is making these reading skills more important than inquiry skills (Howes, Lim, & Campos, 2009). It is a tricky balance

teachers must obtain, but combining reading skills with inquiry skills will help students learn all required content while also developing important reading and scientific skills.

Teachers may see integrating science and literacy as a daunting task, but it can be simple and incredibly successful. Many common reading instructional strategies can be used with science literature and taught in conjunction with science curriculum. Strategies may include grouping students according to reading level, utilizing leveled texts, and using science notebooks the children can journal in and refer back to for information. Connor et al. (2010) used all these strategies in second grade classrooms in Florida and saw significant growth in students' science and literacy skills. Other successful and common instructional strategies included using graphic organizers, explicitly teaching how to read nonfiction text features, using think-pair-share and brainstorming time, word decoding instruction, and using K-W-L charts. These are all common instructional tools that the researchers found were easy to integrate with science instruction, encouraged student discussion, and improved their test scores.

Several studies have researched the effectiveness of different science and literature integration programs. One such study focused on the instruction of reading strategies one at a time or in groups, or families, of strategies to comprehend text (Reutzel, Smith, & Fawson, 2005). Some of those reading strategies included predicting, visualizing, questioning, and summarizing, all important skills for reading fictional and expository texts. Teachers who taught the skills individually saw no real difference in reading gains than teachers who taught the strategies in groups. However, students that had been taught to use the skills in groups made significantly higher gains in science content tests than the students who learned the skills one at a time. Students need to see

all these strategies as connected and an important part of understanding any text, fictional or expository.

To implement a science-literacy program, teachers do not need to completely change or abandon current programs with school textbooks. One study found there to be significant gains in comprehension skills, writing skills, and knowledge of science content by simply changing aspects of the classroom environment to incorporate and encourage more science reading, as well as increasing time spent on science literature (Morrow, Pressley, Smith & Smith, 1997). Some of those changes to the classroom environment involved creating literacy centers and independent reading time during which children had easy access to many leveled science related texts. Classrooms could easily have more science trade books, however these should be as accurate as possible for students to truly benefit from them (Rice, 2002). Classrooms also had more teacher-guided literature activities and an increase in time for independent writing related to literature, science books, and science investigations. Even with pressures to get ready for state tests, teachers need to still encourage creativity in writing and reading activities.

Integrating science with literacy does not have to stop after elementary school. Science texts only increase in difficulty as students progress through school, so reading strategy instruction cannot stop. Along with reading, students see more and more that writing is also an integral part of science discovery and discourse. Fang and Wei (2010) studied the effects of integrating reading strategy instruction in middle school science inquiry classrooms and found that students that were taught reading strategies outperformed students that did not have reading strategy instruction. Students who received reading strategy lessons even just once a week for 15-20 minutes were able to

focus on those strategies as they read science texts. Some of those strategies included think-pair-share, predicting, formulating questions, genre features, note-taking, summarizing, and concept mapping. Not only did students become better readers when they used their skills, they were better able to comprehend complicated science texts and increased their science content knowledge.

Each elementary school teacher views scientific inquiry, literacy, and the integration of the two differently and will apply these to their own classroom situation differently. There is not one clear solution that will work for every classroom. There are too many variables that affect what a teacher is capable of doing in their classroom. These range from state standards, district standards, administrative expectations and mandates, to the student population and diversity, to the teacher's own education, experiences and expectations. Regardless of all these variables, literacy and an emphasis on language arts instruction is common to all. To help students become proficient readers, writers, and scientists in society, teachers need to be consistently exposing their students to science and literacy in interconnected ways. Students need to use their reading and writing skills in scientific inquiry just as much as they need to use these skills while reading and understanding scientific texts and partaking in scientific discussion.

## METHODOLOGY

The intervention took place over four weeks in February and March, 2012 within my fourth grade classroom. During this time, science content books were used in small group reading instruction from Tuesday to Thursday each week. From Monday to Friday, students also visited literacy centers where they were able to choose from a variety of books related to the science content being studied and complete a response or graphic organizer. My focus question was, “What are the effects of integrating science content with literacy instruction on science content understanding?”

### Participants

There were 21 students in my classroom who participated in the study. Two students did not participate due to parental concerns and one student joined the classroom during the last week of the study. Of the 21 participants, 20 were African-American and one was Hispanic. There were 14 females and 7 males in the class. Two of the males and two of the females had Individualized Education Plans (IEP's) and were classified as special education students. The two male students had accommodations to be read-aloud to and all four had various accommodations in all subjects. One other male also had a 504 plan which required frequent small group instruction with the special education teacher and paraprofessional among other accommodations. Ten of the other students were classified as Gifted.

### Intervention

There are eight distinct science units that fourth grade studies throughout the year. These are shown in table 1. I only focused on two of them. During the unit on “Electricity and Magnetism,” instruction proceeded as normal without integrating the science content

into my literature instruction. Before the “Electricity and Magnetism” unit, student surveys were given to gather information on what books students enjoyed reading and how they felt about nonfiction science texts. At least three students were also interviewed to discuss what books they liked to read, their opinions about science, and how confident they felt when reading nonfiction texts.

Table 1  
*Fourth Grade Science Content Units*

Science Unit	Dates of Unit in 2011-2012	Involvement in Intervention
Scientific Investigations and Reasoning	Ongoing: September 2011 - June 2012	
Weather	September 2011 - October 2011	
Virginia Resources	October 2011 - November 2011	
Motion and Force	November 2011 - December 2011	
Electricity and Magnetism	December 2011 - January 2012	Pre-treatment Unit
Earth Patterns, Cycles, and Change	January 2012 - March 2012	Intervention Unit
Life Processes: Plants	April 2012 - May 2012	
Living Systems	May 2012 - June 2012	

The actual intervention took place during the “Earth Patterns, Cycles, and Change” unit. During this unit, science was integrated into literacy instruction during small group guided reading instruction. Small group instruction took place Tuesday through Thursday for 70 minutes each day. Monday and Friday were focused on word

study, or spelling, instruction. The teacher met with four groups based on reading level. These are shown in Table 2. The first two groups lasted 20 minutes and the second two groups lasted 15 minutes.

Table 2  
*Reading Groups*

Reading Group	DRA Reading Level	Number of Students
Red	6- 28	6
Yellow	38-42	4
Green	46-50	5
Blue	50 and up	6

During small group instruction, the researcher and students read nonfiction science texts about the Earth, the Earth's relationship with the sun and moon, and the solar system. Students practiced using reading comprehension strategies such as summarizing, determining the author's purpose, questioning the text, using nonfiction text features and structures, and using context clues to find the meaning of unknown words. The focus of the reading groups was on practicing the reading comprehension strategies, not on learning the material of the book. This was so students were indeed learning comprehension strategies they could carry over to any nonfiction text, rather than just learning the content in one text. The information in Table 3 reviews which reading strategies were covered each week of the intervention.

Table 3  
*Time Table of Intervention Reading Strategies*

Intervention Week	Daily Activities (Tuesday-Thursday)	Reading Comprehension Strategy and Virginia Standard of Learning (SOL)	Virginia Science Standard of Learning (SOL)
Week 1 February 26- March 2	Tuesday: Introduce new book and drawing conclusions graphic organizer (G.O.) Wednesday: Continue reading, summarize in G.O. based on section headings Thursday: Finish text and identify main idea	4.6f Draw conclusions and make simple inferences using textual information as support 4.6d Identify the main idea 4.6e Summarize supporting details	4.7 The student will investigate and understand the organization of the solar system. Key concepts include a) the planets in the solar system b) the order of the planets in the solar system c) the relative size of the planets
Week 2 March 4- 9	Tuesday: Preview new text and discuss text features of the text Wednesday: Read and summarize with G.O. based on section headings Thursday: Finish text and summarizing G.O. of whole text	4.6a Use text structures, such as type, headings, and graphics, to predict and categorize information in both print and digital texts 4.6d Identify the main idea 4.6e Summarize supporting details	4.7 The student will investigate and understand the organization of the solar system. Key concepts include a) the planets in the solar system b) the order of the planets in the solar system c) the relative size of the planets
Week 3 March 11- 16	Tuesday: Preview new text and formulate questions based on each heading Wednesday: Continue reading and formulating questions that could be answered in each section Thursday: Finish text, formulate questions based on Question-Answer Relationship (QAR)	4.6b Formulate questions that might be answered in the selection 4.6a Use text structures, such as type, headings, and graphics, to predict and categorize information in both print and digital texts	4.8 The student will investigate and understand the relationships among Earth, the moon, and the sun. Key concepts include a) the motions of the moon, and the sun b) the causes for Earth's seasons c) the causes for the phases of the moon
Week 4 March 18-23	Tuesday: Begin new text, practice using context clues to identify the meaning of unknown words Wednesday: Continue reading using the context clues, begin author's purpose GO Thursday: Finish text and author's purpose GO	4.4a Use context to clarify meanings of unfamiliar words 4.6c Explain the author's purpose 4.5b Describe how the choice of language, setting, characters, and information contributes to the author's purpose	4.8 The student will investigate and understand the relationships among Earth, the moon, and the sun. Key concepts include d) the relative size, position, age, and makeup of Earth, the moon, and the sun e) historical contributions in understanding the Earth-moon-sun system

Another portion of the intervention was focused on literacy centers already present in the classroom. During the intervention, students visited their word study center as normal and also visited the classroom library center. The library center had nonfiction books with content related to the focus standards on the solar system and Earth cycles and patterns. The books were for students from all reading levels so that each child could find a book appropriate to their level. When students visited this center, they chose a book to read which had a bookmark inside. I had created the bookmarks for each book in the center based on the content of that book. The bookmarks had specific tasks for the students to do inside their science-reading folder. Most of the activities included answering questions about the book, using the text features in the book to answer questions, and to use graphic organizers to show understanding of the book. Students used graphic organizers for analyzing the author's purpose, summarizing nonfiction, comparing topics in a Venn diagram, formulating questions based on headings, and finding relationships in cause and effect charts. The student responses and graphic organizers from literacy centers were valuable sources of data to see how students used their reading strategies independently.

#### Data Collection

Several data collection methods were used throughout the intervention. These data methods are summarized in Table 4.

Table 4  
*Data Triangulation Matrix*

Focus Questions	Data Source 1	Data Source 2	Data Source 3
<i>Primary Question:</i> 1. What are the effects of integrating science content with literacy instruction on science content understanding?	Summative unit test scores	Instructor observations	Student attitude surveys and interviews
<i>Secondary Questions:</i> 2. How do student attitudes about science change when science content is integrated with literacy instruction?	Pre and post-treatment student interviews	Pre and post-treatment attitude surveys	Instructor observations
3. How does student comprehension of expository texts improve after integrating science with literacy?	Student reading test scores using expository texts	Student responses on graphic organizers using expository texts	Instructor observations

After each unit, students took a summative assessment which was scored for the first data collection method. These assessments came from our Harcourt science textbooks so that the assessments were similar in nature and were developed by the same company. The assessments were similarly formatted with some multiple choice questions, some vocabulary matching, and some short answer questions.

Beside the classroom assessment, students took a quarterly district-wide assessment at the conclusion of every quarter. The assessment data from the last school year, 2010-2011, was compared to the data from this year's science unit to see if students' science content knowledge improved after the intervention treatment. Data from

the treatment unit as well as the non-treatment units was compared between the students of 2010-2011 to the students of the present school year. This allowed for a comparison in general between the students last year to the students this year. Since this was the first year that the new Virginia SOL's were implemented, the data was relevant for SOL 4.8 only, not 4.7, which was a new standard for fourth grade. The reading scores from the district wide quarter two test was also compared to the data from the quarter three test to see if students' understanding of expository texts improved due to the intervention. The reading scores from the current year were also compared to the scores from last year.

Another data collection method that was used was student interviews for a select group of students prior to the intervention and after the intervention. These interviews focused on student attitudes towards science and reading science content (See Appendix A). Students from different reading groups were interviewed so that students from all reading levels will be represented. Along with these interviews were surveys for all students about their attitudes towards science in the classroom (See Appendix B). The survey was designed to explore students' interest level in nonfiction science content books. Surveys were given before the intervention and then after the intervention to compare whether student attitudes about reading science content books changed during the intervention.

Student responses, writings, and graphic organizers from literacy centers and small groups were another source of data. These responses were analyzed for how well students were using their reading strategies and how well they understood the science content in the texts. The students work also served as a guide to note who was able to visit the literacy centers and how frequently they were able to do so. Some of the

students, especially the special education students, met with the special education paraprofessional and teacher, and were never even able to visit the literacy centers. Some of the students with higher reading levels worked well independently and visited the literacy centers nearly every day.

The instructor also observed and kept detailed notes about how students interacted with science books, literacy activities, and how their content knowledge and interest seemed to change throughout the intervention unit. The notes the teacher kept are on a checklist so that the observations remained focused on the same topics for each child (see Appendix C). The teacher was looking for how students felt about the text, how they used the reading comprehension strategies, and if they competently used the strategies or needed guidance. The teacher was also observing the students' behavior while they were in small group. This included watching the students to see if they were staying focused on the text while the members of the group took turns reading, if the child needed to be redirected to stay focused on the text, if the child asked questions or made comments to show interest in the text, and if they looked through the text without being requested to do so. Students were also asked to rank their interest level in the text from a one to a five, where one meant they had no interest in the text and five meant they were highly interested in the text.

## DATA AND ANALYSIS

There were three main areas of data to analyze to answer the primary and secondary questions. These three areas were in science content knowledge, student attitudes about reading science content books, and in reading comprehension skills. Data indicated that student knowledge of science content increased when science was

integrated with reading. The data also showed that students did show more interest in the science content and developed more confidence when reading science content books. Reading comprehension skills were not positively affected from the intervention and in fact, decreased slightly after the treatment.

### Impact of Integrating Science and Literacy on Science Content Understanding

To answer my primary question of how integrating science content with literacy impacts student knowledge of the current science unit of study, I analyzed summative test scores from assessments given quarterly by our district and assessments within the classroom. Test scores were compared between the pre-treatment and treatment units and also compared between the treatment class of 2011-2012 and the previous class of 2010-2011. I also analyzed classroom summative test scores for the pre-treatment and treatment units. Completed activities from the classroom literacy center and small groups were also used to gauge content understanding. Based on the data collected, integrating science into literacy instruction had a positive impact on students' understanding of science content.

For the district quarterly assessments, test scores were compared between the class of 2010-2011 and this year's 2011-2012 class. Test scores were also compared between the pre-treatment unit and the treatment unit. For the treatment unit, there were two overarching Virginia standards tested, 4.7 and 4.8 which covered the solar system and the Earth's relationship with the sun and moon. The content of 4.7 on the solar

system was new to the Virginia curriculum during the 2011-2012 school year, so there was no corresponding data to compare scores to from the previous class in 2010-2011.

The district quarterly assessment had eleven tested items covering SOL 4.7, the solar system. Of these eleven tested items, only two students scored below a passing 70%, both of whom receive special education services. One student scored a 73%, two students scored 82%, and sixteen students scored above a 90%. Of these sixteen students, twelve of them scored 100% on these test questions about the solar system and the planets. The class average for this SOL was 89%. The graph below, Figure 2, shows these ranges of scores.

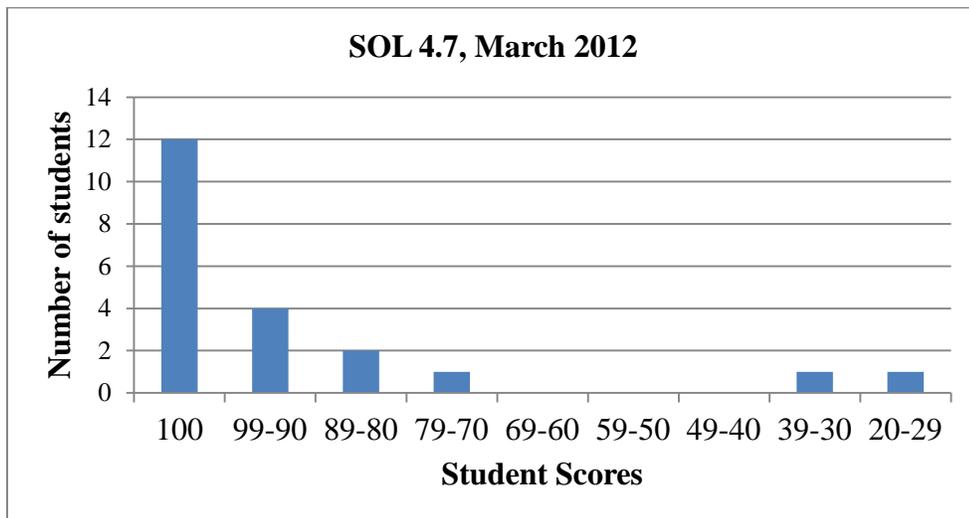


Figure 2. Range of student test scores on SOL 4.7, March 2012, ( $N=21$ ).

There were 24 test questions covering SOL 4.8, the relationships between the Earth, moon, and sun. This is an objective covered in previous years; however it was named SOL 4.7. Eight students scored below a passing 70%, five students scored in the 70's, and eight students scored 88% or higher. Of the eight students with the lowest scores, four of the students have IEP's and one has a 504 plan. In 2010-2011, there were nine students who scored below a passing 70%, seven students who scored in the 70's,

and five students who scored 87% or higher. There was a greater range of scores during the treatment school year which brought down the overall average. The average during the 2010 school year was an 82% while the average during the 2012 school year was a 73%. The graph below compares the quarterly test scores from my students in 2010-2011 to my students in 2011-2012 on this standard.

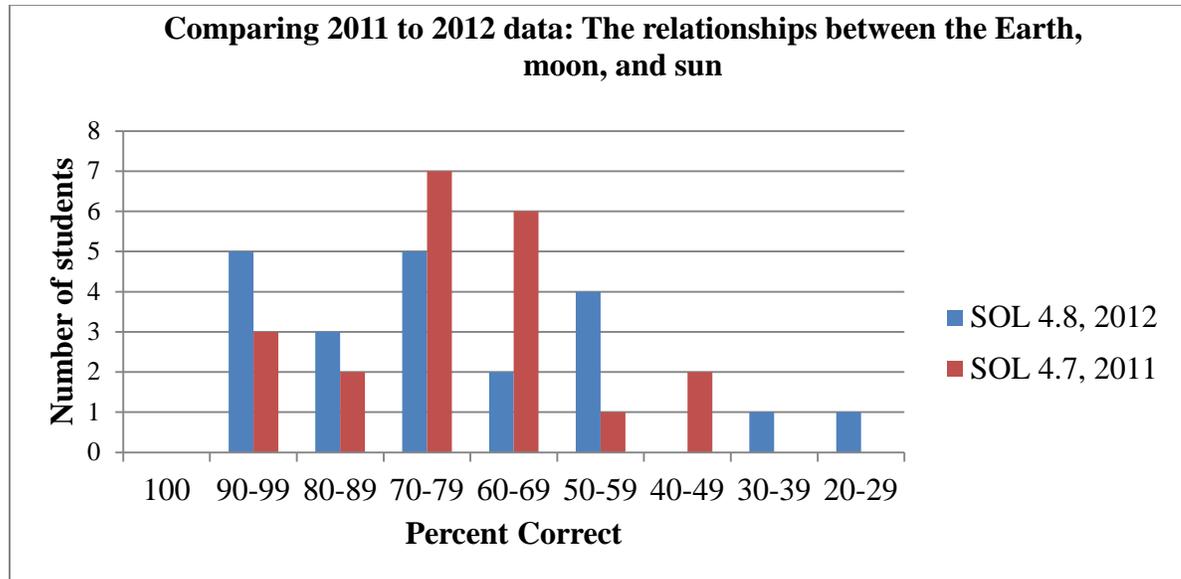


Figure 3. Range of student test scores on SOL 4.8 (4.7 in 2011), (N=21).

The table below summarizes the data from the 2010-2011 and the 2011-2012 school year on these two Virginia standards. The table shows the percent of students who passed each SOL according to our district quarterly assessment, which means they scored a 70% or higher on questions related to these certain SOL's. Students scored high on the questions related to the solar system, but scores dropped on questions related to the relationships between the earth, moon, and sun. A higher percentage of students from the treatment group passed certain standards such as SOL 4.8b and 4.8d, but a lower percent passed on 4.8a and 4.8e. The overall percent of students passing was higher on the overarching standard 4.8 by 4%.

Table 5  
*Comparing 2011 to 2012 Passing Rates on the District Quarterly Assessments*

Virginia SOL	2010-2011 Test Scores- Percent of Students Passing	2011-2012 Test Scores- Percent of Students Passing
4.7 The student will investigate and understand the organization of the solar system		90%
4.7a The planets in our solar system		86%
4.7b the order of the planets in the solar system		81%
4.7c the relative sizes of the planets		81%
4.8 The student will investigate and understand the relationships among Earth, the moon, and the sun.	57%	62%
4.8a The motions of the Earth, moon, and sun (revolution and rotation)	95%	57%
4.8b The causes for the Earth's seasons and 4.8c phases of the moon (combined SOL's in 2010-11, separated in 2011-12)	38%	4.8b: 62% 4.8c: 62%
4.8d The relative size, position, age, and makeup of the Earth, moon, and sun	24%	67%
4.8e Historical contributions in understanding the Earth-moon-sun system	52%	43%

Scores were also compared between this year's class on the pre-treatment unit on electricity and magnetism and the treatment unit on the solar system. The pre-treatment unit was tested by the district on the second quarter science assessment. The overarching standard was SOL 4.3: the student will investigate and understand the characteristics of electricity. On this standard, the student average was a 70%, compared to a 73% and an 89% on the two treatment unit standards. Within standard 4.3 are six more specific standards that addressed particular areas of electricity and magnetism. Student averages on these SOL's ranged from the low 80's to the high 30's. In contrast, the specific standards addressed during the treatment unit had averages from the low 90's to the mid 60's. The highest average on the pre-treatment unit was an 83% on 4.3b, basic circuits. In comparison, there were four standards in the treatment unit that were 83% or higher, including 87% on the planets in our solar system, an 87% on the order of the planets, a

94% on the relative sizes of the planets, and an 83% on the causes for the Earth's seasons. The lowest average was a 65% on 4.8e, which covers the historical contributions to understanding the earth, the moon, and the sun. There were two averages lower than this on the pre-treatment quarterly test. Students scored an average of 38% on the transformation of electrical energy, 4.3d, and an average of 56% on static electricity, 4.3c. Figure 4 displays the averages for each standard associated with the pre-treatment unit and the treatment unit.

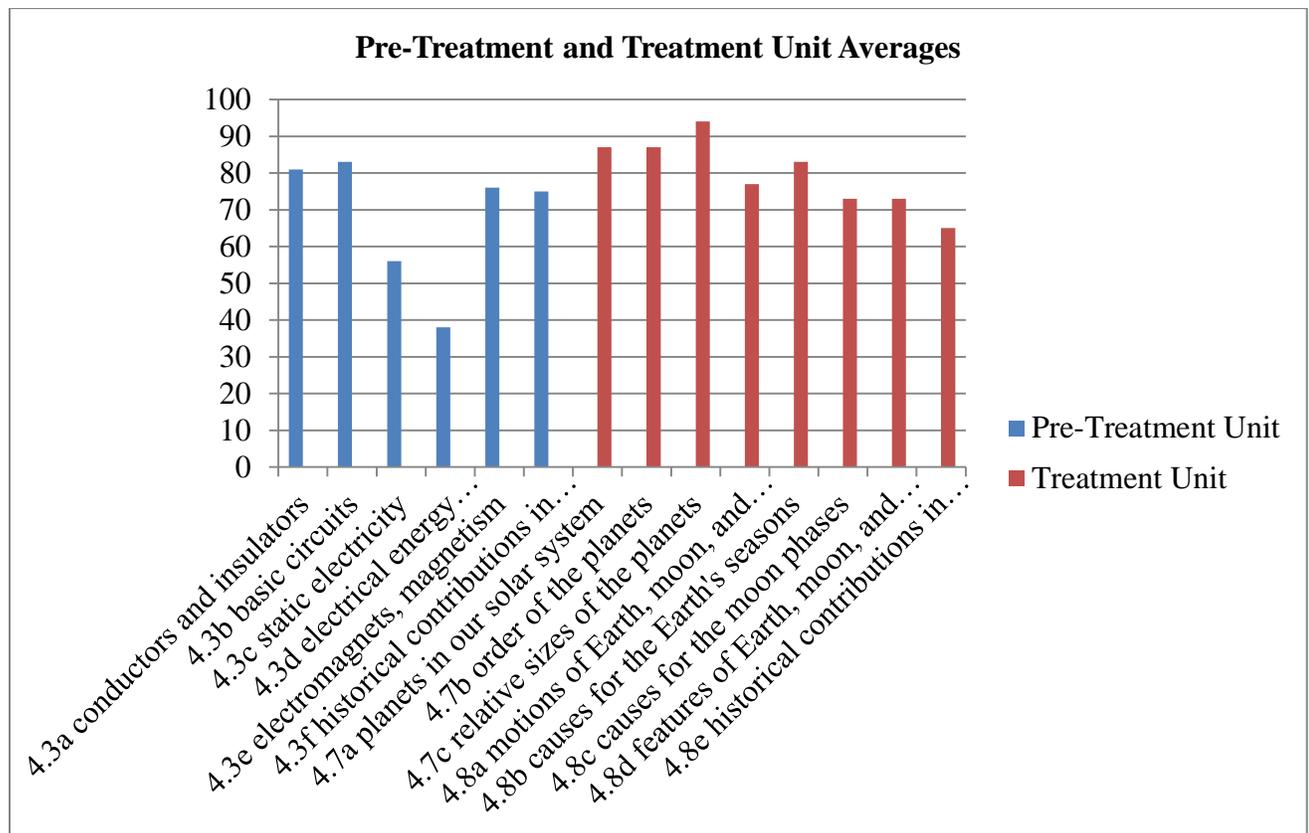
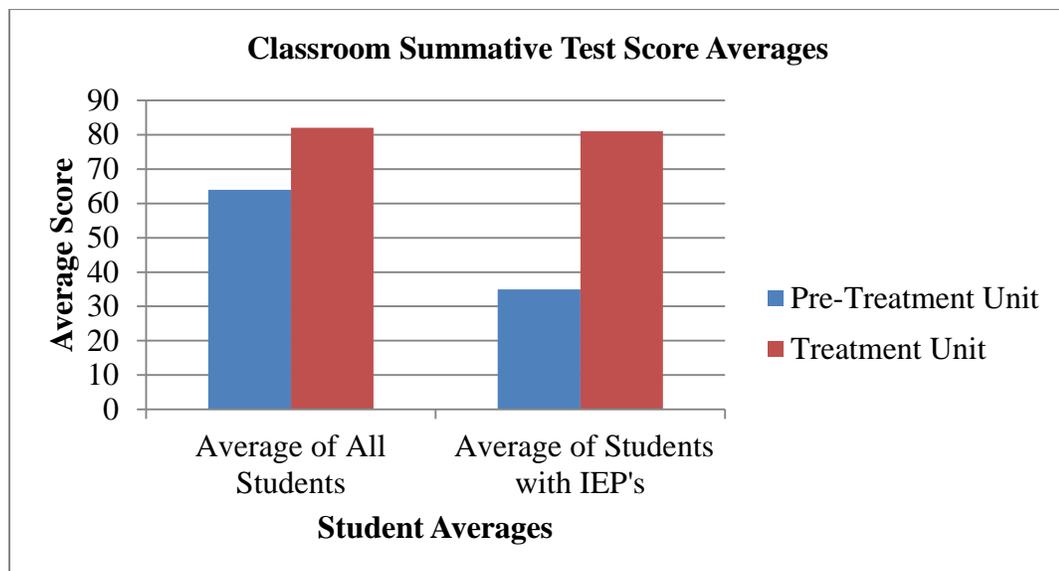


Figure 4. Comparing Pre-Treatment and Treatment Unit Averages, (N=21).

In the classroom, the Harcourt textbook chapter assessment for the treatment unit and the pre-treatment unit were given as a summative assessment at the end of each unit. These tests consisted of vocabulary matching questions and multiple choice questions. The pre-treatment unit assessment on “Electricity and Magnetism” was given at the end

of January. The student scores ranged from 18% to 86% with an average score of 64%. The treatment unit assessment on “Planets and Other Objects in Space” was given at the end of March. The student scores ranged from 50% to 100% with an average of 82%. These scores were for the entire class ( $n=21$ ). If the special education population was separated and analyzed, their growth is much more significant. On the pre-treatment unit test, students with IEP’s scored an average of 35%. On the post-treatment test, those same four students scored an average of 81%, with two of the students scoring a 100%. The graph below compares the pre-treatment unit scores to the post-treatment unit scores for all students ( $N=21$ ) and for the special education population ( $N=4$ ) within the classroom.



*Figure 5.* Comparing Pre-Treatment and Treatment Unit Classroom Test Averages ( $N=21$ ).

Student growth in multiple areas shows that students did benefit from receiving extra instruction in science during literacy instruction. When science was integrated with

literacy, students seemed to grasp and retain more content than in the year prior or during the pre-treatment unit.

### Impact on Attitudes Towards Science When Science and Literacy are Integrated

When science content is integrated into literacy instruction, students' interest in reading science content books related to the current science unit of study increases. Evidence from student interviews showed that students enjoyed reading science content books as well as other nonfiction texts. All three students interviewed were confident in their understanding of the content in nonfiction books. All three also stated that they enjoyed reading science books. When asked what books they enjoyed reading or chose to read from the literacy stations, students seemed to have a favorite book which had pop-up facts about the solar system. One student also said he liked reading the books on astronauts because he "felt really interested in astronauts and just might want to be one when I grow up." The statement shows how strongly the science unit connected with this child who has now considered a career in the field.

Evidence from student surveys did not show as strong of a correlation between integrating science content with literacy and a rise in student interest. In response to the statement, "I enjoy reading about nonfiction topics," 17 of the 21 students agreed on the pre-treatment survey. In the post-treatment survey 13 of the 21 students agreed with the statement, meaning eight students did not enjoy reading about nonfiction topics. However, when asked to mark which nonfiction science topics students would enjoy reading about, 20 of the 21 students marked that they would want to read about "astronomy and the solar system" in the post-treatment survey. In the pre-treatment

survey, only 13 of the 21 students marked “astronomy and the solar system,” which shows that 7 more students came to like reading about the solar system during the treatment period.

On the pre and post-treatment survey, students were given the following statement: “*Below are some of the science topics we learn about in fourth grade. Place a check next to each science topic you like to read about.*” Again, there was not a marked increase or decrease in student interest in any area except for reading about astronomy, the treatment topic. Some other topics showed a small increase in student interest including weather, Virginia resources, force and motion, and famous scientists. However, other areas showed a decline in student interest including animals, plants and trees, electricity and magnetism, and conservation of the environment. Figure 6 displays the number of students who responded that they would like to read about each of the science topics listed on their survey, each of which is a topic taught in fourth grade.

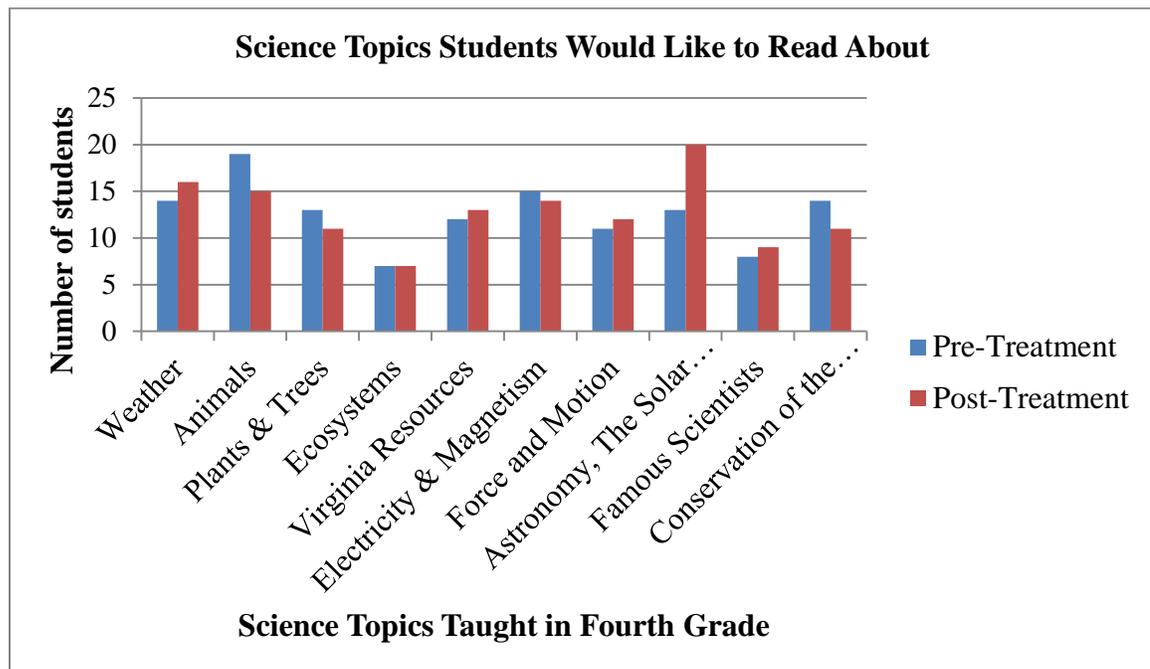


Figure 6. Science Topics Students Would Like to Read About (N=21).

Evidence from instructor observations showed that students did indeed enjoy reading about the solar system and having science topics integrated into literacy. In small reading groups, detailed notes were kept on each child while they read a new science content book each week. Students were asked to rank their interest in the book from a one to five where one meant they had no interest in the book and five meant they loved the book. The majority of students ranked each book they read very highly. Out of four weeks, with 21 students rating a book every week for a total of 84 ratings, there were only seven who rated a book as a “2” and nine students who rated a book as a “3.” The other sixty five student ratings were all either “4” or “5” and showed students had a high interest for the science content books. Nearly all students stayed engaged with the text each week paying attention as others read, asking questions about the text, browsing through the book on their own, and pointing out new information they had learned from the book.

Most students visited literacy stations daily. Those that did not had to meet with the special education teacher or paraprofessional. Visiting the literacy stations involved choosing a book on the solar system, which had a bookmark with different tasks on it. Students had to read the text or part of the text, answer questions, and often complete some sort of graphic organizer. New books were put out each week. Each time new books were put in the center, students were excited to browse through and read the new texts. Students were often seen sharing a book with a peer as they read new information together. Students seemed to enjoy the texts with bright colorful pictures the most or books that had information on their favorite planet.

During the student interviews, when asked if they thought they learned more from having books in the reading centers and our small reading groups, all three students interviewed responded positively. One girl said “I learned more. I would have learned less without the books because I see it or read it and I remember it.” Another male said “yes, because I read them every day.” The literacy center served as reinforcement for the science students were learning in class, even during the weeks when there was no allocated science time. When asked if they enjoyed reading science books, one male said, “Yes, because I can know more about space and science.” This child’s interest in science and his curiosity and drive to learn more led him to enjoy reading the books in our literacy center more.

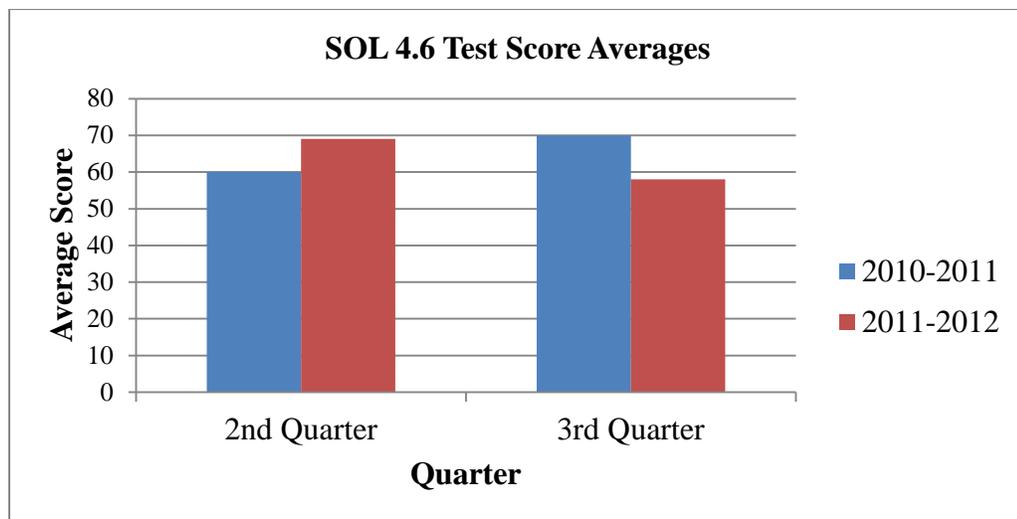
The student surveys, interviews, and teacher observations indicate that students did enjoy reading science content books related to the current science unit of study. Overall, students appeared confident in their understanding of the content in the texts since they were able to make connections to the activities and lessons being taught in science. Students also appeared to engage in more conversation about science topics during reading centers and small group instruction as they had more background knowledge to use in their discussions.

### Impact on Student Comprehension of Expository Texts When Science and Literacy are Integrated

The last question to be addressed was regarding the impact integrating science into literacy would have on students’ reading scores and comprehension. Student

comprehension of expository texts did not seem to be affected by integrating science with literacy. Integrating expository science texts did not seem to increase students' reading comprehension skills more than any other expository texts would have.

Summative unit test scores did not show significant growth in any nonfiction reading standard. In fact, as a class, the students dropped in nonfiction reading standards. On the second quarter summative reading test, 15 students scored a 70% or higher on standard 4.6, "The student will read and demonstrate comprehension of nonfiction texts." On the third quarter summative assessment, nine students scored a 70% or more. While the students in my previous class increased an average of 9% on SOL 4.6 from second quarter to third quarter, the students in the treatment class dropped 11%. Figure 7 compares the average scores on SOL 4.6 between the second and third quarters in last year's class and this year's class with the treatment.



*Figure 7.* Comparing Reading Quarterly Averages between 2011 (N=24) and 2012, (N=21).

Within that larger SOL covering all of nonfiction are more specific objectives for reading comprehension of expository texts. All of these SOL's were covered in the

reading small group instruction as well as the literacy centers. They have been taught since the beginning of the school year so by the third quarter, all objectives are being reviewed. Nothing is being taught for the first time. Within the six objectives focused on during reading groups, student averages improved on three of the objectives, while averages fell for three of the objectives. The graph below in Figure 8 shows which objectives showed growth from second to third quarter and which objectives students actually had a harder time with on the third quarter assessment.

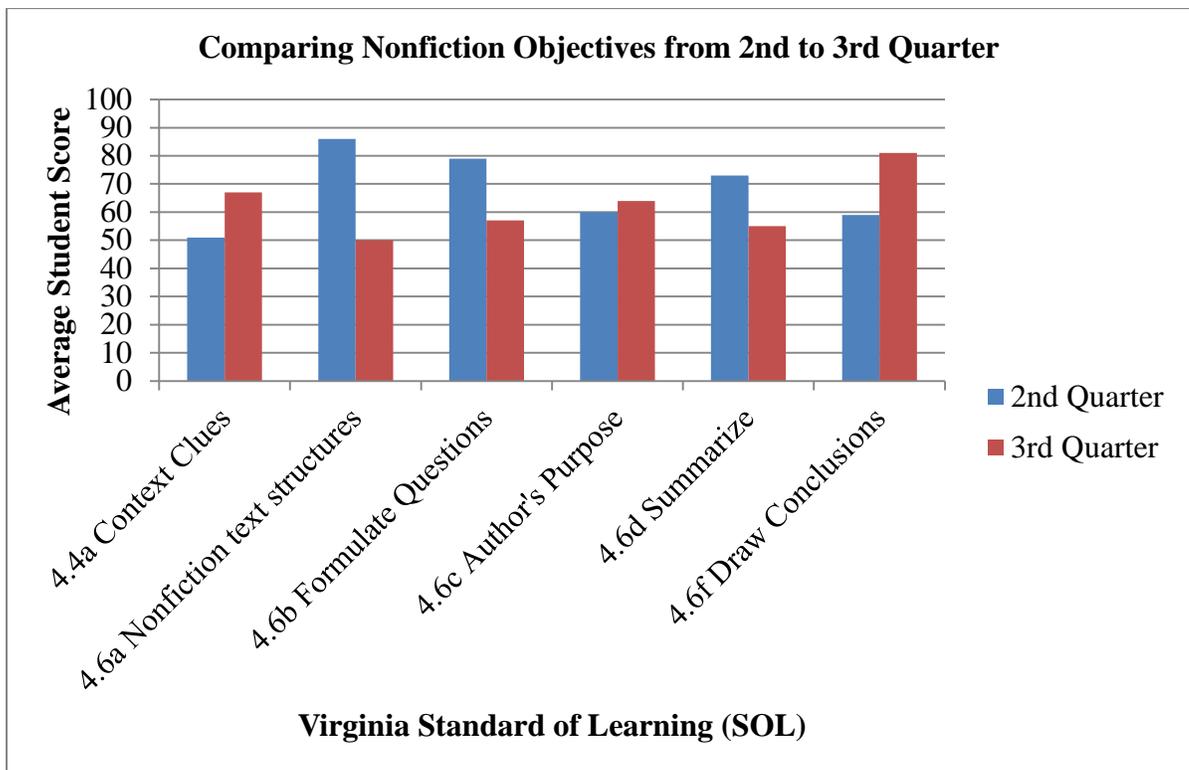


Figure 8. Comparing Averages on Nonfiction Objectives from 2<sup>nd</sup> to 3<sup>rd</sup> Quarter, (N=21).

Significant growth was seen in the area of using context clues, which students scored an average of 51% on in second quarter compared to 67% in third quarter. Another area of growth was in drawing conclusions where student averages increased from 59% in second quarter to 81% in third quarter. Student averages also increased

slightly, 4%, in identifying the author's purpose of a text. The most significant decrease in student averages was in using nonfiction text structures, which includes headings, photographs, captions, and graphics. This was an area where students seemed quite comfortable in small reading groups, yet their overall average fell from an 86% in second quarter to a 50% in third quarter. This thirty-six point drop could be the result of the questions on the third quarter text which all related to appropriate headings for paragraphs. This is closely related to identifying the main idea of a paragraph by finding a good summarizing heading. Students had an average score of 55% on identifying the main idea in the third quarter, so if they struggled on this, then they likely struggled on questions related to headings as well.

Evidence from student responses on graphic organizers and literacy activity centers showed that students were able to comprehend the various science texts in the centers. Students completed the majority of graphic organizers correctly; especially those students who had higher reading levels and could work more independently before the treatment started. However, students tended to answer questions in a basic manner leaving out more detailed answers. Once the instructor had checked their work after the first and second week, students had a clearer expectation and started to give more detailed answers.

Instructor observations indicated that students comprehended the science content books as well as any other expository texts they were exposed to. Because of their background knowledge, some of what appeared to be comprehension of the text could have also been knowledge gained from our other science activities. Students completed their graphic organizers during small group and answered questions to demonstrate

comprehension of the text. Students consistently showed they were competent in using nonfiction text features as they read, including maps, graphs, photographs, and diagrams. They were also competent in describing the author's purpose, however it tended to be an easier area because all the books were nonfiction. The instructor observed that students struggled the most with drawing conclusions and summarizing. They generally needed more guidance to complete their activities within small groups.

In summary, the data did not indicate that student comprehension of expository texts increased because of the integration of science content into literacy. The data showed that students still struggled with certain reading skills such as identifying the author's purpose even after practicing the skills for four weeks with expository science texts. Test scores showed that students did improve in certain areas such as drawing conclusions and using context clues. In class activities indicated students were able to use their reading strategies and comprehend nonfiction texts, but this may have been due to their ability to make connections to the science content they already knew.

## INTERPRETATION AND CONCLUSION

The primary question asked in this study was, "What are the effects of integrating science content with literacy instruction on science content understanding?" In analyzing the data from the summative unit test scores, there is evidence that suggests it is beneficial for students to receive the extra instruction in science during literacy time. For SOL 4.7, investigating and understanding the solar system, 90% of the students in the treatment class passed the questions on the assessment, a figure not only acceptable for a classroom teacher, but quite pleasing. As a fourth grade teacher in Virginia, I would feel

very comfortable sending students to fifth grade if 90% of them were able to pass all of the science SOL's.

In comparing data from the pre-treatment unit to the treatment unit classroom assessments, the average score for all students increased 18% after students had science integrated into literacy. The pre-treatment unit was on electricity and magnetism, an area where we didn't read any books on the topics, but we did do many hands-on learning experiences. While students benefited from these experiments, I believe they would benefit more from having both. Science time could be spent focused on the exploration and elaboration of skills, while reading could be spent on the explanation of the science topics.

One of my most interesting and encouraging pieces of data was the increase in my special education students' understanding of the science topics. The averages for students with IEP's increased 46%, an increase I attribute to the extra time these students generally need to learn. When so little time is spent on science, only 45 minutes for five days every other week, students have little time to ingest and understand all the new information. For all students, but especially my students with disabilities, it seems that the extra time spent on the science content helped students grasp more of the material we needed to cover.

One of the lowest areas on both the classroom assessment and the district summative assessments was in 4.8e, the historical contributions in understanding the Earth-moon-sun system, which included studying scientists such as Aristotle, Ptolemy, Galileo, and Copernicus. There were the fewest books on these scientists in our reading groups and reading centers, which could show the impact the books had on student

learning. Many more books were available on topics such as the planets, stars, the moon, and astronauts. Students then had access to and spent more time with these books and hence scored higher on these objectives on their tests.

One of the secondary questions related to how students attitudes about science would change when science was integrated into literacy instruction. Instructor observations showed that students did indeed react more positively to science when it was integrated into reading groups and literacy centers. Students were often eager to get their “red folder” and a science book when they were at their stations. Students even had the option of visiting the computer for one of their stations, but would bypass it in favor of visiting the science literacy station. This interest wouldn’t only have to be related to the science topic of this study. That kind of interest and excitement could also possibly be generated for the other science units studied throughout the year by changing out the books available for students during each unit.

Student interviews and surveys showed that students were confident when reading nonfiction books where they were familiar with the content. Since the reading material matched what we were studying in science, students had more background knowledge to connect the readings too. This ability to make connections between the material being read and the material learned in science may have also affected the third question of the study regarding the impact on reading comprehension of expository texts. Because students had so much background knowledge and interest from the connections they could make from reading to science, it was difficult to gauge what information they were learning from reading the texts, and what information they already had and was simply being reinforced. During small group instruction, students were asked probing questions

and filled out different graphic organizers to practice their reading skills. However, by answering the questions or completing the graphic organizers successfully, many times students could have been showing off their general science knowledge, rather than their understanding of how to use the reading comprehension strategy.

This showed when it came to their reading assessment scores and the significant drops seen from second to third quarter. Students had been able to use and sometimes rely on their science knowledge for their reading practice. Yet when it came to the assessments, students weren't as skilled at using their reading comprehension skills while reading expository texts on new topics they couldn't make many connections to. For example, one of the nonfiction articles on the third quarter test was about manatees and another was about bats in a community of Texas. Students didn't have the background knowledge to rely on and simply had to use reading comprehension skills.

## VALUE

As an elementary teacher who could be moved grade levels at any time, I know that incorporating science instruction would be valuable to me no matter what grade level I teach or what state I live in. Throughout the nation more time is generally spent on math and reading than on science and social studies, making it not only useful, but sometimes necessary to integrate subjects. This project helped show the value in integrating science into reading, but I think that it also applies to integrating social studies content into reading as well. Not only could these subjects be integrated into reading instruction, but also into writing and math instruction. From this project, I believe that the

more time students spend hearing, reading, and working with science content, the more interest they will show for it and the more knowledge they will gain from it.

Integrating science into literacy instruction can occur in any elementary classroom in which all subjects are taught. Although literacy instructional time may be structured differently for other elementary classroom teachers, they should still be able to incorporate science content into whole group reading, small groups reading, or student's independent reading time. The more time spent on reading and working with science content, the more students will benefit in learning the science. However, as I believe this study shows, reading should involve more than just focusing on the science content for an extended period of time. Students need to be exposed to a variety of texts in a variety of forms, otherwise it is difficult to see whether their reading comprehension is improving, their knowledge of science is improving, or both are indeed occurring.

For my own classroom, this project was valuable to me because I could see how much more interested students became in science when it was part of their everyday routine. When science is only taught every other week, students can often forget key ideas or become complacent with their science knowledge during their "week off." By having science constantly being taught and accessible in classroom activities, students were always learning the science unit content, not just during specified science weeks.

One of the most valuable portions of the actual intervention for me was the literacy centers as it proved to be an interesting and time-consuming center for students to visit. Often times, students are assigned to visit a certain literacy station, but they may finish early or rush through and ask the dreaded question of, "What do I do now?" With a large supply of books though and with the bookmarks tailored to each book, the centers

provided the students with constant activities that no one came close to finishing. Although it required a lot of books and time spent to prepare initially, it paid off in student interest and work. The centers also allowed students to work independently, in pairs, or even small groups. Much to my happiness, students also visited the centers frequently whenever they had free time, such as in the morning while waiting for morning announcements to begin.

For future applications in my classrooms, I would be interested to see whether the results of this study could be replicated with different units of study in science. The treatment unit of the study was related to the solar system, which generated a lot of interest in the classroom. I would like to see whether the same interest and gain in science knowledge could occur when the science topic is plants, natural resources, weather, or force and motion. There are some units that seem to naturally interest students more, such as the animal adaptations and ecosystems unit we cover in the spring. Hopefully this study shows that the same interest could be seen for all topics throughout the year.

If fourth grade students could be not only interested, but knowledgeable in the science areas we study, fifth grade teachers would have a much easier job reviewing these fourth grade objectives before their SOL assessments. It would also hopefully set up a more positive view of science for all students and would help them enjoy their science experiences a little more as they move through their education.

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APPENDICES

APPENDIX A

STUDENT INTERVIEW QUESTIONS

### Pre-Research Interview Questions

Participation in this interview is voluntary and participation or non-participation will not affect your grades or class standing in any way. You may choose to not answer any question that you do not want to answer, and you can stop at any time.

1. Do you enjoy reading fiction or nonfiction books more? Why?
2. If you could visit any section in the library or the classroom library, which section would you visit and why?
3. How confident do you feel in understanding what you read in a nonfiction book?
4. What kinds of books do you think we should read during reading groups?
5. What types of books do you like to read during our reading centers?
6. What do you consider a science book? Do you enjoy reading science books?
7. Do you think you learn a lot from reading science books?
8. What activities do you think you learn the most from in science?

### Post-Research Interview Questions

Participation in this interview is voluntary and participation or non-participation will not affect your grades or class standing in any way. You may choose to not answer any question that you do not want to answer, and you can stop at any time.

1. Do you enjoy reading fiction or nonfiction books more? Why?
2. If you could visit any section in the library or the classroom library, which section would you visit and why?
3. How confident do you feel in understanding what you read in a nonfiction book?
4. What kinds of books have you enjoyed reading in our reading small groups?
5. When you visited the reading centers, what types of books did you choose and why?
6. What do you consider a science book? Do you enjoy reading science books?
7. Do you think you learn a lot from reading science books?
8. What activities do you think you learn the most from in science?
9. Do you think you learned more about the solar system from our reading time than you would have without the solar system books in our groups and centers?
10. Compared to other science units we have studied this year, how confident are you in your knowledge of the solar system and the Earth, moon, and sun relationships?

APPENDIX B

STUDENT READING INTEREST SURVEY

**Pre- and Post-Research Science Reading Survey**

Participation in this interview is voluntary and participation or non-participation will not affect your grades or class standing in any way. You may choose to not answer any question that you do not want to answer, and you can stop at any time.

**How good of a reader do you think you are on a scale of 1-10 where 1 means not a very good reader and 10 means an excellent reader? (Mark only one box)**

1     2     3     4     5     6     7     8     9     10

**To what extent do you agree with the following statements about the books you read?**

(Give your answer with a check on each line. If you do not understand, leave the line blank.)

**1-Disagree    2- Somewhat disagree    3-Neither    4- Somewhat agree    5-Agree**

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| 1. I enjoy reading .....   | 1 | 2 | 3 | 4 | 5 |
| 2. I enjoy reading about nonfiction topics .....   | 1 | 2 | 3 | 4 | 5 |
| 3. I enjoy fictional stories more than nonfiction .....  | 1 | 2 | 3 | 4 | 5 |
| 4. Nonfiction books are only for learning .....  | 1 | 2 | 3 | 4 | 5 |
| 5. I can learn valuable information on different science<br>topics from nonfiction science books .....           | 1 | 2 | 3 | 4 | 5 |
| 6. Science textbooks are the only type of science books .....  | 1 | 2 | 3 | 4 | 5 |
| 7. I think reading nonfiction books is difficult .....   | 1 | 2 | 3 | 4 | 5 |
| 8. I am good at reading nonfiction books .....   | 1 | 2 | 3 | 4 | 5 |
| 9. I have strategies that I can use when I read that will help<br>me understand what I am reading .....          | 1 | 2 | 3 | 4 | 5 |
| 10. Reading nonfiction science books will help me learn more<br>about the science topics we cover in class ..... | 1 | 2 | 3 | 4 | 5 |
| 11. I feel that we spend enough time on science for me to  |   |   |   |   |   |

learn it well .....1 2 3 4 5

**Below are some of the science topics we learn about in fourth grade. Place a check next to each science topic you like to read about.** (You may mark more than one or if you don't like to read about any of the topics, leave them blank.)

\_\_\_\_\_ Weather

\_\_\_\_\_ Electricity and Magnetism

\_\_\_\_\_ Animals

\_\_\_\_\_ Force and Motion

\_\_\_\_\_ Plants and Trees

\_\_\_\_\_ Astronomy and the Solar System

\_\_\_\_\_ Ecosystems

\_\_\_\_\_ Famous Scientists and their lives

\_\_\_\_\_ Virginia Resources

\_\_\_\_\_ Conservation and caring for the environment

APPENDIX C

READING OBSERVATION CHECKLIST

## Reading Observation Checklist

Student Name: \_\_\_\_\_

Reading Group: \_\_\_\_\_

Date: \_\_\_\_\_

Text Name: \_\_\_\_\_

Observed Behaviors:

Looking through text \_\_\_\_\_

Focus needed to be redirected \_\_\_\_\_

Following along as others read \_\_\_\_\_

Asks questions about the text \_\_\_\_\_

Notes: \_\_\_\_\_

Interest Level: (low) 1 2 3 4 5 (high)

<b>Weekly Focus Skill</b>	<b>Reading Skill</b>	<b>Child demonstrated competency</b>	<b>Needed guidance, but could demonstrate some understanding</b>	<b>Confused, did not know how to proceed</b>
	Summarizing the main idea			
	Describing the Author's Purpose			
	Drawing Conclusions			
	Formulating and Answering Questions			
	Using Nonfiction Text Structures			
	Using Context Clues			
	Cause and Effect			
	Fact and Opinion			