

THE IMPACT OF INCREASED NONFICTION READING ON STUDENT
ACHIEVEMENT IN SCIENCE

by

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STATEMENT OF PERMISSION TO USE

In presenting this professional paper in partial fulfillment of the requirements for a Master's degree at Montana State University, I agree that the MSSE Program shall make it available to borrowers under rules of the program.

Tamara S. Jendro

July 2013

DEDICATION

This Capstone project is dedicated to my family; Ron, Teagan and Taylor. Thank you for your love, encouragement and understanding.

ACKNOWLEDGEMENTS

I would like to thank the two members of our trio that really pushed me, encouraged me and ran through the finish line with me. Thank you, Ashley and Tina! Because of you, this was an unforgettable journey!

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ABSTRACT

The purpose of this action research project was to study the effects adding increased amounts of science related nonfiction reading had on student achievement in science. How did the increased exposure to nonfiction reading affect students' attitudes towards science and students' attitudes towards reading nonfiction? After students were given opportunities to read nonfiction books related to the topics of study in science class, data was collected and analyzed to determine if increasing nonfiction reading opportunities improved students' posttest scores or changed students' thoughts regarding nonfiction reading. After this short study, posttest scores indicated the additional nonfiction reading did not improve student content knowledge. The data did show however, an increase in the number of students that choose to read nonfiction books. Results of this action research project also indicated students thought reading nonfiction sources was important to gain knowledge and understanding of science topics.

INTRODUCTION

Teachers face many challenges when it comes to delivering the curriculum with fidelity. A challenge I face in my classroom is finding enough time during the week to teach science. The third grade curriculum emphasizes the teaching of reading, language arts and mathematics. With the pressure of meeting AYP (Annual Yearly Progress) and preparing students to take the CRT (Montana's standardized test) in the spring, I spend a great deal of time teaching math and reading which leaves only a small portion of the day to commit to science. If there happens to be a disruption in the schedule, such as an assembly, for example, it is science that gets omitted. It is not my intent to neglect teaching this equally important subject; I am looking for a creative way to increase the amount of science exposure my students receive during the school day.

As a third grade teacher, the majority of the students that come into the third grade have gained confidence in their ability to read, often have good word decoding skills and are moving into reading more complicated fictional chapter books. A concerning observation I have made is most of these proficient readers rarely choose to read nonfiction books. I understand the value of reading fiction, but I also question whether students lacking background knowledge in areas such as science and social studies would be more knowledgeable if they were encouraged to read more nonfiction text in school.

Over the course of the last three years, I have participated in a SILC (Science Inquiry Learning Classroom) program with many other K-8 teachers in our school district. A concern frequently expressed by the upper elementary and middle school teachers in this group is the lack of content knowledge students have when entering their

science classes. This lack of fundamentals creates a challenge when trying to teach more difficult science concepts. The middle school teachers with whom I have conversed tell stories of having to teach basic science concepts that students should have been exposed to earlier in their schooling and when they have to back up in the curriculum, it is difficult to complete the curricular goals for their grade level.

Thinking of these three concerns, I really wanted to find a way to increase student exposure to science topics, build background knowledge and integrate more nonfiction reading into the school day. My overall observation is students lack science background knowledge and exposure to science concepts in elementary school. How can I increase student exposure to science concepts and build science background knowledge that will better prepare students for upper elementary and middle school?

The questions I developed and hoped to answer during my research project were:

- **Primary action research question:**
How does increasing nonfiction science reading impact student achievement in science?
- **Sub-questions:**
 1. How does increasing nonfiction reading affect student attitudes towards science and reading nonfiction book?
 2. How does increasing nonfiction reading affect my teaching practices?

After my research was complete and my conclusion was determined, I shared the results of my study with my students. It is important for students to know different strategies for acquiring knowledge and how acquiring knowledge affects learning. Therefore, I hoped by knowing the results of my action research project I would instill in my students the importance of reading nonfiction books to gain knowledge about science and increase their understanding of science topics.

I also shared my results of this action research project with my administrator and colleagues. It has become increasingly important to incorporate nonfiction reading into teaching as National Common Core Standards becomes the road map to the goals and objectives we use as we teach. Teachers are required to use more nonfiction literature in their teaching practices and by sharing the positive results I saw in this study and the strategies I found successful, I hoped to inspire more of my peers to increase the amount of exposure their future students would have to nonfiction literature sources.

After careful thought and consideration, I selected the members of the support team I relied on throughout my Action Research Project for their support, critical feedback and expertise.

- **Jill Nyman** – Jim Darcy Elementary School, fifth grade teacher

Jill and I have worked together at the same elementary school for eight years. She is a dedicated educator and is always very conscientious of the curricular goals as she develops lessons and delivers instruction to her students. Her knowledge of curriculum and interest in data driven instruction are strengths that were helpful as I collected and interpreted data during my project. Jill just recently completed her Master's in School Administration and is quite familiar with defending a thesis.

- **Jeanne Morigeau** – Jim Darcy Elementary School, teacher librarian

Jeanne is a whiz when it comes to writing. Jeanne loves a challenge and was willing to edit my work as I proceeded with this project. Jeanne is an amazing librarian that goes above and beyond the typical duties of a school librarian. She supports the teaching staff in any way she can and is always willing to

track down books upon a teacher's request. Jeanne stays current on the latest and greatest books for students and is constantly adding quality age appropriate literature to our library. She has a wonderful relationship with the students in our building, knows all of the students by first name and has worked closely with the staff to increase reading proficiency school wide. Last year when I started visiting with her about this project she immediately got excited and started looking for high quality nonfiction books to support my action research project. I went to her on many occasions to discuss data collection, nonfiction reading materials and possible action research questions etc. Therefore, she was well aware of this endeavor and was willing to support me in any way she could.

- **Tina Brothers** – Jim Darcy Elementary School – kindergarten teacher, MSSE classmate

Tina has been a valuable resource since the beginning of the MSSE program. She is my “go to” gal and has been extremely supportive when I have questions on an assignment or I need some analytical discourse. She is passionate about teaching science, and her knowledge and enthusiasm are constant. Tina does a great job giving constructive criticisms, which motivates me to give 110% to this program. I can't imagine going through the MSSE program without her.

- **Ashley Milbrandt** – Jim Darcy Elementary School – first grade teacher, MSSE

Ashley is very goal oriented and focused. She is able to see the bigger picture, but break it down into manageable parts (which really keeps me on track). She knows how to get things done. Working with Ashley has helped me remain focused and organized while focusing on the end goal. Ashley is an amazing teacher and I value her fresh ideas and teaching methods. Again, I can't imagine going through the MSSE program without her.

Walter Woolbaugh, my MSSE committee chair, and Dr. McLaughlin, a professor of chemistry at Montana State University were also members of this valued support team. The time commitment and advice the members of this team provided were greatly appreciated!

CONCEPTUAL FRAMEWORK

By conducting a literature review I hoped to find more information to confirm the necessity of my action research project and help me design research methods to answer the questions pertaining to my project. I searched for studies and articles supporting benefits of reading nonfiction and expository text to increase background knowledge. It is my belief that by exposing my students to more nonfiction science themed materials, my students would gain knowledge in science and enjoy reading nonfiction more often.

I first wanted to back up my belief that it is important for students to learn how to read nonfiction and find evidence that supports the benefits of increased nonfiction reading. In the first few years of elementary school, students learn to read primarily through the use of fiction books, but with the National Common Core Standards at the forefront of education, there is an increased push to use nonfiction sources to deliver curriculum. Starting at an early age, children are expected to process rigorous

information, therefore, it is important for students to learn to read and understand expository materials (Fang, 2008; Kelsey, 2011). It is important for students in elementary school to have many opportunities to read nonfiction so they will be prepared to “handle the more demanding reading materials in later years of schooling” (Fang, 2008, p.477). One article, “Nonfiction in the Early Grades: Making Reading and Writing Relevant for All Students” (Flowers, 2000), validated the importance of this action research project stating, “Nonfiction promotes learning across the curriculum.” Having students read expository and nonfiction materials also prepares students to understand more complex concepts and engage in critical thinking (Flowers, 2000). The academic benefits of integrating more nonfiction and expository reading was apparent and supported the importance of my study.

As I continued gathering evidence for my action research project I needed to find out why students preferred reading fiction and if there were nonfiction sources that would appeal to my students. I read many articles discussing the nonfiction “makeover” that has occurred in recent years. I was pleasantly surprised by the “new” nonfiction (Gill, 2009) and how nonfiction books have been revamped in recent years to appeal to young readers. Nonfiction books have changed immensely over the past 20 years with more appealing photographs, illustrations, and are written in a way that intertwines a story with rich science vocabulary and text (Kelsey, 2011; Gill, 2009; and Collard, 2003). Nonfiction books today are accurately written, well organized and visually attractive (Collard, 2003 and Gill, 2009). After reading these articles, I visited our school library to find that indeed, authors and publishers have put a great deal of effort into making nonfiction appealing to young readers.

Providing an educational framework and developing a foundation for my study was my next goal. My views about teaching science and reading are similar to the findings of early theorists such as John Dewey. Dewey believed learning is an active process and involves the assimilation of knowledge (Emand & Fraser, 2011). His theory of experience explains that we learn by applying what we have learned in past situations to new situations. By building knowledge through reading nonfiction and expository materials, students will gain knowledge that can be applied to new situations and new learning experiences. If we are to believe the Constructivist theory, new information is internalized through past experiences or prior knowledge. “Learning occurs on the framework of what a student already knows” (Crowther, 1999, p.18). Building background knowledge and conceptual knowledge through increased nonfiction reading would help students assimilate new learning in science and improve science achievement.

Scientific literacy is a new hot topic in education. The National Science Education Standards define scientific literacy as “the understanding of science content and scientific practices and the ability to use that knowledge to participate in decision making that is personal or that affects others in a global community” (Krajcik & Sutherland, 2010, p. 456). In further reading about science literacy, I found many correlations between the instructional methods used to encourage science literacy and the goals of my study. Scientific literacy involves a rounded approach to teaching science content, stressing the importance of reading, writing, questioning and communicating to gain knowledge and understanding of science topics. I planned to use all of these methods during my study by adding more science reading opportunities, having students write in science journals,

and encouraging students to communicate with their peers the new information they had gained through their reading.

Reading nonfiction is very different than reading fiction books and since many third grade students have not had a lot of experience reading informational text, it was important to research best practices for teaching children how to read this more complex text structure. Nonfiction text often has specialized vocabulary and technical language that makes comprehension more difficult for students. Fang (2008) recommends several teaching strategies to alleviate frustration and hesitation among students when reading expository materials. To promote student understanding, paraphrasing and summarizing key points is helpful. It is also important to model reading nonfiction books so students realize these books do not have to be read in sequential order (Gill, 2009; Clark, 2011). Graphs, sidebars, captions, and other graphic sources are parts students should be aware as a way to gain additional information and should not be overlooked. The most important strategy is to allow students time to read. Reading practice is necessary, therefore, having quality nonfiction books readily available and allotting students time to practice will increase student exposure to expository materials (Fang, 2008).

If we, as teachers, are able to increase background knowledge and conceptual knowledge, students will be able to apply this knowledge to enhance learning across the curriculum.

METHODOLOGY

Treatment

The treatment for my action research project included providing more nonfiction science themed reading opportunities for my students during the school day. The research

methodology for this project received an exemption by Montana State University's Institutional Review Board and compliance for working with human subjects was maintained during Fall 2012 (Appendix A). Throughout my action research project I taught one non-treatment chapter in science followed by a treatment chapter in science with a total of two cycles of treatment and two cycles of non-treatment phases. Table 2 outlines the teaching approaches and data collection methods I used during the treatment and non-treatment phases.

Table 1
Non-Treatment and Treatment

Non-Treatment Units	Treatment Units
<ul style="list-style-type: none"> * Use pre-test to evaluate student knowledge of material and objectives to be covered in upcoming science *Teach daily lessons within the science unit *Give a formative assessment (CAT) at least once a week to gauge student understanding *Students will participate in at least one inquiry activity per chapter *Chapter worksheets will be given to enforce concepts and science vocabulary *Science journals will be used to take notes, collect data and write about concepts *A posttest will be given at the end of the science chapter 	<ul style="list-style-type: none"> * Use pre-test to evaluate student knowledge of material and objectives to be covered in upcoming science unit *Teach daily lessons within the science unit *Give a formative assessment (CAT) at least once a week to gauge student understanding *Students will participate in one inquiry activity/chapter *Chapter worksheets will be given to enforce concepts and science vocabulary *Science journals will be used to take notes, collect data and write about concepts *A posttest will be given at the end of the science chapter <u>In Addition:</u> *Introduce nonfiction books related to science chapter *Read aloud one nonfiction book related to the science topic each week *Have at least 20 nonfiction books related to current science unit available for students to read during independent reading (The Nonfiction Book Nook) *Give one book talk on related nonfiction book each week *Teach students strategies for reading nonfiction books *Allot 15 minutes/day for students to read nonfiction books related to the science topic with partner or independently *Encourage students to take Accelerated Reader Quizzes on the nonfiction books they have read.

During my action research project, I planned to teach four chapters of science from the Harcourt Science third grade textbook, alternating treatment and non-treatment phases. Each non-treatment chapter took approximately three weeks to complete during the four day a week, 40-minute science block I planned into our weekly class schedule.

The non-treatment phases of my study included reading from the textbook with the students, engaging the students in at least one experiment or hands-on science lesson, and completing written assignments such as CATs (Classroom Assessment Techniques), chapter worksheets, and science journal entries. At the end of each non-treatment phase, the students were required to take a posttest so I could assess student understanding of the concepts and vocabulary taught during the chapter.

A treatment phase, again using a three-week time frame and teaching four science lessons a week, kept the treatment phases teaching format consistent with the non-treatment phases. As referenced in Table 1 above, during each treatment, the delivery of science instruction remained consistent with the non-treatment phases except for the additional opportunities students were given to read and hear nonfiction books with themes related to the science chapter being taught at the time. For example, during the chapter on the five main animal groups, I read aloud several nonfiction literature selections with concepts and vocabulary words students had become familiar with through the lessons in the science textbook such as animal traits, mimicry, and extinction. Nonfiction reading was also encouraged during the 20-minute independent reading time the students were given each day. I created a special Nonfiction Book Nook in our classroom, which held many content rich nonfiction books with a wide range of reading levels to meet the needs and interests of all the students in my class. Adding more nonfiction books to our classroom, giving more book talks and reading nonfiction aloud were all suggestions students had given during the students' interviews. The students were allowed to read books from this corner of our classroom anytime they had a free minute.

The selection of quality nonfiction books was critical to my action research project to ensure that adding additional nonfiction reading was going to truly improve student achievement in science and improve student understanding of the science concepts and vocabulary being taught during the science chapter. It was essential to find books that would coincide with the content I was teaching during science class. To help me gather nonfiction books for this study I relied on our school librarian, Jeanne Morigeau. I knew Jeanne would know a great deal about what types of nonfiction students enjoyed reading as well as being able to find worthy nonfiction books to reinforce science concepts and vocabulary students were expected to know. She and I were able to find many nonfiction books containing relevant concepts and vocabulary words. Books we found credible with accurate information were recommended books from reliable sources such as National Science Teachers Association (NSTA) and National Geographic. This specialized nonfiction collection was used for book talks, read alouds and independent student reading.

Demographics

The data used for my action research project was reflective of the twenty-three third grade students in my classroom for the 2012-2013 school year at Jim Darcy Elementary School. Jim Darcy Elementary is one of eleven elementary (K-5) schools in Helena, Montana. Our school has 305 students with 20.3% of the population receiving free or reduced lunch. We have a very stable population of families and the majority of our students attend Jim Darcy for all six years of elementary school. My class was comprised of 13 girls and ten boys, all Caucasian English speaking students. Of these students, two girls attended speech class twice a week for 20 minutes each time for minor

articulation difficulties. During the length of this project, none of my students received special education services in math or reading and two of the students received free or reduced lunch. Academically, my students were an average class with 12 students at or above benchmark on the Fall 2012 Academic Improvement Measurement System (AIMSWeb) (Appendix C) reading assessment, seven students were in the intensive range and four of the students fell into the strategic category according to the assessment standards.

Research Methods

Table 2 explains the tentative treatment schedule including the science chapters I taught and the data collection instruments and techniques I used throughout the course of my action research project.

Table 2
Treatment Schedule

Science Unit and Chapter	Tentative Date	Non-Treatment/ Treatment	Data Collection
Unit A – Plants and Animals Chapter 1 – Plant Types	September 18- Oct. 17	Non-Treatment	*Initial student interviews *Posttest *Student AR reading quizzes *Student Opinion Surveys *Teacher Journal and observations
Unit B – Plants and Animals Chapter 2 – Types of Animals	October 22- November 20	Treatment	*Posttest *Student AR reading quizzes *Student Opinion Surveys *Teacher Journal and observations
Unit D Cycles on Earth and in Space Chapter 2 Weather	November 26- December 18	Non-Treatment	*Posttest *Student AR reading quizzes *Student Opinion Surveys *Teacher Journal and observations
Unit D Cycles on Earth and in Space Chapter 3 Earth and Its Place in the Solar System	January 2- January 25	Treatment	*Post-study student interviews *Posttest *Student AR reading quizzes *Student Opinion Surveys *Teacher Journal and observations

I used the same teaching strategies consistently in both phases of my study. I tried to keep the length of each treatment and non-treatment phase about the same length, but the number of days spent on a chapter did vary slightly due to the varying number of lessons each science chapter contained. The change occurred during the treatment phase, at which time I introduced nonfiction books that are related to the topics taught during the science lessons. Students had an opportunity to read these nonfiction selections during independent reading times each day. During the research project, I used the same data collection instruments for both the treatment and non-treatment phases with the exception of the student interviews, which were given at the beginning of the study and again at the

end of the study. I compared the data collected during each phase in order to determine if changes had occurred in student achievement, student understanding and/or student opinions.

I chose specific data collection instruments to assess each question of my action research, and to show how increased nonfiction reading affects student understanding of science as well as how it affects student attitudes. Table 3 outlines the data collection methodologies that corresponded to each research question. Table 3 also indicates the triangulation necessary for a valid and reliable study.

Table 3
Data Collect Methods

Research Questions	AR Quizzes	Student Surveys	Student Interviews	Chapter Posttests	Teacher Journal and Observations
1. How does increasing science based nonfiction reading impact student achievement in science?		B	B	A, D	D
2. How does increasing nonfiction reading affect student attitudes about science and about reading nonfiction books?		B, C, D	B, C, D		D
3. How does increasing nonfiction reading affect my teaching practices?	A, C, D	B, D	B, D	A, C, D	D

Key – The data collection methods I used allowed me to answer the question and sub-questions of my research project and this key explains how the methods are suited to gather data for each question.

- A) Quantitative data will measure student achievement of concepts or vocabulary
- B) Qualitative data will indicate student attitudes and opinions
- C) Data will show student progress over time
- D) Data will show the value of the treatment

The main research question I wanted to answer was “What impact did increased nonfiction reading have on student achievement in science?” To measure this, I specifically looked at student posttest scores; student performance on assigned CATs and reviewed my teacher journal notes and observations. The posttests were given at the end of each science chapter during both the treatment and non-treatment phases of the project to measure overall understanding of the concepts and vocabulary terms taught in each chapter. To assure the validity and reliability of the chapter posttests, I had one of my readers, Jill Nyman, review each of the four tests. She agreed with me that the posttests seemed fairly equal in types of questions and difficulty. The test questions on each for the four tests were at the remembering and understanding levels according to Bloom’s Taxonomy. Walt Woolbaugh, my college professor, also looked over the chapter posttests and agreed that the tests seemed valid and reliable. I compared these assessments, looking for changes in student performance between the treatment and non-treatment chapters.

In addition to this quantitative data, I used teacher journal notes and observations to support evidence of student learning by noting how well students understood the

lessons I was teaching, and how students responded during class discussions or activities. To further understand if increased nonfiction reading was making a difference in student understanding of science, I looked at Accelerate Reader (AR) quiz scores to determine if students were successfully passing quizzes.

Student surveys (Appendix D), student interviews (Appendix E) and teacher journal notes were used to determine if adding more nonfiction science themed reading affected students' attitudes toward learning science or changed students' thoughts about nonfiction reading. Students were asked to share their thoughts and opinions about reading nonfiction books and how reading nonfiction science related books helped them learn science concepts by completing a student survey at the end of each treatment and non-treatment unit. In order to ask more probing questions and ensure the information I was gathering was reliable, I interviewed my students before I began my study and again after the last phase to see if students had a shift in their thoughts towards science and science related nonfiction reading. Using these data collection instruments showed changes that had occurred in student opinions regarding nonfiction reading and how it related to learning science.

The first student survey I designed was a ten question survey students answered with yes and no responses. After I administered the first survey, I realized that I would receive more valuable information if the students were able to respond with yes, no or sometimes. I recreated the survey adding several probing questions and administered this survey mid-way through and again at the end of the action research study.

My teacher journal and observations were also critical to acquiring information during this action research project. I was able to write down student comments about

reading, science related thoughts or ideas students had mentioned and any other observations I felt would support the data I was collecting. The teacher journal was used to record the number of students I observed reading nonfiction during independent reading times. It was important for me to reflect on student perceptions of reading nonfiction books and to make note when I observed students making connections between reading nonfiction books and how this reading related to information learned during science lessons. I also used my teacher journal to note how students responded to the concepts being taught during science lessons, and how students responded to the posttests given at the end of each science chapter. My teacher journal was a valued resource as I analyzed the data collected to support my action research findings.

DATA AND ANALYSIS

Once I had established the methods I would use to answer my research questions and determined the data collection instruments that would give me valid and reliable information regarding my study, I was able to compile and analyze the data I had collected. All 23 of my students participated in each piece of data collected except for the student interviews. For the student interviews, I used a stratified random sampling by choosing three students from each of the three reading levels as determined by the Fall 2012 AIMSWeb (Appendix B) scores. I interviewed these same students before the first non-treatment phase and after the final treatment phase. Sifting through the data gave me much insight on the effects increasing nonfiction reading opportunities had on student achievement in science and student attitudes towards science. This data also gave me a vision of future teaching practices in support of the National Common Core Standards.

Student Achievement

The most important question of my action research project “How does increasing nonfiction reading effect student achievement in science?” can be addressed by looking at student posttest scores shown in Figure 1. I used science chapter posttests (Appendix F) to compare treatment and non-treatment student test scores.

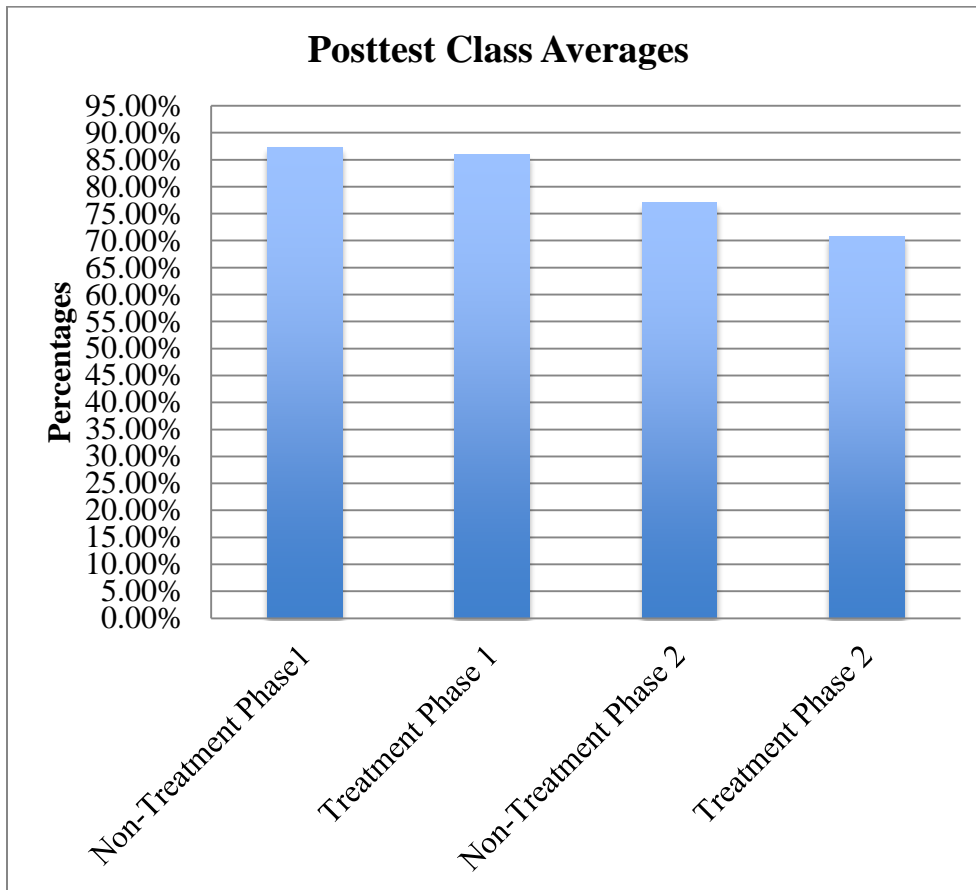


Figure 1. Test averages, (N=22).

After the first non-treatment phase, the class was given a posttest on Plants. The average of the students’ non-treatment posttest scores (Figure 1) were 87.3%, (N=22). Then a posttest on Animals was given after the treatment phase. The average of the students’ test scores were 85.9%, (N=22). Though not a significant difference, the non-

treatment posttest (Plants) class average was higher than the treatment posttest (Animals) class average by 1.4%.

During the second non-treatment/treatment phase the class average test scores of the non-treatment posttest given after the chapter on Weather was 77.0%, ($N=21$) and the treatment test scores that were given after the chapter on the Solar Systems was 70.8%, ($N=21$). Again there was a decrease (-6.2%) in the class posttest average scores during a treatment portion of the study even with an increased amount of student exposure to nonfiction books related to the chapter being taught. It was apparent through the posttest scores that overall student achievement in science did not increase with additional exposure to nonfiction literature. I was not surprised to see the decline in test scores as I noticed the students had a much more difficult time taking the posttest independently on the last two posttests of the action research project. The first two posttests on Plants and Animals seemed easier for the students, as indicated by the level of independence while taking these tests. During both the posttest on Weather and the Solar System students asked me a lot of questions about the test questions. When I looked back at my teacher notes on the day of the Solar System test, I wrote the following notes in my journal.

Today I gave the posttest on the solar system. I thought the students would be able to work independently but many students had questions on the test. Many of the students had questions on how to label the diagram of the planets in the solar system. I gave the whole class further explanation on how to label this diagram because so many seemed confused. Three students could not remember what revolution meant and needed to know in order to answer question 22. I told these students to choose the answer they thought would make the most sense. Two of

my students that struggle academically came to me several times even though I reiterated I would like them to work on their own and answer the best that they could. It is so difficult for me to not help students on a test because I want them to feel successful but I also want the data to be valid (teacher journal, 1-26-12).

It is very possible that the reason students asked for more clarification of questions during the test was increased difficulty in the material being taught. Students start learning about plants and animals long before they begin school and have a great deal of background knowledge regarding both subjects. Weather and the Solar System are units of study students generally do not see until they begin school. Therefore, students have less background knowledge and are actually learning new concepts and vocabulary as opposed to building on prior knowledge.

I analyzed the data from the student surveys (Appendix D), and found this data showed students believed that increasing nonfiction reading increases academic performance. Table 4 shows a portion of the student survey questions regarding academic performance and the students' opinions.

Table 4
Student Survey Percentages 1, (N=23)

Student Survey Question	Pre-Study Percentages		Mid-Study Percentages			Post Study Percentages		
	Yes	No	Yes	No	Sometimes	Yes	No	Sometimes
3. Reading nonfiction books about science helps me better understand what Mrs. Jendro is teaching in science class.	73.9	26.1	55	15	30	41	10	50
4. I understand science concepts better when I read nonfiction books.	81	19	48	24	29	27	18	50
5. I understand science vocabulary better when I read nonfiction books.	60	40	48	14	38	36	23	41
7. Reading nonfiction helped me when I took a test about plants.	75	25	82	5	14	57	0	42

T

he preliminary data from questions #3, #4, #5, and #7 indicated most students believed reading nonfiction would help them learn science. After Phase 1 of the study (non-treatment /treatment), in which I taught the chapters on Plants and Animals, I administered the mid-study student survey. Looking at the percentage of “yes” responses, I found that a high percentage of students still felt reading nonfiction had a positive effect on their performance in science. Interestingly, the post-study student survey data showed a decline in the percentage of students who answered, “yes” to these same questions. This pattern of decline in posttest scores, student survey responses,

indicated that the content that was taught during the chapters on Weather and The Solar System was increasingly difficult.

Next, I analyzed the data that I collected from the Accelerated Reader student quizzes (Figure 2). This data supported the same trend I had discovered when I analyzed the student survey data and the posttest scores. Once again, there was a decline in the number of AR nonfiction books the students chose to read when I compared Phase 1 and Phase 2 of the Action Research project. During the treatment Phase 1 (Animals) eight students took a total of 15 AR quizzes. Only two students took one quiz each during treatment Phase 2 (Solar System).

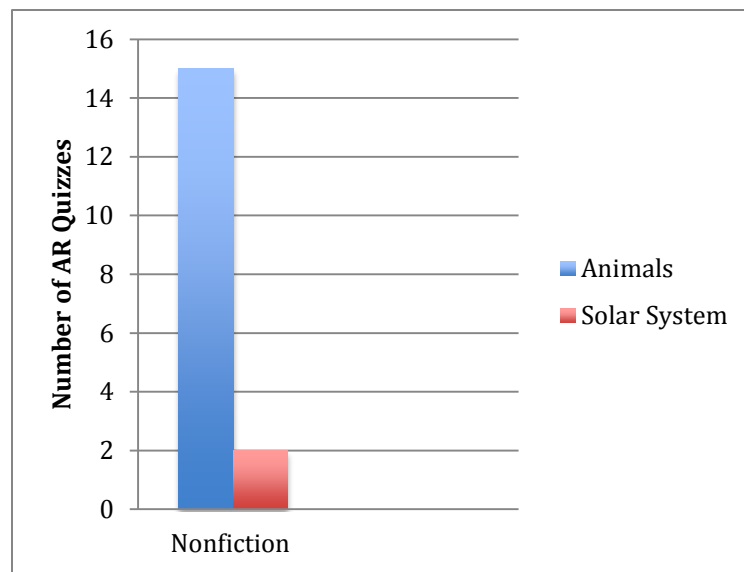


Figure 2. Number of accelerated reader quizzes taken during treatment phases.

The AR quiz data (Appendix C) was yet one more source of proof the students were less interested in reading nonfiction books about the Solar System. Of the students whom provided me with data via AR quizzes, did any show evidence of increased achievement?

I proceeded to look at Accelerated Reader (AR) records to see if there was a correlation between the students who chose to take AR quizzes and their posttest scores (Appendix F). In comparing the information, only two of the students had slightly improved posttest scores from non-treatment (Plants) to treatment phases (Animals) possibly due to reading more nonfiction. Of these two students, one student's test score percentage increased by 2% and the other student had a 3% increase on the treatment posttest. Five of the eight students had a slight decrease in their treatment posttest scores even though they had read additional nonfiction books related to the concepts we were studying in science.

During the second phase of the study two students took one Accelerated Reader quiz. In comparing test scores, the first student's treatment test score decreased by 2%. The second student was absent during the last treatment posttest; therefore a comparison was not made. In the small sampling of students taking AR quizzes after reading nonfiction books related to our areas of study, there was no real correlation between increasing the amount of nonfiction reading and student achievement. I believe the students' apprehension to take AR quizzes on the books they had read as well as the lack of improvement in posttest scores indicates students' need for continued opportunities to read nonfiction books. Students need many (often more than 100) exposures to a new learning task or concept before academic growth is evident. With the same decline showing up again as I compared the number of AR quizzes taken with the student posttest scores in the second treatment phase, I was convinced the difficulty of the content had an effect on student achievement.

One interesting piece of data supporting these findings appeared in the AR quiz score and posttest comparison of treatment phase 1 with one of my students. This student is a high achieving student in my class, a Benchmark (proficient) reader according to the fall AIMSWeb assessment, and enjoys reading nonfiction. This student took six AR quizzes during the treatment phase (Animals) with an AR quiz score average of 93%. The phase 1 Plant (non-treatment) posttest score for this student was 100% while the Animal (treatment) posttest score was 88%. Disappointingly, increased nonfiction reading during the treatment phase Animal unit did not have a positive effect on this student's achievement.

The analysis of the three data collection sources clearly indicated increasing student exposure to nonfiction materials did not improve student achievement. Were students able to explain this lack of interest and the decline I saw in the data analyzed thus far? Post-study student interviews helped me gain a better understanding of the discouraging results I had uncovered. When the nine students were asked which books they enjoyed reading more, books about animals or books about the solar system, eight of the students enjoyed the animal books better while only one student preferred reading about the solar system. The probing question I asked next was "Why did you enjoy the animal books more than the solar system books?" Three of the students remarked the solar system books were too long and not as interesting. One student commented, "I read parts and pieces of some solar system books, the books were kind of long." Another student stated, "The solar system books were a little difficult to read."

My teacher journal supported these same findings, I could see the correlation between the difficulty of the material and student interest in nonfiction reading. I wrote:

On three occasions this week I had the students pick a partner and read books about the solar system out of the Nonfiction Book Nook for approximately 15 minutes each time. The students enjoyed reading together and came to me to share the many interesting facts they had discovered. During our daily independent reading time students do not gravitate toward the Nonfiction Book Nook to read books about the solar system like they did when the animal books were over there (teacher journal, 1-25-13).

Student Attitude

The second question of my research project focused on how increased nonfiction reading affected student attitudes towards science and nonfiction reading. Would students enjoy science more if they were exposed to more nonfiction books related to the science subject they were learning about? Would I see an increase in the amount of nonfiction books that students read? Would students' thoughts towards reading nonfiction change over the course of my action research project? I analyzed the student surveys, student interviews, and my teacher journal and observations to determine the changes in students' attitudes towards science and nonfiction reading.

The pre-study student survey (Appendix D), mid-study student survey, and post-study student surveys revealed several changes in the students' attitudes towards reading nonfiction over the course of my study (Table 5).

Table 5
Student Survey Percentages 2, (N=23)

Student Survey Question	Pre-Study Percentages			Mid-Study Percentages				Post-Study Percentages		
	Yes	No		Yes	No	Sometimes		Yes	No	Sometimes
1. The books I read for fun are mostly...	Fic 62.5	NF 37.5		Fic 67	NF 5	Equal 29		Fic. 59	NF 18	Equal 23
2. I enjoy reading nonfiction science books.	70.8	29.2		36	18	45		27	14	59
6. I like science more when I read nonfiction books that go along with what we are learning in class.	70	30		52	33	14		73	10	18
9. It is easy for me to find nonfiction books that I am interested in reading.	65	35		50	18	32		27	10	36
10. I like science class.	90	10		50	18	32		68	14	18

Student survey question number one indicated an increase in the number of students who chose to read nonfiction books. The pre-survey percentage of students who read mostly nonfiction books was 37.5% and the percentage of students who read mostly fiction books was 62.5%. I thought the percentage of students who said they read mostly nonfiction was high, this was probably due to the fact that the students had not had much exposure to nonfiction books, therefore many students did not know the difference between nonfiction and fiction books. By the mid-survey I had incorporated the

Nonfiction Book Nook into our classroom. Students were able to read books from the Book Nook independently throughout the day. The mid-survey study, after the first treatment phase, did not show an increase in the number of students who read mostly nonfiction books. 34% of the students responded “sometimes or yes” to “The books I mostly read for fun are...” with the majority of the students preferring to read fiction books (67%). According to the survey, students were still hesitant to read nonfiction books even though the focus of the books in the Book Nook was animals. The post-study student responses showed a slight increase in the number of students (41%) who sometimes or mostly read nonfiction books for fun. This was an encouraging piece of information, it was evident students were more apt to choose a nonfiction book to read for enjoyment by the post-study survey.

Question two of the student survey showed a positive shift in the students’ attitudes towards reading nonfiction books with science related topics. Prior to the study 70.8% of the students responded “yes” they enjoyed reading nonfiction science books. Again, this was before the students had had much experience with nonfiction reading in our classroom. The mid-study survey indicated 81% of the students responded “yes or sometimes” they enjoyed reading nonfiction science books. By the post-study survey, 86% of the students responded “yes or sometimes” they enjoyed reading nonfiction science books. Several students’ responses to the probing question on the survey “I enjoy reading nonfiction books about science. Explain why or why not,” supported the shift in attitudes I saw in the survey results. One student claimed, “I just really like learning about true things.” “Sometimes because they are interesting” and “because they are full

of facts” are what two other students had written about reading nonfiction science books on their student survey forms.

This shift in attitudes was encouraging and when I looked back at my teacher journal, I had reflected on this change. I had written about observations I had made during an independent reading time during the treatment phase 1.

Even though the animal books have been in the Nonfiction Book Nook for a couple of weeks now, students have not gotten tired of reading them. I am surprised by the number of students that are still going to the Book Nook to choose books to read (11-27-12).

The student interviews did not show the same positive change in attitudes towards nonfiction reading. I noticed the opinions of these nine students changed very little from the pre-study interview to the post-study interview when they were asked, “What books have you read lately?” and “Do you like reading fiction or nonfiction books more?” Eight out of the nine students interviewed post-study liked reading fiction books more than nonfiction books as opposed to six of the students expressing they liked fiction more in the pre-study interviews. By the post-study interview, six of the students stated they had not read any nonfiction lately, while three of the students said they had read a nonfiction book in the last week. Only one student claimed to have read a nonfiction book in the last week during the pre-study interview. It is difficult to explain the discrepancy between these two data sources. I had recently returned the books from the Book Nook to the libraries, leaving the Book Nook bare for over a week prior to the post-study interviews; therefore, nonfiction books were not readily available in our classroom.

This lack of easily accessible nonfiction books could have accounted for the students' lack of nonfiction reading and the students' comments during the post-student interviews.

Overall, the data analysis indicated increased exposure to nonfiction science related books did have a favorable effect on students' attitudes towards reading nonfiction. The percentage of students that marked "yes or sometimes" on the student survey had increased. I observed students reading nonfiction books during independent reading times and even though the students I interviewed still preferred to read fiction books, they did sometimes choose to read nonfiction and thought that reading nonfiction books helped them learn more about science.

Third graders generally like science but I wanted to see if increasing the amount of science related reading would increase the number of students that enjoy learning about science. I used the student surveys (Table 4), student interviews and entries from my teacher journal to find out if adding more nonfiction reading had an effect on students' attitudes toward science.

Pre-study student surveys gave good baseline data when looked at question six and question ten to get a better understanding of students' thoughts towards science. Before I began this action research project, 90% of my students liked science (question 10) and 70% of the students stated they liked science more when they read nonfiction books that correlated with our topic of study (question 6). I am not sure this pre-study data is valid due to fact the students had not been exposed to nonfiction books related to the science topics we were studying. This study started at the beginning of the school year, therefore, we had not had many science lessons yet.

The results of the mid-study and post-study survey questions were more important to me as I continued to evaluate the information I had gathered. When I compared the student survey responses during this time frame, I did see a gain in the percentage of students who liked science class. The mid-study survey showed 82% of the students liked or sometimes liked science, while 18% of the students said they did not like science. In the post-survey the percentage of students who did not like science decreased to 14%, while the number of students who liked science or sometime liked science increased to 86%. I also saw an increase in the percentage of students who liked science more when they read nonfiction books that went along with the content we were learning in science. The mid-study showed 66% of the students like science more when additional nonfiction books were available, but this number increased significantly after the students had their second exposure to nonfiction books in the Book Nook. The post-survey percentage was 91%. Was this change in the student responses on the survey attributed to more nonfiction reading?

To further support the student survey responses I specifically looked at the interview responses to the questions “Do you like science class?” and “What do you like about science class?” of the nine students I had interviewed before and after the action research project eight of the nine students told me they liked science class. “I like reading out of our science book,” “I liked learning about the planets,” “I liked learning new things about animals,” were some of responses to this interview question during the pre-study interviews and post-study interviews. This showed the students’ attitudes towards science had remained the same over the course of the study.

One student said, “I don’t know, I am just not a person that likes science that much,” when I asked if this student liked science class and what this student liked about science class during the post-study interview. This information is consistent with the responses this student gave me during the initial interview. “I am really not that interested in science,” was the response this student gave during the first interview. I was not able to sway this student’s thoughts about science through more nonfiction reading.

Student surveys and student interviews imply the majority of the students in my class enjoyed science before I began the action research project and the thoughts and attitudes remained much the same after the completion of this study. My teacher journal and observations support these findings as well. One of my teacher journal entries states:

Even on the days we are just reading and discussing the material in our science book, most of the students are cooperative and engaged during science class (12-11-12).

I had also noted in a journal entry during a Solar System activity where students were finding and writing facts about the planets using their science books and books from the Nonfiction Book Nook:

The students really like this activity. All of the kids are on track with the assignment and I like to see them using the resources that we have in our room. I noticed that some of the kids are helping one another find facts by pointing out which books they found good information in and sharing these resources (1-16-13).

Daily observations also support the notion that my students like science. I put the day’s schedule on the board each morning. When the students notice we were scheduled

to have science that day there were always lots of “hoorays” and questions about what we were going to be learning. On days that I did not have science written as one of activities for the day, students often asked if we were going to have science or why we were not having science that day. The positive attitudes towards science were apparent, my hope was these students would continue to enjoy science as they progressed through their school years.

Teaching Practice

The most important piece of data to analyze was the impact adding more nonfiction reading had on my teaching practices. My goal was to increase student exposure to science by adding more nonfiction reading to our daily schedule, by increasing nonfiction reading opportunities. I hoped to see growth in academic performance and improved student attitudes towards nonfiction reading and science. To evaluate what effect this had on my teaching I looked at student surveys, student interviews, posttest scores, and observations I had noted in my teacher journal.

Before I could begin this action research project, I had to determine the students' reading preferences. Through the use of a pre-study student interview and a pre-study student survey the majority of my students preferred reading fiction books. Prior to starting the project, most of my students enjoyed reading fiction books better than nonfiction and this theme was consistent across the board when I looked at the student surveys, student interview responses and my observations during independent reading times. Student survey results showed 62.5%, ($N=23$) of the students read mostly fiction books. When I interviewed the nine students selected through random stratified sampling, six of the nine students reported reading fiction most often. When I observed

students during independent reading times at the beginning of the study, at least 18 of the 23 students in my class were reading fiction books during these assigned reading times. My work was cut out for me; I needed to implement strategies that would encourage students to read more nonfiction.

To further assess the direction I needed to take in my study, I asked students why they preferred fiction books to nonfiction books. The written responses on the student survey and the oral responses of the student interviews were much the same and indicated students believed nonfiction books were more difficult to read and much less interesting than fiction books. One student said, “The books that are real aren’t really funny and I like funny books.” “I like the Edgar and Ellen books because they are kind of silly,” and “Fiction books are more fun to read,” were other responses I heard as I interviewed students. Students did not think nonfiction books were very enjoyable so my next task was to find out how I could encourage students to read more nonfiction books.

Again, I used student survey responses and the suggestions students gave me during the pre-study interviews to find strategies for introducing nonfiction books into our classroom. When I asked students during the pre-study interviews what I could do to get students to read more nonfiction, students gave very reasonable and good suggestions that they felt would increase the amount of nonfiction reading done by students. Five of the nine students gave one or two reasonable suggestions ranging from including more nonfiction reading time, assigning nonfiction books to read, reading aloud nonfiction books, informing students they would learn more and simply adding more nonfiction books to the classroom. I implemented many of these suggestions to promote more

nonfiction reading such as adding a Nonfiction Book Nook to our classroom during the treatment phases of this study.

What I found over the course of my action research project is getting students to read more nonfiction was much more difficult than I had anticipated. A few more students were reading nonfiction books as supported by the data I had collected but most of the students were still reading mostly fiction books. I wondered if students viewed nonfiction as valuable tool for learning and if they did, why wasn't this enough to encourage them to read more nonfiction sources? I asked students during the pre-study interviews and the post-study interviews, "What helps you learn about science?". At the beginning of the year, five out of the nine students said reading more nonfiction would help them learn more about science and by the post-survey study, six of these nine students indicated they thought reading nonfiction books about science helped them learn science. Survey question three is similar to this interview question and the results of the survey are consistent with the interview results. The survey question read, "Reading more nonfiction books about science helps me better understand what Mrs. Jendro is teaching in science class." The pre-study survey showed 73.9% of the students thought reading more helped them understand what I was teaching, but by the end of the study, 91% of the students thought reading more nonfiction helped them understand what we were learning in science class.

The students understood the value of reading nonfiction, my job was to continue to encourage students to read nonfiction by modeling this practice, providing easy access to quality nonfiction sources, and giving students multiple opportunities each week to read nonfiction books, in hopes of seeing an increase in the number of students

occasionally choosing to read a nonfiction book for enjoyment. Third graders have strong reading skills but they still need to develop and practice these skills especially when reading a less familiar genre. Just like teaching a child anything new, multiple exposures and many opportunities to read nonfiction are needed in order to see increased confidence and growth in student understanding.

Something that I had not thought much about until I was able to compare two treatment phases was the difference in the level of interest the students showed in the books I had selected for the Nonfiction Book Nook. I relied on our school librarian to help with the book selection process and we were able to find a large number of books related to the topics of study in a wide range of reading levels to accommodate my students. In my observations, the students enjoyed reading the books about animals much more than they enjoyed reading books about the solar system. I asked students during the post-study interviews which books they enjoyed most and why and eight out of nine students enjoyed the animal books more. Students remarked, “The animal books were more interesting than the solar system books,” “The solar system books were a little hard,” and “I just like learning about animals I don’t know about.” Learning the thoughts of these students heightened my awareness of the importance of selecting books that will appeal to students.

I have to agree; many of the animal books did seem more appealing. Many of the solar system books had a great deal of text on each page and did seem dry. In visiting with our librarian, she agreed and explained that publishing companies are in a transitional time with the National Common Core at the forefront of education. Publishing companies are updating and modernizing nonfiction books to make nonfiction

more engaging for students while targeting the Common Core Standards. I did find many such books with animal themes but not as many appealing books about the solar system. It is important to keep exposing students to quality nonfiction and I will continue to search for these sources and I will continue develop and implement teaching practices using nonfiction reading to support student learning.

INTERPRETATION AND CONCLUSION

The purpose of this action research project was to determine if adding nonfiction science related reading to the curriculum increased student achievement in science. I also wanted to know if increasing student exposure to nonfiction books related to the topics we were studying in science affected students' attitudes toward science. Would students have more positive thoughts towards reading nonfiction that supported the topics the students were learning in science class with increased opportunities to read related nonfiction books? By adding a nonfiction library (The Nonfiction Book Nook), reading more nonfiction books to my students and giving students opportunities to read nonfiction books independently, I was able to use several data collection methods to determine how increased nonfiction reading impacted student learning and student attitudes.

By implementing this study I learned valuable information regarding student achievement and the effects of increased nonfiction reading. I recorded and analyzed posttest scores from two non-treatment posttests and two treatment posttests. I was somewhat surprised by the results as I compared the four posttests. After the first non-treatment chapter on Plants, the student posttest average was 87.3% (N=22). There was a decrease in the posttest averages over the course of the next three posttests. After the last

posttest, the student posttest average was 70.8%. The data shows a total decrease of 16.5% from the first posttest to the last posttest. This data showed that increasing the amount of exposure students had to nonfiction books related to the topic of study did not improve test scores. I predicted scores would remain about the same or increase slightly given more opportunities to learn about the science topics through sources other than the science book.

One important consideration that could have contributed to the decline in test scores is the varying difficulty of the subject matter. The first treatment/non-treatment phase was conducted during the Plants and Animals chapters of our science book. By third grade, students have had multiple exposures to these topics through life experiences, books, movies, previous lessons in school as well as countless other opportunities to learn about these topics. Students are less apt to have multiple exposures or learning opportunities to learn about Weather or The Solar System; the chapters taught during the second treatment/non-treatment phase. Therefore, students had less background knowledge on these topics. Although students are aware of weather and experience weather every day, they do not understand weather or make the same connections through past experiences as they do with plants and animals. The same holds true with knowledge about the solar system. A few students may be truly fascinated about outer space and be very knowledgeable, but for most students, the study of space and our solar system is very abstract for students of this age.

Thinking about the varying difficulty of the science topics and the vast differences in nonfiction books, a more in-depth analysis could help teachers provide more valuable nonfiction resources. In a continuation of this study, a group of teachers could rate

selected nonfiction books using a rubric to gain a better sense of the variations in the quality of nonfiction literature that is available. Asking students during student interviews about the quality of books and interest level of the books they chose to read would be helpful in selecting nonfiction.

The student interviews indicated that students lacked interest in this more abstract concept. When the students were asked during the post-study interviews which books they enjoyed more, books about animals or books about the solar system, eight out of the nine (89%) students preferred reading the nonfiction books about animals. Lack of confidence in reading books about the solar system was evident when I evaluated the number of Accelerated Reader quizzes the students had taken during each treatment phase. During the chapter on Animals, 15 quizzes were taken and during the chapter on Solar Systems two quizzes were taken. The decrease in the posttest scores could be attributed to students having less background knowledge and the content being more difficult for students to understand regardless of nonfiction reading exposure.

Although I did not see positive growth in student achievement during my action research project, the shift that I saw in student attitudes towards nonfiction reading was encouraging. The data I used to support this finding came from the student surveys and my observations. Student survey data showed the percentage of students who enjoyed reading nonfiction books was 70.8% prior to the two treatment phases of the study. Between the mid-study survey and the final survey there was a 7% increase in the number of students who sometimes read nonfiction books for fun. Students who enjoyed reading nonfiction science books increased by 5% from the time of the mid-study survey to the time the post-study survey was taken. I also noted in my Teacher Journal that on

average, at least 5 students selected nonfiction books to read during independent reading time in our classroom. This change was not significant, but it helped me identify that students were putting down their favorite fiction books to give nonfiction books a try. With much of the teaching of reading being supported by fiction stories and books, it was exciting to see my students test-driving this unfamiliar genre more often.

Another interesting finding was that students recognized the value of reading nonfiction to gain knowledge. The student interviews and student surveys both showed students thought it was important to read nonfiction to learn more about science. Five out of nine (56%) of the students interviewed mentioned they learned more about science by reading nonfiction books about science. The percentage of students who indicated on the student survey (question 3) reading nonfiction helped them learn more about science increased by 6% while the percentage of students who claimed reading nonfiction helped them take the tests increased by 3%. Students knew it was important to read the nonfiction books and were beginning to make the connection between reading nonfiction and learning.

My final question in my project looked at how increasing nonfiction reading affected my teaching. I now have a greater understanding of the students' achievement and attitudes when additional nonfiction reading was incorporated into the science chapters. I gained an awareness of the various nonfiction resources that are available to this age of students. I also recognized that it was more difficult to encourage students to read nonfiction over fiction because many of the resources are not written in story and lack appeal to students, therefore, students are hesitant to read nonfiction. Finally, I found that providing a Nonfiction Book Nook did help students acknowledge the

importance of nonfiction reading, but students will need more exposure to make nonfiction reading one of their main selections.

VALUE

By conducting this study, I found that teaching from the chapters in the book did not give me as many opportunities to teach science inquiry. A more traditional teaching approach is not how I usually teach science, but I felt that it was needed for this study so that the data was reflective of student exposure to nonfiction reading and not from the science inquiry method. Next year, I will incorporate nonfiction reading into my science teaching in addition to the science inquiry method that I will be using.

The posttest data showed a larger decrease during the Solar System and Weather chapters that were more difficult than the Plants and Animals chapters. Next year, I will begin my introduction of nonfiction reading with the science chapters that students enjoy and are more familiar with the content. I also found that during the non-treatment phases the lack of encouragement to read nonfiction made the students' excitement dwindle. This was caused because I was not encouraging and promoting those resources during the non-treatment phases. Next year, I will use my Nonfiction Book Nook throughout the entire year so that the students know it is always available as a resource to them and they can access nonfiction books at any time. I will also incorporate nonfiction student-led book talks as part of the curriculum to increase their interest in nonfiction reading.

The data analysis showed that the students' attitude towards nonfiction reading was overall positive. The students indicated that they would learn more about science, but they wouldn't always choose to read nonfiction. Next year, I would like to increase their interest of reading nonfiction by giving the students another purpose for reading it.

For example, I will ask them to choose a nonfiction book to read to their first-grade reading buddy with their buddy's interest in mind. Incorporating more nonfiction book projects in the future will give students a purpose for reading nonfiction books. I will also make nonfiction reading available in all the other curricular areas to reach students that may be interested in nonfiction in other areas of study.

This year my district adopted the National Common Core curriculum and this curriculum needs to include more nonfiction reading. I plan to spend more time teaching students how to read and comprehend nonfiction reading because nonfiction requires a different skill set even when the reading level is the same. How they read it is so different because of the tables, charts and the vocabulary. I would also like to provide the students with a bibliography of nonfiction resources that are quality resources for third grade students. I know that not all learners are the same and I don't have the easy answers, but the data showed me that students need multiple exposures to improve their nonfiction reading and build their confidence levels when they read nonfiction.

Reading nonfiction to gain knowledge is an important part of school today and will be even more important in the future of education as more emphasis is placed on the National Common Core Standards. Teachers will need to implement more expository reading throughout the curriculum. Hopefully, though this study was short in length and did not prove to show academic growth, it does validate the importance of reading informational books to build science literacy. Students will be required to read more vigorously in all subject areas. Teaching students how to read more complex text and giving students the opportunity to do so is critical to student success in school. Prior knowledge is the foundation needed to learn and comprehend new material. Therefore, it

is important to continue with this work to discover effective ways to encourage students to enjoy and to see the value in reading informational text.

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APPENDICES

APPENDIX A

IRB APPROVAL



INSTITUTIONAL REVIEW BOARD
For the Protection of Human Subjects
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MEMORANDUM

TO: Tamara Jendro and Walt Woolbaugh
FROM: Mark Quinn, Chair *Mark Quinn et al*
DATE: October 24, 2012
RE: "Perceived Parental Stress due to Adolescent use of Technology" [TJ102412-EX]

The above research, described in your submission of October 16, 2012, is exempt from the requirement of review by the Institutional Review Board in accordance with the Code of Federal regulations, Part 46, section 101. The specific paragraph which applies to your research is:

- (b) (1) Research conducted in established or commonly accepted educational settings, involving normal educational practices such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.
- (b) (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability, or be damaging to the subjects' financial standing, employability, or reputation.
- (b) (3) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior that is not exempt under paragraph (b)(2) of this section, if: (i) the human subjects are elected or appointed public officials or candidates for public office; or (ii) federal statute(s) without exception that the confidentiality of the personally identifiable information will be maintained throughout the research and thereafter.
- (b) (4) Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available, or if the information is recorded by the investigator in such a manner that the subjects cannot be identified, directly or through identifiers linked to the subjects.
- (b) (5) Research and demonstration projects, which are conducted by or subject to the approval of department or agency heads, and which are designed to study, evaluate, or otherwise examine: (i) public benefit or service programs; (ii) procedures for obtaining benefits or services under those programs; (iii) possible changes in or alternatives to those programs or procedures; or (iv) possible changes in methods or levels of payment for benefits or services under those programs.
- (b) (6) Taste and food quality evaluation and consumer acceptance studies, (i) if wholesome foods without additives are consumed, or (ii) if a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the FDA, or approved by the EPA, or the Food Safety and Inspection Service of the USDA.

Although review by the Institutional Review Board is not required for the above research, the Committee will be glad to review it. If you wish a review and committee approval, please submit 3 copies of the usual application form and it will be processed by expedited review.

APPENDIX B

INFORMED CONSENT

Informed Consent Form for Students in the Research Study

Dear Family,

I am currently working toward a Master's Degree in Science Education and for my final Capstone project I am required to perform a study incorporating an educational strategy that will positively affect my students. I have chosen to study the effect increasing the amount of nonfiction science related reading has on the students' knowledge and understanding of science.

During this research project I will be collecting and analyzing data in our classroom. Pre/post tests, daily assignments, student surveys, student interviews and Accelerated Reader are the instruments I will use to collect data for my project. This project will not disrupt learning in our classroom and our science lessons will not change in anyway. I will include more opportunities for nonfiction reading during class time. There will not be any extra requirements outside of the school day.

Since I will be using student work for data collection purposes, I am required to ask for parent consent. All student names and any other identifiable characteristics will be confidential. Your child's participation in this study does not include any foreseeable risks. This project is meant to provide me with valuable information regarding the effects increasing nonfiction reading has on student learning.

Thank you for allowing me to use student data for my final project. Please contact me if you have any questions.

Sincerely,

Tami Jendro

Parent Signature: _____

Student Name: _____

Name _____

Date _____

APPENDIX C

TABLE OF TEST SCORES AND AIMSWEB DATA

Treatment and Non-treatment Posttests and Reading Scores

Student Number	N.T. Plants 10/17 % Score	T. Animals 11/26 % Score	N.T. Weather 12/18 % Score	T. Solar System 2/7 % Score	AIMSWeb Fluency Score 83+ = B 53-82 = S 0-52 = I	AIMSWeb Comp. Score 12+ = B 7-11 = S 0-6 = I	AR Quiz % Score and # of Books Read in Treatment Phase 1 Animal Books	AR Quiz % Score and # of Books Read in Treatment Phase 2 Solar System Books
1	86	71	58	52	52	15		
2	69	79	63	41	64	8		
3	86	82	ab	63	39	9	100% - 2	
4	94	97	88	78	71	5		
5	94	97	96	78	94	15	100% - 1	
6	94	100	96	78	163	25		
7	94	97	92	93	115	14		
8	100	97	75	96	120	20	80% - 1	
9	ab	76	ab	48	62	11		
10	94	94	71	78	103	19		
11	100	91	83	63	70	13		
12	81	85	92	70	121	24		
13	94	85	63	63	82	7		
14	81	ab	58	56	130	16	80% - 1	
15	62	76	67	ex	16	7		60% - 1
16	81	79	63	70	93	18		
17	56	65	92	78	86	14		
18	100	88	75	89	110	19	93% - 6	
19	100	91	92	ab	77	17	90% - 1	
20	81	79	58	52	82	11	100% - 1	40% - 1
21	100	88	71	85	112	19		
22	74	76	71	63	48	9	70% - 2	
23	100	97	92	93	132	16		
Class Average	87.3% N=22	85.9% N=22	77.0% N=21	70.8% N=21	B=Benchmark I=Intensive S=Strategic		89%	

APPENDIX D

STUDENT SURVEY

Name _____ Date _____

Student Survey

<p>1. I have read about _____ books in the last week.</p> <p>None 1 or 2 3 or 4 More than 4</p>	<p>6. I understand science vocabulary words better when I read nonfiction books.</p> <p>Yes Sometimes No</p>
<p>*What books have you read in the last week? (titles or topics)</p>	<p>7. Reading nonfiction books about our solar system helped me when I took a science test about our solar system.</p> <p>Yes Somewhat No</p>
<p>2. The books I read are mostly _____.</p> <p>Fiction (made up)</p> <p>Nonfiction (true)</p> <p>About equal fiction and nonfiction</p>	<p>*How did reading nonfiction books help you?</p>
<p>3. I enjoy reading nonfiction books about science.</p> <p>Yes Sometimes No</p>	<p>8. I like science class.</p> <p>Yes Sometimes No</p>
<p>*Explain why or why not.</p>	<p>*What do you like about science class?</p> <p>*What do you dislike about science class?</p>
<p>4. Reading nonfiction books about science helps me better understand what Mrs. Jendro is teaching in science class.</p> <p>Yes Sometimes No</p>	<p>9. I like science class more when I read nonfiction books that go along with the science topics we are learning in class.</p> <p>Yes Somewhat No</p>
<p>*Explain why or why not.</p>	<p>10. It is easy for me to find nonfiction books that I am interested in reading.</p> <p>Yes Sometimes No</p>
<p>5. I understand science concepts better when I read nonfiction books.</p> <p>Yes Sometimes No</p>	<p>11. I enjoy reading books from the Nonfiction Book Nook.</p> <p>Yes Sometimes No</p>

APPENDIX E

STUDENT INTERVIEW QUESTIONS

The following statement will be read to each student before I proceed with the interview.

“ Your participation in this interview is voluntary. You may choose to not participate in this interview or may stop at any time. Your class grades or class standing will not be affected by your choice to participate or not participate in this interview.”

Name:

Date:

Student Interview Questions (pre-study)

Warm up Questions

P= Probing questions

How is school going for you this year?

P- What do you like best about school this year?

What is your favorite subject?

P- What do you like about this subject?

1. What books have you read in the last week?/ What books have you read lately?

P-Why did you choose to read these books?

P- What do you like about this book?

2. What do you think of when I say nonfiction?/ Do you know what nonfiction is?

P- Can you give me an example of a nonfiction book?

P- Can you give me an example of a fiction book?

P-Have you read any nonfiction books in the last week?

P-What non fiction book have you read?

P-Do you like reading nonfiction books?

P-Why or why not?

P-What nonfiction book would you choose to read?

3. Do you think it is important to read nonfiction books?

P-Why is it important to read nonfiction books?/ What is good about reading nonfiction?

P-What would encourage you to read nonfiction?

P-What could I do to get students to read more nonfiction books?

P-What types of nonfiction books do you like?

4. What do you like about science?

P-Have you always liked science?

P- What have you learned in science this year?

P-What activities help you learn science?

P-Have you read anything neat about science?

P-Can you tell me what you learned?

5. What would help you learn more about science in third grade?

APPENDIX F

STUDENT POSTTESTS

Date: _____

Name _____

Plants Test

Use the words from the word box to answer the questions.

photosynthesis	sunlight	water	stem
leaves	oxygen	carbon dioxide	
roots	chlorophyll	simple plants	
air	soil	cells	

1. What four things does a plant need in order to live?

2. All living things are made up of tiny units called _____.
3. The _____ of the plant carries water and nutrients from the roots to the other parts of the plant.
4. _____ gives plants their green color.
5. Most _____ have no stem, leaves, or roots.
6. The process in which a plant uses sunlight to make food is called _____.
7. Plants take in carbon dioxide and release _____.

8. List three ways in which we use plants.

9. Explain what would happen to a plant if it had soil, water, and air but no sunlight.

10. Plants start from seeds and seeds are spread in many ways. Tell two ways that seeds could be spread.



Name _____

Date _____



Types of Animals

Part I Vocabulary

Match each term in Column B with its meaning in Column A.

Column A

- ___ 1. Body feature that helps protect a fish
- ___ 2. Body features that take in oxygen from water
- ___ 3. To receive features from parents
- ___ 4. Animals that have feathers
- ___ 5. Land animals that have scales
- ___ 6. Animals that usually live first on water and later on land
- ___ 7. Animals that live only in water
- ___ 8. Animals that feed their young with milk
- ___ 9. A body feature that an animal is born with
- ___ 10. Evidence of a plant or animal that lived long ago
- ___ 11. When all of one kind of organism is gone forever
- ___ 12. An organism whose numbers are going down
- ___ 13. The scientific name of an organism
- ___ 14. A species that may become extinct

Column B

- A amphibians
- B birds
- C fish
- D gills
- E inherit
- F mammals
- G reptiles
- H scales
- I trait
- J endangered
- K species
- L fossil
- M threatened
- N extinct

Harcourt

Name _____

Column A

- ___ 15. Travel from one place to another and back again
- ___ 16. Colors, patterns, and shapes that help an animal blend in with its surroundings
- ___ 17. Imitating the features of another animal to keep predators away
- ___ 18. Behaviors an animal knows how to do
- ___ 19. Go into a deep sleep during winter months

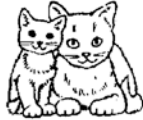


Column B

- O instincts
- P hibernate
- Q migrate
- R camouflage
- S mimicry

Part II Science Concepts and Understanding

For Questions 20–25, write a word from the Word Bank in the blank.
Words may be used more than once.

eggs lungs wings milk gills water

Animal	Example	Traits
Mammals		have fur or hair breathe with 20. _____ feed their young 21. _____
Birds		have two legs most fly with 22. _____ hatch from 23. _____
Fish		live only in 24. _____ breathe with 25. _____ are born live or hatch from eggs

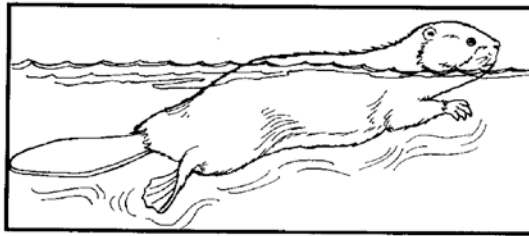
Name _____

Write the letter of the best choice.

- ___ 26. Snakes and crocodiles are reptiles because they —
 A can change colors C have lungs and scales
 B can swim D have long tails
- ___ 27. The process that takes place as a tadpole changes into a frog is —
 F metamorphosis H digestion
 G photosynthesis J protection

Part III Critical Thinking

For Questions 28–29, answer in complete sentences.



28. Describe how some of the parts of a beaver's body help it survive.

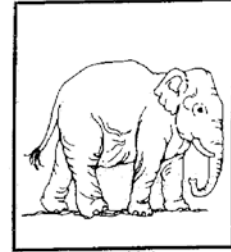
29. What are two reasons that organisms can become extinct today?

Harcourt

Name _____

Part IV Process Skills Application

30. Compare the pictures. Circle the animal that is the most unlike the others. Then list two traits it has that the other two do not have.



Name _____

Date _____



Observing Weather

Part I Vocabulary

Match each term in Column B with its meaning in Column A.

Column A

- ___ 1. Map that shows weather data for a large area
- ___ 2. Place where two air masses of different temperatures meet
- ___ 3. Measurement of how hot or cold something is
- ___ 4. Movement of air
- ___ 5. Tool for measuring wind speed
- ___ 6. Air that surrounds Earth
- ___ 7. What is happening in the atmosphere at a certain place

Column B

- A wind
- B weather map
- C weather
- D atmosphere
- E front
- F temperature
- G anemometer

Part II Science Concepts and Understanding

Write the letter of the best choice.

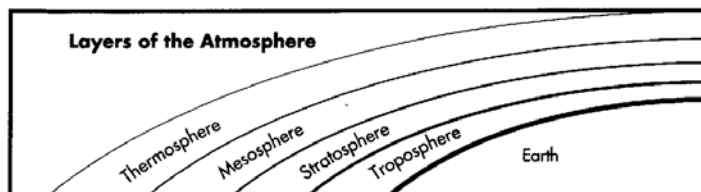
- ___ 8. Earth is kept warm by—
 A layers of air B the oceans C clouds D space
- ___ 9. To measure temperature, you would use a—
 F rain gauge H thermometer
 G weather map J snow board

Harcourt

Name _____

- ___ 17. You use an anemometer to measure—
 F rainfall H temperature
 G wind speed J snowfall

Use the following diagram to answer Questions 18–19.



- ___ 18. Which layer of the atmosphere do we live in?
 A thermosphere C stratosphere
 B mesosphere D troposphere
- ___ 19. Which layer contains ozone?
 F thermosphere H stratosphere
 G mesosphere J troposphere

Part III Critical Thinking

Answer the following on a separate sheet of paper.

20. Today you are in Illinois, where it is raining. Tomorrow you will be traveling east to New York, where it is cloudy. What should you take with you? How do you know this?
21. People who live near rivers need to measure precipitation so they can predict when a flood might occur. Think of another reason why people might want to measure precipitation.
22. Why do meteorologists fly airplanes into the middle of hurricanes?

Harcourt

Name _____

- ___ 10. To measure precipitation, you would use a—
A front C rain gauge
B thermometer D weather map
- ___ 11. Which of the following kinds of weather would probably have the strongest winds?
F thunderstorm H blizzard
G hurricane J sunny day
- ___ 12. When a cold front moves through your town, you can expect the weather to—
A stay the same C warm up
B become calm D cool off
- ___ 13. When a warm front moves through your town, you can expect the weather to—
F warm up H stay the same
G become calm J cool off
- ___ 14. Wind blows because of differences in—
A temperature C air pressure
B precipitation D air weight
- ___ 15. Which of the following tools would a meteorologist NOT use to make a weather map?
F computers H anemometers
G satellites J umbrellas
- ___ 16. In places where warm and cold air meet, there is likely to be—
A precipitation C a tornado
B sunshine D a flood

Name _____

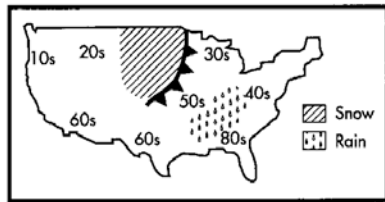
Part IV Process Skills Application

Use the words in the Word Bank to answer Questions 23–24.

rain gauge thermometer anemometer weather map

23. Which tools would a meteorologist use to **measure** the weather? _____
24. What would a meteorologist use to **record** the weather and **interpret data**? _____

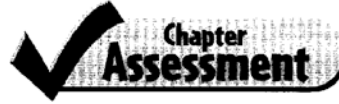
Use the following map to answer Questions 25–26.



25. **Observe** the map. Then **compare** the weather for the Middle West and the Southeast. How is the weather in both places similar? How is it different?
- _____
- _____
26. Weather in the United States tends to move from west to east. **Interpret the data** on the map. What kind of weather do you think is moving toward the Northeast? Explain.
- _____
- _____

Name _____

Date _____



Earth and Its Place in the Solar System

Part I Vocabulary

Match each term in Column B with its meaning in Column A.

Column A

- ___ 1. Large ball of ice and dust that orbits the sun
- ___ 2. Different shapes the moon seems to have
- ___ 3. Sun and objects that orbit around the sun
- ___ 4. Chunk of rock or metal that orbits the sun
- ___ 5. Imaginary line that goes through the North Pole and South Pole
- ___ 6. Result of Earth's shadow falling on the moon
- ___ 7. Spinning of an object on its axis
- ___ 8. Path an object takes around another object
- ___ 9. Large body of rock or gas that orbits the sun
- ___ 10. Result of the moon's shadow falling on Earth
- ___ 11. Movement of one object around another

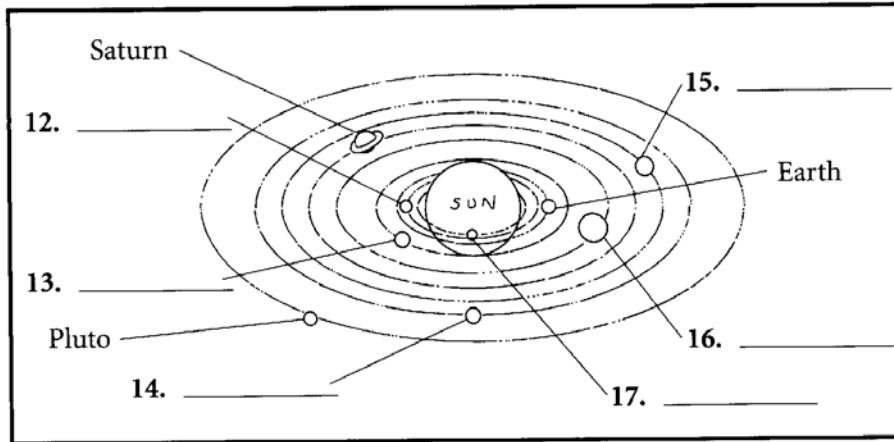
Column B

- A revolution
- B orbit
- C asteroid
- D lunar eclipse
- E phases
- F solar system
- G axis
- H planet
- I rotation
- J solar eclipse
- K comet

Name _____

Part II Science Concepts and Understanding

Use the following diagram to answer Questions 12–17. Fill in the diagram with the names of the planets. Three of them have been done for you.



Write the letter of the best choice.

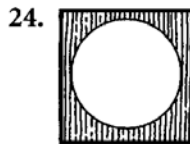
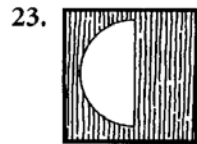
- ___ 18. All inner planets are —
 A frozen gases C rocky on the surface
 B far from the sun D made of gas
- ___ 19. What causes the objects in the solar system to stay in orbit?
 F sun's gravity H moon's gravity
 G asteroids J lunar eclipses
- ___ 20. Earth takes one day to —
 A rotate B revolve C orbit D tilt
- ___ 21. The tilting of Earth's axis causes —
 F days G months H years J seasons

Name _____

- ___ 22. The moon seems to move in the sky each night because of Earth's—
- A revolution
 - B rotation
 - C seasons
 - D gravity

Use the terms in the Word Bank to label each picture.

crescent moon full moon quarter moon



Part III Critical Thinking

26. Compare the inner planets to the outer planets. How are they alike? How are they different?

27. How is a lunar eclipse like a new moon? How is it different?

Harcourt

APPENDIX G

STUDENT SURVEY QUESTION RESULTS

Student Survey Percentages – After Treatment 11-29-12

Student Survey Question	Yes Responses Pre-study	No Responses Pre-study		% of Yes Treatment	% of No Treatment	% of Sometimes	% of Yes Post Survey	% of No Post Survey	% of Sometimes Post Surv.
1. The books I read for fun are mostly...	fiction 62.5%	non-fiction 37.5%		Fic 67%	NF 5%	Equal 29%	Fic. 59%	NF 18%	Equal 23%
2. I enjoy reading nonfiction science books.	70.8%	29.2%		36%	18%	45%	27%	14%	59%
3. Reading nonfiction books about science helps me better understand what Mrs. Jendro is teaching in science class.	73.9%	26.1%		55%	15%	30%	41%	10%	50%
4. I understand science concepts better when I read nonfiction books.	81%	19%		48%	24%	29%	27%	18%	50%
5. I understand science vocabulary better when I read nonfiction books.	60%	40%		48%	14%	38%	36%	23%	41%
6. I like science more when I read nonfiction books that go along with what we are learning in class.	70%	30%		52%	33%	14%	73%	10%	18%
7. Reading nonfiction helped me when I took a test about plants.	75%	25%		82%	5%	14%	57%	0%	42%
8. I can get a good selection of science books from the library.	85%	15%							
9. It is easy for me to find nonfiction books that I am interested in reading.	65%	35%		50%	18%	32%	27%	10%	36%
10. I like science class.	90%	10%		82%	18%	32%	68%	10%	36%

APPENDIX H

COMMON THEMES OF STUDENT INTERVIEWS

Table 2: Common Themes of Student Interviews

Interview Question	Common Themes	Number of Student Responses (N=9)
1. What books have you read in the last week? What kinds books have you read lately? Do you like reading fiction or nonfiction more?	Fiction Nonfiction Fiction/nonfiction about equal	6/9 = 67% 1/9 = 11% 2/9 = 22%
4. What helps you learn more about science? How can you learn more about science? What would help you learn more about science in third grade?	Reading more books about science I don't know, I am not sure	5/9 = 56% 4/9 = 44%
3. What can I do as a teacher to get students to read more nonfiction?	Reasonable responses Add more to nonfiction books to our classroom Not sure or response did not match the question *some students gave more than one suggestion	4/9 = 44% 2/9 = 22% 4/9 = 44%