THE EFFECTS OF READING THE TEXTBOOK IN A SEVENTH GRADE SCIENCE CLASSROOM

by

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A professional paper submitted in
partial fulfillment of the requirements for the degree

of

Master of Science

in

Science Education

MONTANA STATE UNIVERSITY
Bozeman, Montana

June 2011

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.

Beth Ann Workman

June 2011

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ABSTRACT

In this investigation the science textbook was read orally through 12 weeks of our 7th grade science curriculum. Formative assessments were given throughout this period after each section of a chapter was read. Pre and post tests were given before and after each chapter. The next 12 weeks followed the same pattern except for the fact that the students read the textbook silently. Students' surveys were given at the beginning of the school year, after the 12 weeks of reading orally, and again after the 12 weeks of reading silently. Silent reading showed better results in both the formative and summative assessments. The survey showed that students don't particularly enjoy reading orally, but they feel it improves their learning.

INTRODUCTION AND BACKGROUND

Introduction

I teach seventh grade science in a rural, low income area of southern Ohio. We have about 70% of our students on free lunch programs. I never meet more than half of my parents; they don't make education a priority. This is part of the reason that I am very passionate about my topic: I'm afraid that most of my students won't read the textbook if I don't read it with them. I also worry that some of my students would not be able to comprehend the textbook even if they tried to read it. I have students who can read fluently when we read orally, but I can tell from their test scores that they are not getting it. For a lot of my students, I think it is more important that they get reading practice than science practice. And the way I am operating my class now, they are getting both at the same time. This seems like a win-win situation.

However, I am also very aware of the fact that reading takes up valuable time in my classroom, time that could be spent on other activities that I think are very important. These activities include hands-on investigations, group projects, and current science topics and events that are vital to our everyday lives. In my classroom, we read the textbook at least twice a week for about 30 minutes per day. I would love to spend this hour on the above mentioned activities.

General Statement of Purpose

The purpose of my action research was to determine which method of using the textbook is most useful for increasing: student learning of science concepts and state

science standards, student motivation to learn science, and student feelings of self-esteem. I used the results of this action research to make decisions about how to use the textbook in my own classroom. This is important in my classroom because it seems like I never have enough time in the day to do everything that I need and want to do with my students. If I discovered through my research that orally reading the textbook is not necessary, then I would have more time to spend on other activities for my students. I have discussed the results of this project with the other two junior high science teachers at my school to help us make decisions on how we might use the textbook throughout all three years of our students' science instruction. Lastly, this action research will become a part of Montana State's collection of action research projects to be viewed by fellow teachers all over our country.

In my own classroom, I wanted to discover what method is best for using the textbook. For the last six years in which I have taught 7th grade science, orally reading the textbook with my students is the method I have chosen. It seems to have worked well for most of my students, but I still worry about the students it doesn't work for. I also wonder if another method could further increase student learning. Based on my literature review results, there are strategies that can be employed to help students increase their comprehension of science text. There were also some strategies that were shown not only to increase student comprehension, but also to increase student self-esteem. I also found ideas that could help students be more motivated to learn science. After my research shows whether it is better to read the textbook orally or silently, I will then look at some of these other strategies to help increase student comprehension, motivation, and self-esteem. My plan is to continue conducting action research until I come up with the

best method of teaching science for my students and myself. One of my goals as a teacher is to make students life-long learners of science. Whatever helps with this goal, I'm willing to try it.

Action Research Questions

The question that I researched this year is: **What effect does orally reading the textbook have on 7th grade science students? My sub-questions included:**

1. **What effect does orally reading the textbook have on student comprehension? To what degree are state standards met using this approach?**
2. **What effect does orally reading the textbook have on student motivation to learn science and their excitement about science?**
3. **What effect does orally reading the textbook have on students' confidence in learning science and student self-esteem in general?**
4. **What impact will this research have on my teaching?**

Sharing Information

This information gathered through my action research could prove useful to my fellow teachers, at this school and around the country. There was an article in my literature review that quoted statistics about student reading skills. It stated that elementary students have a good start in reading ability; however, this ability does not continue to increase for junior high students (National Middle School Association, 2003). It is important for teachers everywhere to do what we can to reverse this trend. Science

texts become increasingly difficult as students progress in grade level, and I think that many students just quit trying to learn from their textbooks because they don't have the skills necessary to help them comprehend the text.

Another thing that might help me, and other teachers as well, is to find teaching methods that could save valuable time in our classrooms. One thing I've heard over and over again in my education classes is that we never have enough time in our school day to do everything we would like to do with our students. If my research showed me that orally reading the textbook is not necessary for student learning, I would gladly replace it with more hand-on activities. My student interviews were very emphatic about how much students prefer hands-on learning. This would be research that I would gladly share with teachers everywhere.

I created a Power point presentation of my research and have sent it to all of the teachers in my school district. I think sending this to all of the teachers at my school is important because our school is lacking in the professional development department. Hopefully, some of the teachers will be interested in what I did, and maybe even ask about how they could do action research themselves. Our professional development days are spent learning things that never end up being carried out at our school. Sad to say, this is the on-going story of our school. We learn something cool and new, but we never continue using it. The great thing about action research is that each teacher can carry it out on his or her own. They can continue with their research even after the administration decides it's not important any more. They can continue with their research even if there is no money left to fund it. But most importantly, they can decide

themselves what they want their action research to be about. They can decide what is important for their classroom.

I also plan on presenting my action research to at least one of the following web sites. Each of the action research websites (Participatory Action Research Network, The Collaborative Action Research Network, Centre for Action Research in Professional Practice, Highland Park High School Action Research Laboratory, and the Queen's University Action Research Web Site) look as though they will provide a valuable resource for me in my teaching career. It's amazing to me how much information is out there that I didn't even know existed. It's also exciting that I can do this from my own home. So many of the conferences that teachers go to are expensive, not informative, not what we thought they were going to be and they take us away from our students.

I like that these websites involve real teachers like me who are involved in their own action research. It sounds like other teachers make comments and ask questions about the posted research. The listservs also seem like a place to receive feedback on our research and ideas. They sound rather similar to what we did in our online discussions with classes I've taken at Montana State. The listservs seem to be more informal than the action research websites. Even though the action research websites seem to have a selection process, it looks to be not as involved as with the online journals. I'm not sure that I would feel comfortable sending my research into an online journal. I am excited about the collaboration that seems to be involved with some of these websites.

My Support Team

My team included two people with education experience: my sister, Ruth, and my principal, Heather. I also had one person with no education experience, my husband, Mark.

I chose my husband for several reasons. The first and the most obvious reason was that he was convenient. The second reason was that he would be the person who would give me the most criticism. We both think that we are smarter than the other, and we are always ready to prove it. Another reason was that he is an engineer, which means he thinks in a very different way than I do. This will always produce another way to look at things (even though his way is probably wrong). The last but not least reason I chose him is his incessant habit of having to be the devil's advocate. He is continually looking for problems in any given scenario, and he was glad to point them out. This provided a lot of constructive criticism.

I chose my sister for two reasons. The first was that I respect her opinions as an educator. She has been a teacher, an elementary principal, a middle school principal, a superintendent, has completed her PhD in educational leadership, and is now a director of an online charter school. Her first thought is always, "What is best for the student." I think that is a great perspective to keep in mind. The other reason I chose her was because we got into a great argument about five years ago while she was still a principal at a middle school. She was bragging about how her science teacher uses only hands-on activities to teach science. She was also bragging about how great their science achievement tests scores were because of this teaching method. I told her that I think it is impossible to teach all of the standards that we have to teach in Ohio by only doing experiments. There have to be some new vocabulary words presented and some

background information presented to make some concepts make sense to the students. There are also thinkers like myself, that need to have all of the pieces of the puzzle in place in order to completely comprehend the subject matter. I think the results of my research project will be interesting to us both in trying to resolve our argument.

I wanted to involve my principal for a couple of reasons. First of all, she is a very open-minded person who looks at both sides of any issue. She has also been a teacher for about 20 years, so she will look at the research from both a teacher and an administrator position. Another reason I wanted her to be involved was so she could share this information with other teachers, if she thinks it is valuable. I think action research would benefit our school greatly, but I'm not the kind of person who is going to tell other teachers how they should teach. But she could!

I met with my principal on Friday of each week to discuss her observations and suggestions. I also had my husband critique my assignments before I handed them in. I sent my sister a copy of my graded assignments to ask for any additional comments from her.

CONCEPTUAL FRAMEWORK

Guiding Articles

I found two articles that provided a direction for my work. The first one (Cook, 2008) I chose because I thought it supported my reasons for orally reading the textbook together with my students. The next article I really liked because it was trying to make science interesting and fun for students (Fernsten & Loughran, 2007). If

students aren't engaged in the learning process, there is not going to be any learning accomplished.

Cook (2008) began by stating that visuals are commonly used in science instruction to increase learning. Historically, educational research has focused on verbal learning instead of visual learning. More recently, attention has been devoted to the effect of visual learning on the acquisition of knowledge and the relationships and processes in science class (Mandl & Levin, 1989). Illustrations found in science books, which include photographs, diagrams, charts, graphs, drawings, and tables are the basis of visual learning in science class. Visual learning can help students obtain knowledge that they might not get from text alone (Mayer, Bove, Bryman, Mars, & Tapangco, 1996) and improve the retention of ideas (Newton, 1984). Most teachers assume that students understand the images present in textbooks. Student misconceptions about the images have been documented (Billings & Klanderman, 2000) and come from a lack of prior experience with the subject at hand.

Teachers need to help students develop the skills of visual communication. Teachers need to also be aware that students might not have the background that they need to completely understand figures and tables found in science books. I think all of the above information points to the importance of orally reading together with my students. The illustrations have been shown to help with student learning, but I'm afraid that on their own, students will not pay close enough attention to them. Also, even if they do give some attention to the illustrations, they might be able to understand them without teacher intervention. I plan on spending more time helping my students to analyze the illustrations in our textbook.

Fernsten & Loughran (2007) described a variety of strategies available to help students become more competent and independent readers. They all involve active participation and can be adapted to help diverse learners. These strategies get students discussing, interpreting, analyzing, and evaluating the textbook. One example using cooperative grouping is to place students into groups of 4 or 5. Each student in the group has a specific role. These roles could include: find and define 10-25 of the most challenging words in the chapter, create a 10 question quiz about the readings, write a skit using the main ideas, write a song, rhyme, or rap over the chapter, draw or cut out pictures that represent key concepts. Each member of the group would then share their information with the rest of their group members.

Some independent strategies included using a teacher generated list of words about which the students were asked: What does it mean? Why is the word important to the reading? What can I do with this word? Another one would say, "The most important point in this section is _____. The student would then write several sentences to support their viewpoint. A third strategy would ask the student to list the main ideas in the reading. They would then be paired up to compare notes and compose questions based on their notes. The partners would then quiz the class with their questions.

I used this article as one of the main guiding points in my research because I felt that I have to do something that makes our textbook more interesting to the students. Based on my last interview with my students, most of them felt that the textbook was boring, even though they admitted it was helpful to their learning. They can't learn if they are not paying attention. I wanted to focus on what is important to junior high

students, and that is other junior high students. Cooperative learning allows students to practice their social skills while improving their literacy skills, as well as increasing positive feelings about their reading. I hoped some new strategies would make the textbook more relevant to the students, and therefore more conducive to their learning.

Theoretical Guide

I used an article by Radcliffe, Caverly, Peterson, & Emmons (2004) as my theoretical guide. It was so relevant to my paper because it dealt with literacy (which is really what my action research is about), and pertains particularly to the age group with which I work every day. This article gave a very clear picture of literacy in a typical middle school science class room of today (Radcliffe, et al, 2008).

Included in this article were many statistics and facts about the situation for today's middle-school students. The article began by stating that elementary students get off to a good start, but middle school students deserve and need continued instruction in reading (National Middle School Association, 2003). It also stated that 71% of middle-school students were at basic level, which only denotes partial mastery of knowledge and skills necessary (NAEP, National Center for Education Statistics, 2006). This statistic only deepened my conviction that it is my job to help my students become more literate in science topics. I do believe that orally reading the textbook would help with the students' literacy.

The article went on to cite that 80% of 8th grade science teachers reported using their textbooks regularly (NAEP; National Center for Education Statistics, 2006). However, The American Association for the Advancement of Science (2002) reported

that science textbooks do a poor job of following standards-based principles for concept learning, a reason to avoid textbook reading. This statistic made me rethink my decision to use a textbook, at least for teaching standards. I do, however, still think that reading the textbook is useful to increase student literacy. It also makes me want to find a textbook that does a good job of following standards-based principles for concept learning. There has to be a good textbook out there somewhere, or else somebody needs to write one.

This article ended by saying that there is a substantial body of research that shows the effectiveness of strategic reading instruction for middle school students to aid in comprehension (Trabasso & Bouchard, 2002). Later in my paper I will use a couple of articles that give some great ideas on using these strategies. I used several of these this year during my action research. A strategy called PLAN (Predict-Locate-Add-Able) has been shown to be very effective with middle school students (Caverly, Mandeville, & Nicholson, 1995; Radcliffe, Caverly, Peterson, & Emmons, 2004). The PLAN approach also proved to strengthen the self-esteem of the students. I felt that this was a very important reason to focus on this approach. So many middle-school students need a big boost of self-esteem.

Despite the evidence that shows the effectiveness of many of these strategies, studies have shown that few teachers use them in instruction (Trabasso & Bouchard, 2002). It is too easy for most teachers to continue doing the same thing year after year, using the same strategies year after year, asking why our students aren't learning- year after year. One of my goals for this year was to find and use as many successful,

researched strategies as I could to help my students become better science readers and motivated scientists.

Methodology in Articles

I chose two articles that contained data collection and data analysis ideas that I used in my research. The goal of the first article was to determine if a brain-based approach was superior to a traditional learning approach (Ozden & Gultekin, 2008). Brain-based learning is an interdisciplinary answer to the question of "what is the most effective way of the brain's learning mechanism" (Jensen, 1998). Brain-based learning can also be defined as "recognition of the brain's codes for meaningful learning and adjusting the teaching process in relation to those codes" (Caine, 2002). I really liked this article because of its focus on the retention of material. The study included a pre-test, a post-test, and a retest three weeks later. The retention of material was very important because in Ohio the Achievement Test in science covers three years of a student's learning. They are tested over what they learned in 6th grade science, 7th grade science, and 8th grade science. This means my 7th graders must retain material for up to two years before finally taking the Ohio Achievement Test.

The next article I found to help in data collection and analysis began by stating that recent research has shown a declining interest in science among young students (Swarat, 2008). The first step in addressing this problem is to find out what it is about a topic that makes it interesting or not. A mixed-method study combining quantitative data from paired-comparison judgments and qualitative data from interviews was used to determine what influences middle school students' interest in topics. Students were

asked to pick the more interesting topic: topic A or topic B. One hundred twenty possible pairs of sixteen topics were used. To check for validity, another set of questions asked students to rate each of the sixteen topics on a 4-point Likert scale. Follow-up interviews were used to further understand why students found some topics interesting and other not.

I used a simplified method of this to help me to determine what topics my students found interesting. As I stated before, students won't learn if they are not paying attention to the teacher. And they won't pay attention if they are not interested in what the teacher is talking about. In spite of the fact that I have to teach certain standards regardless of whether students find them interesting or not, I still think that I can use student interest in planning my lessons. For example, if a certain topic is very interesting to the students, I could teach this topic in a traditional manner (oral reading, discussing, lecturing, taking notes). However, if a topic is not interesting to the students, I might need to add some excitement or WOW to my lesson. This might be a lesson where I use some of the cooperative group suggestions from the previous article *Making it Meaningful*. These cooperative groups could not be used all of the time because they take a lot of class time. They could be used when necessary to help retain student interest.

Additional articles

Along with all the above articles, I found two more articles that I thought would help complete my action research. Both of these articles provided methods to help with student reading and comprehension of science text. The first article was a study that

involved seventy-four 6th grade science students (Oliver, 2009). They used a 900 word textbook chapter on soil conservation to complete a concept map. They were given four superordinate terms and twenty-four unsorted concepts. There were no major differences in the performance of students at different reading levels. Two-thirds of the students enjoyed this activity and preferred to map along with reading. Students also preferred to map in pairs or groups.

Concept mapping is very useful because it makes students express in writing how two concepts are related. This may aid in reading comprehension because textbooks are often embedded with relational structures. The students in this study used Cmap Tools software. Since this is probably something that had to be purchased, we used paper, scissors, and glue in my classroom to make the concept maps. I don't think that it is important how the students make the concept map, as long as they understand the relationships involved. And sometimes, I think they actually enjoyed doing things the old-fashioned way. The findings of this study suggest that pre-selected term concept mapping can help students better understand science textbooks. The student map scores show successful classification under superordinate headers and modest success with grouping terms into sets and describing the relationships present. Based on these findings, I used more concept mapping with my classes this year.

. The last series of articles I wanted to use are ones that support the opposite of my opinion regarding the oral reading of the textbook. I wanted to present these as a way of showing that I am receptive to the other side of the argument and that I am willing to look at both sides of this topic. The research of Armbruster and Wilkinson (1991) showed that silent reading can establish more favorable conditions for learning than oral reading can.

The subject of time came up in two other articles that I found. Salasoo (1986) stated that subjects spent more time reading the passages aloud than reading them silently. This idea was continued in Taylor and Connor's research (1982) who found that reading silently has the advantage of being fast. They also added that when reading aloud, the reader must be more concerned with more than deriving meaning. I think my Likert survey was addressing this when it asked about how students feel when they read aloud. Since adding these new articles to my literature review, I was more anxious than ever to see how my research turned out. I knew I would be happy with either way my research turned out. If I found that reading aloud helped students, I would continue conducting my class in the same manner as I have been. If I found that silent reading was better, I would be glad to have some extra time in our school day to other activities.

METHODOLOGY

Treatment

In my classroom, we begin a new lesson by looking over the up-coming section in the textbook. We observe the major and minor headings as well as the illustrations. We spend approximately 5-10 minutes discussing what we see and what we think about it. The students are then asked to write predictions about what they think the section will be about. I've just started doing this activity this year, after we had an in-service about reading comprehension. The speaker stated that research shows that student comprehension is better if they make predictions before they read. The students are required to write at least 5 sentences. They keep these predictions in their science journal, which is graded every two weeks. During our oral reading semester, the students

spent approximately 5 minutes writing their predictions. During the silent reading semester, the students completed these predictions on their own schedule. After making their predictions, the students then recorded their own reading times for the section (when they began and when they finished). These reading times were initialed by me to ensure that the students were actually reading the textbook. After the predictions, the students completed a graphic organizer that helped them to think about what they already knew about the subject at hand. These graphic organizers included: KWL charts, outlining activities, super-ordinate/subordinate headings. The predictions and graphic organizer were then followed by reading the text, either orally or silently. If the students were reading orally, we took turns reading a paragraph each. We observed the illustrations with the readings and discussed as necessary. This usually took about 30 minutes, approximately twice a week. If the students were reading silently, they recorded their reading times in their notebooks. This took the students somewhere between 5-15 minutes. After reading, orally or silently, the students completed a short formative assessment. These formative assessments were recorded in my grade book for a few points (usually 5-10). I kept these point values small. I wanted them to be recorded as a grade so that students would try their best, but I didn't want them worth enough points to hurt the students' grades. I used the results of the formative assessments to review the lesson the following day. We went over the correct answers and discussed why the students thought they missed each incorrect answer. The students then filled in guided reading papers that went along with the textbook. After the students have completed their worksheets, they self-corrected their work with an answer key. This took some of the students 30 minutes and some of the students 90 minutes. I gave a folder quiz every

couple of weeks to check their self-corrections. On the folder quiz, the students are given a page number from their folders as well as the question numbers that they need to answer from that page. I usually have two questions from each page in their folder. They simply write down the answer from their folder. The quiz usually has about 25 questions. This is a quick way to see if students have finished and corrected their folders. I repeated the above three times during the oral reading period and five times during the silent reading period.

Research Design

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.

The following instruments were given to my 1st, 2nd, and 4th period classes, for a total of about 70 students. I did not use these instruments on my special-needs class because I did not include them in my research. I didn't feel that it would be fair to have them read silently because many of them are not good readers. As mentioned above, I think that reading practice will be especially more useful to them than science practice. If my research suggested that oral reading is not critical in helping students to grasp science concepts, I might try this research project with my special needs students next year.

To answer my first sub-question (**What effect does orally reading the textbook have on student comprehension of science concepts and state standards?)** I used three different instruments. The first instrument was a pre/post test over the science concepts that we were currently studying in our textbook. This gave me a good idea of where the students were starting in their knowledge of the chapter's concepts. It also

provided me with feedback on how far they had progressed in their comprehension of concepts after the chapter was completed.

The second instrument was a quarterly state standard test that was given at the end of each nine week period. This test did not have a before and after scenario that I could look at for comparison. Instead, I compared the results of this test to the quarterly state standard test that they took at the end of the third nine week grading period. The tests for the first and second nine weeks were given after we had been reading the textbook together. The quarterly assessment tests for the third and fourth nine weeks were given after the students had been reading silently. I compared these four tests: two from oral reading and two from silent reading.

I selected which textbook chapters to read based on which ones best aligned to the state standards. Sometimes these chapters included more information than was necessary to cover the state standards. However, I think this works better than just presenting the parts of the chapter pertaining to state standards. Occasionally, I had to add some extra resources to cover some state standards not included in our textbook. During the second nine week period the students read the text on their own. I then compared how well they did on the quarterly state standard test that they took after orally reading the textbook to how well they did on the quarterly state standard test that they took after reading the textbook silently. I know this was not a great comparison because the quarterly state standards tests are different. However, I do have the data from last year's class that I also could compare. This would be comparing this year's data based on silent reading with last year's data based on orally reading. In this scenario, the students from this year would be taking the exact same test as the students from last year.

The quarterly assessment given after the first week grading period averaged 81.3%. The quarterly assessment given after the second nine grading period averaged 80.9%. This produces an average of 81.0% for the quarterly assessments given while the students read orally. The quarterly assessment given after the third week grading period averaged 81.5%. This assessment was given after the students had been reading silently. This shows an improvement of 1.5% during the silent reading of the textbook. I am disregarding the quarterly assessment given after the fourth nine week grading period, which averaged only 65.9%. Our school falls apart after we take the Ohio Achievement Tests. Many teachers, not including me, stop teaching. The students lose all focus and discipline right along with "those" teachers. Adding to that, many of our best students were on a field trip to Washington DC during the second to last week of school. They missed our quarterly assessment review class and they came back trying to catch up on all of their missing work. They squeezed in their quarterly assessment during one of our last "fun days." Needless to say, they weren't very focused.

The third instrument was a formative assessment that I gave to the students after we (or they) read a section in the chapter. This was a short multiple choice, short answer quiz about the concepts in that section. I had them include a sentence or two about the muddiest point in the section. If they didn't have a muddiest point, I asked them to state what they thought was the most important idea from the section. I compared the data from these formative assessments: the ones conducted after reading orally versus the ones conducted after silently reading.

My second sub-question was: **What effect does orally reading the textbook have on student motivation to learn science and their excitement about science?** I

had three instruments to look at this question as well. The first instrument was a simple observation. I kept tallies of how many questions were asked by the students during the oral reading of the text compared to how many questions were asked during the silent reading of the text. I also kept a journal to record the actual question that they asked so I could analyze at a later point if that question revealed student interest in the subject. I spent at least one class period where I observed the students during the reading to determine how many students were on task.

The second instrument I used to analyze student interest was a Likert survey. The survey asked questions about orally reading the text and how that affected students' feelings about learning science. There was one survey after the 9 week period of orally reading the text and another survey after the 9 week period of silently reading the text. The only difference on the survey was that one asked questions about orally reading the textbook and the other survey asked questions about silently reading the textbook. I mainly looked at quantitative information with these surveys. I did this same Likert survey at the beginning of the school year so I would have baseline information to look at.

The third instrument that I used was student interviews. The interviews also included questions about how students felt about orally reading the textbook (or silently reading the textbook) and how that affected their feelings about learning science. These interviews were conducted one-on-one and used open-ended questions. These helped me to collect qualitative data on the same type of questions used on my survey. I interviewed 6 students, selecting two students with top grades, two students with average grades, and two students with below average grades. I selected three boys and three girls.

This was a random selection of students because I completed the interviews during my 7th period planning time. Students come to my classroom at this time to finish missing work, correct previous work, or to work on homework assignments for the next day. I used this group of students for my interviews. If they were there and I wasn't busy, I conducted an interview.

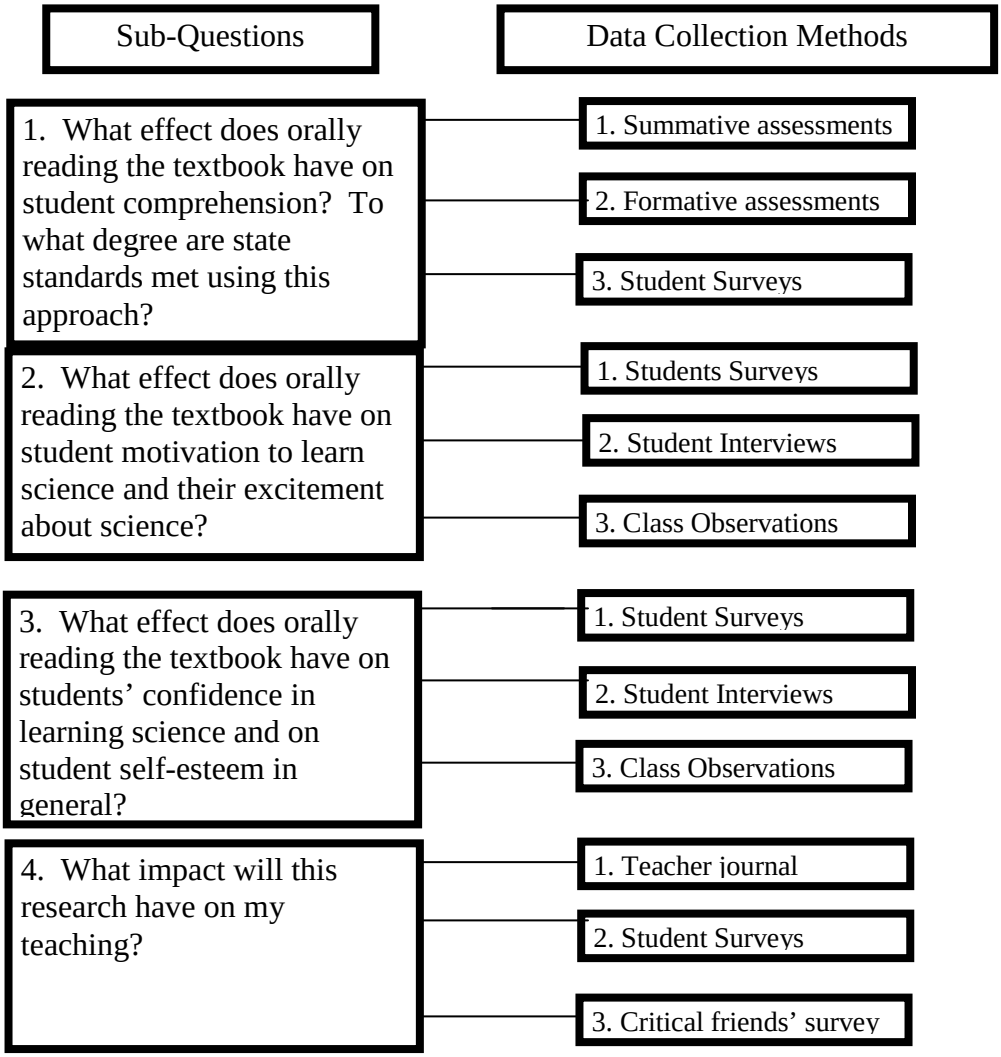
My third sub-question was**: What effect does orally reading the textbook have on students' confidence in learning science and on student self-esteem in general?** I wanted to explore if orally reading (or silently reading) the text made students feel more confident about their ability to learn science. I also wanted to examine how students felt when they read orally, whether it made them feel good about themselves or whether it added to their feelings of low self-esteem. I used two instruments to help me analyze this question: a student survey and student interviews. Both of these instruments asked questions about how students felt about themselves in general and about how confident they felt in learning science. I conducted the surveys and interviews after nine weeks of orally reading and then again after nine weeks of silently reading. A Likert survey gave a lot of quantitative data (70 students) and the interviews gave me a lot of qualitative data on a few students (6 students).

My final sub-question looked at how my action research affected my teaching. The most obvious way it affected my teaching is whether I decided to use the textbook as an oral reading resource or a silent reading resource. Based on my favorable results for silent reading, I continued with the silent reading for the rest of the school year. After making this decision, I started looking into ways that I can help the students with their reading comprehension, be it oral or silent. I triangulated the data by comparing these

formative assessment results with the students' surveys on oral reading. I looked at the students who said that orally reading helped them learn better. I then looked at their scores on the formative assessments after orally reading compared to their score on the formative assessments after silently reading. I looked to see if there was a correlation between those students and their formative assessments results. I also did this with the students who said they learn better with silent reading. I looked at their scores on the formative assessments after oral reading compared to their formative assessments after silent reading. I looked for a correlation between their motivational survey and their formative assessment results. I also compared the results of the motivational survey with the pre/post assessments and the quarterly state standard tests.

The following matrix shows how I used several different methods of gathering information to help make my research more valid and reliable. Another way I could improve the validity and reliability of my research would be to continue this study during the next school year. This would allow me to collect more data to add to the previous analysis. It would also let me switch the order of my treatment. I could do the silent reading for the 1st 12 week period and then do the oral reading for the 2nd 12 week period. This would help to alleviate the chance occurrence that my results were caused by the first 12 weeks being more difficult than the second 12 weeks.

Table 1
Data collection matrix



DATA AND ANALYSIS

The collecting of data began with a Likert survey that questioned students about their ideas and feelings regarding the reading of the textbook. The questions on the survey asked students how they felt when the class read orally (both when they

personally read and when other students read), how they felt their learning was affected by reading orally, and if they felt that orally reading the textbook made them excited about learning science. This same survey was given at the beginning of the year, after we had finished reading the book orally, and again after we had finished reading the book silently. A copy of the survey is included in Appendix A. A comparison of the three surveys is shown in the following table.

Table 2
Comparison of student opinion Likert surveys

Questions &Mean Score Surveys	*Orally reading a textbook makes me excited about learning science*	*Orally reading a textbook makes me want to learn more about the topic*	*My favorite thing to do in science class is reading the textbook*	*Orally reading the textbook helps me to understand science concepts better*	*I like it when I get to read orally*	*I feel good about myself when I read orally*
1st survey August	3.13	2.16	1.69	3.13	2.36	2.24
2nd survey December	1.96	2.64	1.60	2.92	2.38	2.26
3rd survey April	2.37	2.69	2.07	2.89	1.86	2.37
Difference between 1st and 3rd	- .76	+ .53	+ .38	- .24	- .50	+.13

I will be using the last survey because I think it will be a better indication of how the students really feel about reading the textbook. They have had 12 weeks of reading

orally, followed by 12 weeks of reading silently. I do think that all three surveys could be useful to find a mean score for each question. The questions that increased from the 1st survey to the 3rd survey were questions 2, 3, and 5. These included: the textbook makes me want to learn more about a subject, reading the textbook is my favorite thing to do in science class, and I feel good about myself when I read orally. It is interesting that these were the three lowest percentages on the first survey. The greatest gain was question 2: reading the textbook makes me want to learn more about a topic. This tells me that the students didn't think that reading the textbook would make them more interested in the current topic, but they found that it did make them more interested. I feel like our textbooks are very engaging and well-illustrated. Maybe the textbooks they used in the past weren't like that. The question that decreased the most was question 1: reading the textbook makes me excited about learning science. This tells me that the students thought that reading the textbook would make them excited about science, but they realized after we did it that did not make them excited. I also think this is a reflection of how I conduct my classroom. We do lots of hands-on science investigations. I think that maybe the results of question 1 might just be a reflection of the students' preference for activities over textbook.

Students ranked the questions from 1 meaning not at all and 5 meaning always. An answer of 3 would show that the student does not feel strongly one way or the other. All of the mean scores were below 3. This tells me that the students did not have positive feelings about orally reading the textbook. The highest mean score was a 2.89 for question #4. This question asked if the student felt that orally reading the textbook helped them to understand science concepts better. The lowest mean score was a 1.86 for

question #5. This question asked if the student liked it when they were chosen to read orally in science class. The second lowest mean was a 2.07 for question #3. This question asked if reading orally was the student's favorite thing to do in science class. The survey tells me that even though students feel that orally reading the textbook helps them to learn, they do not like it when they are chosen to read orally and they do not find it particularly exciting. A full analysis of the last survey can be found in Table 3.

Table 3
Full analysis of April Likert survey (N=62)

Questions *Averages*	Orally reading a textbook makes me excited about learning science	Orally reading a textbook makes me want to learn more about the topic	My favorite thing to do in science class is reading the textbook	Orally reading the textbook helps me to understand science concepts better	I like it when I get to read orally	I feel good about myself when I read orally
Mean	2.37	2.69	2.07	2.89	1.86	2.37
Median	2	2	2	3	2	2
Mode	1	2	1	1	1	1
Standard Deviation	1.32	1.38	1.19	1.55	1.52	1.47

As well as revealing some very important quantitative data, the final survey also has some qualitative data to examine. I am going to look at questions #4 & #5 because they were the highest and lowest rated on the survey. Question four asked the students if

they felt like orally reading the textbook helped them to understand the science concepts better. With a mean of 2.89, it received the highest rating, even though it didn't even reach the halfway mark. The standard deviation on this question was 1.55, so the outliers would be below 1.34 and above 4.44. Examining the surveys of three students who were well below the standard deviation on the pre/post assessments (for both oral and silent reading) , one of them was a high outlier (5), one was a low outlier (1), and one was within the range (4) on this survey question #4. The student who was a low outlier, meaning he or she felt that oral reading does not help them to understand science concepts better, also performed below standard deviation on the pre/post assessments. However, the student who was a high outlier, meaning that he or she felt that oral reading was important to helping them understand science concepts better, was also below standard deviation on the pre/post assessments. This tells me that a student's opinion on oral reading being helpful to science comprehension isn't dependent on their reading comprehension as shown by a pre-post assessment.

Examining the surveys of three students who were above the standard deviation on the pre/post assessment, one of them was a high outlier (5), and the other two were within range (2). The two students who were within range were very close to being below standard deviation, meaning that they didn't feel that oral reading was very important for understanding science concepts. However, these students did perform well above standard deviation for the pre/post assessments. The student who was a high outlier, meaning that they felt that oral reading does help them to understand science concepts better, was also well above standard deviation on the pre/post assessments. I feel these also show that a student's opinion on oral reading isn't dependent on their

reading comprehension.

The next data analysis instrument I used was a pre/post test comparison. The students took a pre-test before beginning a new chapter in the textbook. After we completed that chapter, the students took a post-test to see how much they had learned. An example of a pre/post test is included in Appendix C. Table 3 shows the average improvement between the pre-test and the post-test for both the oral reading and the silent reading of the textbook. The silent reading of the textbook shows a .60 higher increase over the oral reading. This statistic tells me that this difference, although small, shows that silently reading the textbook is just as good as reading the textbook orally, if not even better. Also included in Appendix D is the analysis of each individual chapter. Three chapters were completed during the oral reading which included: The Scientific Method, The Air Around You, and Weather Patterns. Three chapters were also completed during silent reading which included: Weather Prediction, Energy, and Heat. As mentioned above, I would like to switch the order of the chapters next to see if that affects my final results.

Table 4

Pre/post assessment comparison of chapter tests for oral vs silent reading (N=58)

Chapter tests	Pre-test score	Post-test score	*Percentage change*
Orally read	53.9%	69.6%	15.7%
Silently read	62.5%	78.8%	16.3%

The last set of quantitative data I collected was from formative assessments given after the students finished reading a section from the book. I compared the results from the assessments given after oral reading of the textbook with the assessments given after silent reading of the textbook. There was a 1.2% difference between them, with silent reading being higher than the oral reading. Table 4 shows the statistical averages and standard deviation for both oral and silent formative assessments. An example of one of my formative assessments can be found in Appendix E. A full analysis of the formative assessments can be found in Appendix F. This shows that students do just as well, in fact a little better, when they read silently. This means that students do not need to hear a textbook read in order learn. This data will be used to drive my instruction for the next school year. I will begin the new school year just like I finished this year: students reading the textbook silently. I will continue to collect summative assessments, formative assessments, and student surveys from the silent reading of the textbook. This method of reading will allow more classroom time to be used for hands-on activities. In the interviews I completed, students overwhelmingly stated that they preferred these

hands-on activities. If my data collection shows that silent reading is not better than oral reading, I will return to oral reading for the second semester. I will collect this data from oral reading and compare it to the first semester of silent reading. This will give me two years of data to look at. I also like that this allows me to look at another group of students and how they respond to my research.

Table 5

Formative assessment averages for oral and silent reading (N=55)

Formative Assessment	Mean	Mean Percent	Median	Mode	Standard Deviation
Oral	3.43	68.5%	3	4	1.04
Silent	4.97	69.7%	5	5	1.53

The above table shows a"mean percent" because of a problem I didn't foresee when I was writing the formative assessments. I should have had the same amount of questions on each of the assessments. Instead, I had more questions on some of the longer sections. This ended up causing me problems when it came time to compare the results. I thought that changing the mean into a percent based on the number of questions on the quiz would solve that problem. And so I created my own word: mean percent

Qualitative analysis of my data reveals some interesting outliers. I am going to look at the last formative and summative assessments given during the oral and silent reading periods. Chapter 6 on heat was covered during the last assessment of silent reading. The mean on this post assessment was 8.32 with 1.81 as the standard deviation. I am going to look at three students that were below this. Student one scored a 5, student

two scored a 4, and student three scored a 5. I also looked at the post assessment on chapter 5, and all three students were below on that one as well. The mean was a 7.51 with 2.11 as the standard deviation. Student one scored a 5, student two scored a 3, and student three scored a 4. When comparing these results with the results on the last formative assessment given during the silent reading, two of the three students were below range. The mean on this assessment was 3.79 with 1.22 as the standard deviation. Students one and three scored a 2, while student two scored a three.

Looking at the Likert survey shows some interesting things. Starting with student two, his highest marks were for: orally reading the textbook is my favorite thing to do in science class (5) and orally reading the textbook helps me to understand science concepts better (4). His lowest score was for liking when he gets to read orally (1). I think this shows that in spite of not liking to read out loud himself, student two feels that oral reading helps him to understand the textbook better. Student two is a quiet student who doesn't like to draw attention to himself, and usually doesn't ask questions in class. I think this type of student benefits from oral reading and discussions. Student two is a poor student who succeeds only by working hard. For student three, his highest score was for orally reading the textbook helps me to understand science concepts better (4). His lowest scores were for: liking to read orally, feeling good about himself when he reads, his favorite thing to do is oral reading of the textbook, and orally reading makes him excited about science (all 1). Student three is another quiet student, and I think he follows much of what I said about student two. However, we need to add that he doesn't seem to like anything about orally reading the textbook, resulting in his very low scores on all of the oral assessments. Student three is a C/D student. It's a very different story

for student one. His lowest score is for my favorite thing to do in science is reading the textbook (3). All of his other statements he rated as 5. Although student one is also quiet, he seems to actually enjoy science class. I don't feel that that the low score for reading orally means that he doesn't enjoy it, it's just that he enjoys other parts of science class better. Student 1 is an A/B student.

I believe that my study shows that silent reading of the textbook is the more effective method of learning for my 7th grade science classroom. Using a triangulation of data including: formative assessments, summative assessments, student surveys, student interviews, class observations, and teacher journals provides convincing evidence for my research project question. Even though the actual difference in my study results is not large, the fact that all three of my quantitative data support silent reading of the textbook makes my conclusion valid. The following table presents all three of my quantitative data analysis results.

Table 6

Synthesis of quantitative analysis (N=58)

Method of Reading Textbook	Formative Assessment Mean Scores	Summative Assessment Improvement	Student Survey
Orally	68.5%	15.7%	Highest Scores: Makes me want to learn more, helps to understand concept
Silently	69.7%	16.3%	Lowest Scores: Likes to read orally, favorite thing to do is to reading textbook

This synthesis of information shows that on both formative and summative assessments students performed better when the textbook was read silently instead of orally. The student survey showed that the highest scores were for the statements "makes me want to learn more about a topic" and "helps me to understand a concept better." However, even though these were the highest scores on the survey, they only had means of 2.69 and 2.89 out of 5 possible. With 3 being the middle score of my survey, both of these were still below average. The lowest scores on the survey were for the statements "I like it when I get to read orally" and "My favorite thing to do is reading the textbook." I think that the mean score of 1.86 for a student liking when they personally read orally shows their lack of comfort with reading orally. Based on my student interviews, most students stated that it makes them nervous and uncomfortable when called on to read. They also felt like their comprehension was jeopardized because of their concentration on the actual verbalizing of the words. I think this was also part of the mean score of 2.07 for reading being their favorite part of science. Not only does it make them uncomfortable to read orally, many of the students interviewed stated that they are highly distracted when the class reads orally. They find it very difficult to keep concentrating on the textbook.

The only thing in my research that supported the oral reading of the textbook was the class observations and the teacher journal that I kept. For one week I documented the questions asked by students during the oral reading of the textbook. They ranged from a minimum of three questions per reading selection to a maximum of 7 questions per reading selection. I also recorded the actual question asked to analyze later if it was a pertinent question. All of the questions asked by the students related in one way or

another to the topic of the day. When I tried to do the same for the questions asked during silent reading, nothing was documented, because nothing was asked. In fact during the twelve weeks of silent reading, not once did I get a question about the textbook. The other disadvantage of reading silently came from my journal. I missed the interaction between the students and myself about certain science topics. Some of the ideas that I find most interesting in science were not discussed because the students didn't bother asking about them. If we had been reading together in the textbook, a student would probably have asked a question that would have led into an interesting discussion. There were many days that I didn't feel like a science teacher at all, only a facilitator for the classroom dynamics.

INTERPRETATION AND CONCLUSION

To conclude my action research project, I will return to my original questions. The main question asked how orally reading the textbook affects seventh grade science students. This question gets answered by looking at my four sub-questions. The first sub-question asked how student comprehension is affected by reading orally (formative assessments after oral reading- mean 68.5; formative assessments after silent reading- mean 69.7). This statistic shows that students can learn just as well from silent reading as from oral reading. This means that next year my students will be reading the textbook silently. Thus, more classroom time will be devoted to hand-on activities and group projects. The second sub-question asked how state standards are met through oral reading (summative assessments after oral reading- mean increase of 15.7; summative assessments after silent reading- mean increase of 16.3). This also

shows that students do just as well on standard summative assessments after silent reading as after oral reading. The third sub-question asked how oral reading affected the motivation and self-esteem of students (all survey questions on the Likert survey were below 3). This statistic showed that students don't enjoy reading orally and they don't feel good about themselves when they have to read orally. Once again, this supports my decision to have the students read the textbook silently next year. The last sub-question asked how my teaching would be affected. This question will be answered in the next section.

VALUE

Based on the above analysis and its conclusions, I will be spending my first semester of the next school year having my students read silently. This makes me both happy and sad. I am happy because this will leave a lot more classroom time for the students to do hands-on activities. My student interviews overwhelming showed that these activities are what the students enjoy the most. They also stated in the interviews that they felt like hands-on was the way that they learned best. My next question for a research project would be what can I do to make these hands-on activities the best possible learning experience. I've heard a lot of teachers state that after students finish their labs in class, they still don't understand what the lab was supposed to teach them. I want to make sure that the students are actually getting what the lab was all about.

I will continue collecting data next year, and after the first semester is over, I will compare the results of my new data with the results of my data for this year. If this data shows once again that silent reading produces better results, I will continue silent reading

for the rest of the school year. If silent reading produces lower scores than from the oral reading of the textbook from the previous year, I will return to oral reading for the second semester to collect more data. I can then compare the oral reading for the second semester of next year to the silent reading of this year. I do plan on continuing my search for additional information on this topic. I might discover that there are some other benefits of oral reading that I hadn't discovered when preparing my literature review. In fact, I plan on doing some oral reading at least once a month due to something that just happened this week in my classroom. A student was giving his quarterly science report to the class about an MSNBC article on future human evolution. I thought it was very interesting, and since it went along with the standards we were currently studying, I copied it so we could read it together. The vocabulary used in this article was way above what a normal seventh grader could read on their own. This presented a great way to introduce the students to some new words and ideas while still covering our required material. I think it also exposed my higher students to some higher thinking.

Silent reading makes me sad because I really miss the interaction with my students. I will admit that I have had more time this second semester to interact with students one-on-one. When they are finished doing an activity, I have them bring me their journal so I can evaluate their work. This allows me time to immediately correct them if they had done something incorrectly or if they had misunderstood the concept. Last year I didn't see that they had a problem until they handed their journals in, which was usually too late to re-do the lab. I think this is a big positive, but I still will be looking for ways to interact with my class as a whole group. This is another question that my research this year has led me to find an answer for.

As I mentioned above, I do plan on finding an interesting science news article each month for the class to read together. This would provide a chance to discuss current science topics as a group and provide some upper-level vocabulary for my students. I will continue giving students formative assessments after they finish reading. This will provide two benefits. First, it allows me to see what concepts students are and are not grasping from the textbook. I can use this information the following day to present a mini lesson. I can also use this time for questions and a short discussion period about the topic. Secondly, I've read several times this year about studies that show students learn more when they are assessed more often. Having to process information in order to answer questions on a test, helps them to learn and remember better. I also will continue with the pre/post assessments. These not only provide evidence that the students are learning, which all teachers might have to start documenting soon, I can also use them to readjust my teaching for the following year.

There are still several questions that my research has not answered. I feel my research shows that silent reading of the textbook is preferable to oral reading. I still have the uncomfortable question of whether using a textbook is the correct way to teach science. I know inquiry learning is important, but is it enough on its own? Are there lots of studies that show inquiry learning is completely successful? Are there programs out there that could guide a teacher through this process? Would I be able to teach this way? (I'm very strict and can't stand chaos) Another question I have is how my labs should be done in class. I like students working on their own because it cuts down on the noise, but also because I think it is important that students get to make their own discoveries. However, I also know the students are very social at this age and that learning from each

other is a good way for students to learn. My question is how can I allow students to work together more often and yet keep the classroom environment conducive to learning and maintain my sanity. Another question I have is how oral reading impacts students. Maybe there are benefits to oral reading that didn't show up in my research project, but are there nonetheless. I will continue looking for current studies and reading new articles that examine how reading the textbook (both orally and silently) affects student learning.

In summary, I feel like I have made a very important discovery about how to use the textbook in my seventh grade science classroom. I am very excited about continuing this research into my next year's classroom. More importantly, I have learned a process of action research that I can continue into the rest of my teaching career. I really think that action research could be the answer to the educational unrest that is occurring in our country today. It provides the evidence necessary to show student growth, or the lack of it which would be followed by intervention. It also provides the teachers with a way to improve their craft and the documentation to prove it. It's not an easy process, so I think all of the teachers not willing to do it would stop teaching. Isn't this what all of the politicians are screaming about? The bad teachers would get out, and the ones left would be constantly improving.

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APPENDICES

APPENDIX A

LIKERT STUDENT SURVEY

Likert Student Survey

Participation is voluntary and participation or non-participation will not affect your grades or class standing.

Please answer each question by ranking them from 1-5, with 1 meaning not at all and 5 meaning always.

1. Orally reading a textbook makes me excited about learning science.

   1 2 3 4 5

2. Orally reading a textbook makes me want to learn more about the topic.

   1 2 3 4 5

3. My favorite thing to do in science class is reading the textbook.

   1 2 3 4 5

4. Orally reading the textbook helps me to understand science concepts better.

   1 2 3 4 5

5. I like it when I get to read orally.

   1 2 3 4 5

6. I feel good about myself when I read orally.

   1 2 3 4 5

APPENDIX B

PRE/POST TEST ASSESSMENT

Pre-test Self Assessment

Click the button next to the response that best answers the question.

1. 100°C is equivalent to what temperature on the Kelvin scale?

a. 100 K

b. 173 K

c. 273 K

d. 373 K

2. The significant figures in a measurement include

a. all of the digits that have been measured exactly, plus one digit whose value has been estimated.

b. only the digits that have been measured exactly.

c. only the digits that have been estimated.

d. all of the digits that come before the decimal point, plus one digit that comes after the decimal point.

3. Which of the following is NOT a precaution that should be taken to stay safe in the laboratory?

a. Wear safety goggles to protect your eyes.

b. Wear sandals or other open-toe shoes to be comfortable while working in the lab.

c. Keep your work area clean and uncluttered.

d. Make sure electric cords are untangled and out of the way.

4. What prefix is used in SI units to mean 1,000?

    a. deci-

    b. centi-

    c. kilo-

    d. milli-

5. What is the proper first aid procedure when a chemical spills on someone's skin?

    a. Flush the skin with large amounts of water.

    b. Cover the spill with a clean dressing.

    c. Apply direct pressure to the skin.

    d. Cover the skin with plastic gloves.

6. Which of the following statements about graphs with no trend is NOT true?

    a. In a graph with no trend, the data points may be scattered about.

    b. In a graph with no trend, the data points may show no recognizable pattern.

    c. A graph with no trend may mean that there is no relationship between the two variables being graphed.

    d. Graphs with no trend are not at all useful.

7. Which of the following is NOT a useful tip for drawing a line of best fit?

    a. Make sure none of the data points are directly on the line of best fit.

    b. If the data points seem to follow along a straight line, draw a straight line.

    c. Include as many data points as possible directly on the line.

    d. For data points that don't easily fit on the line, try to have the same number of points above the line as below the line.

8. Which of the following is NOT a precaution that should be taken to stay safe when doing science activities in the field?

a. Carry out field investigations on your own so other people will not get in your way.
b. Always tell an adult where you will be.
c. Prepare yourself ahead of time.
d. Dress appropriately for the weather and other conditions you will encounter.

9. A student finds the density for a sample of aluminum to be 2.7 g/cm3. If half of the sample were removed, how would the density be affected?

a. The density of the smaller sample would increase.
b. The density of the smaller sample would decrease.
c. The density of the smaller sample would remain at 2.7 g/cm3.
d. The density could either increase or decrease based on the lab activity.

10. Which SI unit of measurement would be the most appropriate to use if you were measuring the wingspan of a fruit fly?

a. inches
b. meters
c. centimeters
d. millimeters

APPENDIX C

FULL ANALYSIS OF PRE/POST ASSESSMENTS

Chapter pre/post assessments

Silently read

Chapter tests	**Pre-test score**	**Post-test score**	**Percentage change**
Chapter 5 Energy	58.2%	75.1%	+16.9%
Chapter 6 Energy	69.1%	83.2%	14.1%
Chapter 3 Weather	60.2%	78.2%	18.0%
Averages	62.5%	78.8%	16.3%

Orally Read

Chapter tests	**Pre-test score**	**Post-test score**	**Percentage change**
Chapter 2 Scientific Method	48%	60%	+12%
Chapter 1 Weather	53.4%	74.5%	+21.1%
Chapter 2 Weather	60.4%	74.4%	+14%
Averages	53.9%	69.6%	+15.7%

APPENDIX D

FORMATIVE ASSESSMENT

Formative Assessment

1. Circle the letter of each sentence that is true about safety symbols.
    a. They identify safety equipment that you should use.
    b. They alert you to possible dangers in doing the lab.
    c. They give you specific instructions about each lab in the book.
    d. They remind you to work carefully.
2. Circle the letter of each place that a science investigation might be done in the field.
    a. schoolyard
    b. classroom
    c. forest
    d. beach
3. Circle the letter of when preparing for a lab should begin.
    a. 1 hour ahead of the lab
    b. 10 minutes ahead of the lab
    c. The morning of the lab
    d. 1 day before doing the lab
4. Is the following sentence true or false? You should never try anything on your own in the lab without asking your teacher first. _____ Please include a reason for your answer.

    _____

    _____

5. What should you do immediately whenever an accident occurs? Please include a reason to support your answer.

_____

_____

6. Write a sentence or two about what you thought was the muddiest point in this section. Also include what you thought was the most important idea in this section as well as your reason for thinking this.

APPENDIX E

FULL ANALYSIS OF FORMATIVE ASSESSMENT

Formative Assessment Analysis

Formative Assessment	**Mean**	**Mean %**	**Median**	**Mode**	**Standard Deviation**
(Silent) *Ch. 3 Sec. 1*	6.37	63.7%	7	5	2.43
Ch. 3 Sec. 2	4.97	62.1%	5	4	1.16
Ch. 5 Sec. 3	3.40	68.0%	4	5	1.37
Ch. 5 Sec. 4	3.79	75.8%	4	5	1.22
Averages	4.97	69.7%	5	5	1.53
(Oral) *Ch. 1 Sec. 3*	3.13	62.6%	3	2	1.10
Ch. 2 Sec. 1	3.77	75.4%	4	4	1.07
Ch. 2 Sec. 2	3.38	67.6%	3	4	.96
(Oral) *Averages*	3.43	68.5%	3	4	1.04