TEXTBOOK READING STRATEGIES IN THE MIDDLE SCHOOL SCIENCE CLASSROOM

by

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Sarah Alida-Fetzek Tabor

July 2013
DEDICATION

I would like to dedicate this paper to my darling son. He was born in the midst of this adventure and I hope someday he will realize that the long summer nights away in the field and the late nights at home in front of the computer were just another way to show my dedication to our family. This is also for my husband, for being my sharpest critic and strongest ally. This is for my parents and grandparents, who instilled within me the value of education. Finally, to my students, who inspire me to continuously seek new ways to instruct and guide them as I share my passion for Biology.
ACKNOWLEDGEMENTS

During the course of my AR project, I relied upon my support team: Shannon Knodel, Emily Nelson, and Shiloh Fetzek. Each of these women provided a unique role on my team as they come from a variety of backgrounds.

Shannon Knodel is a 2011 graduate of the MSSE program and is my classroom neighbor. She is the “other” seventh grade science teacher in my district and her input was absolutely invaluable as I undertook this process. In a move of solidarity, she also implemented the reading strategies used in my action research. She is always a few days ahead of me in her lessons, so this allowed me to get some immediate feedback about what was working, what wasn’t, and what she would change. Her instant accessibility has been extremely helpful during my entire tenure at my school.

Emily Nelson is a personal friend who also happens to be an amazing English teacher at the high school in our district. She has a passion for teaching that is contagious and she was honest and constructive when reviewing my project. I value her input as an expert in literacy and her perspective as a teacher who sees my students a couple of years after they are done in my classroom.

Shiloh Fetzek is my sister and one of the most intelligent people I know. She currently lives in London, U.K. where she interprets scientific papers about climate change for policy makers. She has been my editor throughout the entire MSSE program and her feedback always inspires me. She is well versed in the interpretation of data and has made sure that my presentation of my results will make sense to my readers.
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ABSTRACT

The majority of middle school students have not been specifically taught strategies to read textbooks. My goals were: to determine whether learning a textbook reading strategy would improve the students’ understanding of the content, to measure any shift in attitudes towards reading textbooks after being taught specific strategies, and to evaluate any effect that teaching these strategies might have on my teaching. Many of my middle school science students struggled to locate information within their textbook during coursework. This impacted their reading assignments, which were rarely read, and homework assignments, which had low scores. The Common Core Standards mandate that technical writing and reading of informational text be incorporated into science curriculum. Two textbook reading strategies, THIEVES (Manz, 2002) and PLAN (Radcliffe, Caverly, Hand, & Frank, 2008), have been used successfully with middle school students. Over the course of four units, teaching of the reading strategies was alternated with using no reading strategy. The quantitative data that were collected included; test scores, quiz scores, homework scores, and final class grades. The qualitative data that were collected included; student surveys before and after learning the reading strategies, student interviews, and my own journaling. This study’s findings were that quiz and test scores remained relatively consistent throughout the investigation, but homework scores did show an improvement during the final unit that used the PLAN reading strategy. Final academic grades remained the same for some of the students, while most students’ grades improved or declined. Survey results indicated that students shifted from extreme feelings about reading textbooks, i.e. that they either loved or hated reading them, to having more neutral feelings about reading textbooks. The majority of the students preferred the PLAN reading strategy because they felt that it made them more familiar with the content and that their final product in their science notebooks had value to them, as it aided them in studying for tests. I also preferred PLAN due to the ease of teaching the strategy, the writing component that is built into the reading strategy, and the creative final product from the students.
INTRODUCTION AND BACKGROUND

The purpose of my action research (AR) project was to examine two different reading strategies to assess whether implementing their instruction in my classroom would increase my students’ understanding of the content as their textbook delivers it. I also assessed how learning specific strategies for reading textbooks might alter their attitudes towards textbook assignments. I chose to study reading strategies as a means to not only benefit my students, but to benefit my teaching in both day-to-day planning activities and the larger objective of incorporating more reading and writing into science teaching, as mandated by the Montana Common Core Standards.

I teach seventh grade Life Science in the small town of Belgrade, Montana. It is a community of 7,500 with an economy originally based on agriculture. In recent decades its demographics and economy have shifted away from agriculture as the town has become a community of commuters that work in the nearby city of Bozeman, Montana. I teach 119 of the 200 seventh graders in our Middle School. Approximately 60% of my students qualify for free and reduced lunches and the majority of my students are white. I have four Hispanic students, two Native American students, and one African American student. Belgrade is sometimes referred to as a “transient” community because many people who move in soon move out as they follow employment opportunities. Many of my students have attended a variety of schools during their education.

One of the problems that I encountered with my seventh grade students over the five years I have taught in Belgrade was their lack of skills and understanding when they were asked to find information in their textbook. My district recently purchased my department new Life Science textbooks and it was bewildering to me that my students
lacked the ability to use the textbook as a tool to help them better understand the topics that we were learning about in class. Reading assignments were rarely read, and the most basic key concepts presented within a section of a chapter escaped them. If my students had a basic understanding of the concepts as they are laid out in their textbooks, then my time could be spent further explaining those concepts, or better still, facilitating their exploration of those concepts in the laboratory.

In addition to my frustration with my students’ seeming inability to read a textbook, there were recent developments at a statewide level that would impact my teaching in the immediate future. In November 2011, the Office of Public Instruction for the State of Montana adopted the Common Core Standards for English Language Arts, Literacy, and Mathematics. For science educators in my state, this meant that we would be expected to incorporate technical writing and reading of informational text into our current curriculum. Many of us already did this to some degree, but these new standards raised questions among many teachers as to how they could be certain they were meeting the new requirements. These included the extent to which it was our new job to teach reading and writing, and how we were meant to accomplish this when we were formally trained in the sciences and not in literacy. I knew that I needed to find a way to help my students develop their scientific literacy, and at the most basic level; this meant the ability to read about science from a textbook that was designed for their particular developmental level.

Exploring strategies that would help my students develop their textbook reading skills seemed that it would benefit not only my students in their current and future endeavors, but also myself in my current classroom teaching and my future as I changed
my curriculum to incorporate the new Montana Common Core Standards. Students are expected to read informational texts in their other subject areas, and the reading of informational texts only becomes more critical as students progress in their education. An inability to read a textbook would make success in higher education nearly impossible. Students that do not continue to higher education would still benefit from the skills needed to read informational text in technical or occupational settings. My role as a teacher could shift from lecturing and explaining toward guiding and supporting my students in hands on activities in the lab, which have the value of connecting them to the content through tactile and emotional response. If I could find some quality textbook reading strategies that were effective in the science classroom, I could share them with my colleagues as we adapted to our newly defined role as more multi-disciplinary teachers under the new state educational standards.

Focus Question and Sub-Questions

These goals have led me to the following research questions. My focus question is: What is the effect of textbook reading strategies on student comprehension of science content in a seventh grade classroom?

I would also look for answers to these three sub-questions:

- Which textbook reading strategy will be most effective in helping students comprehend the content of the science textbook?
- What is the impact of incorporating textbook reading strategies on students’ attitudes toward textbook reading?
- What is the effect of each textbook reading strategy on my teaching?
I turned to the current educational research to find out more about scientific literacy and to determine what was already understood about the value of textbook reading in the middle school science classroom. I was also interested in finding strategies that had been proven to be successful in the middle school science classroom.

CONCEPTUAL FRAMEWORK

When considering students’ use and comprehension of a science textbook, the term “scientific literacy” often comes to mind. This term can have multiple meanings, and my research into the topic has revealed a distinction between scientific literacy in the derived sense and in the fundamental sense. Norris and Philips (2003) describe the derived sense of scientific literacy to be “knowledgeable, learned, and educated in science” (p. 224) and the fundamental sense of scientific literacy as the ability to read and write when the content is science. They argue that all scientific knowledge is based on text, and that reading and writing are just as constitutive to science as observation, measurement and experimentation are (Norris & Phillips, 2003).

Educators make a distinction between the ability to read in the simple sense of stringing together properly pronounced words, compared to being able to infer meaning from text. When reading a science text, the reader must use critical thinking to determine whether the material that they are reading is an inference, an assumption, or a supported fact. Without this deeper interpretation and understanding of the text, the reader has “failed to grasp science” (Norris & Phillips, 2003, p. 235). When students are knowledgeable in scientific content, in the traditional sense of knowing the vocabulary
and being able to restate accepted theory, yet they cannot interpret the interconnectedness of those theories, then science educators have failed to provide them with the skills to interpret scientific information provided by other media, which can impair their capacities as citizens. As stated by Norris & Phillips, “The reasoning required to comprehend, interpret, analyze, and criticize any text resembles in its major features the reasoning at the heart of all of science” (p. 237). The promotion of science literacy in its fundamental sense can be seen as support for literacy in general.

Students traditionally receive significant reading instruction in the lower and upper elementary grades, and much less direct reading instruction in the middle school grades. (Radcliffe, Caverly, Hand, & Frank, 2008; Kelley & Clausen-Grace, 2010). “Middle school science texts are challenging for students because they typically deal with topics that are far removed from students’ everyday life experience and often use language that is simultaneously technical, dense, abstract and hierarchically structured” (p.263) as demonstrated by Fang (2005). In my own experience, I have been surprised on more than one occasion when a student lacks the ability to locate information that seems to be directly visible to them in the textbook.

When I was a pre-service teacher, I observed students asking for help in a high school science class and being told by the teacher to look it up in their book without any further assistance. If my students were to be tasked with this within a couple of years, then it would be critical that I help them acquire the skills necessary to “look it up.” When I evaluated my role as a seventh grade science teacher, it was imperative that I be equally concerned with my students’ ability to analyze the text as I was with their comprehension of scientific concepts. I hoped that using proven strategies to increase
higher level thinking skills when approaching an informational text would help my students better comprehend the scientific concepts that I am tasked with teaching them. For my students, these strategies should prove themselves useful, not only in science but in other subjects and in future academic, technical, and occupational endeavors as well.

It was not difficult to find current research in the area of reading strategies for use in the science classroom. The general theme to all of the strategies that I encountered is preview of the text and predictions of what will be learned. Looking through the textbook before reading helps students connect the reading with their prior knowledge, which ultimately allows them to better understand the concepts presented. Things to look at include table of contents, headings, sub-headings, vocabulary, charts, pictures, diagrams, and first and last sentences of each paragraph. There are some additional strategies for wrapping things up after reading like writing a summary or making concept maps. I decided that I would like to find a strategy that had already been created and tested and would not require me to “reinvent the wheel.”

One study by Radcliffe et al. (2008) looked at a specific strategy called PLAN, which stands for Predict, Locate, Add, Note. A single teacher implemented the use of PLAN in her treatment group (50 students) and followed her traditional approach with the control group. The PLAN strategy is appealing because it uses concept mapping and many seventh grade students are unfamiliar with that process so if implemented, it provides the additional benefit of teaching that skill. The strategy was also the subject of two additional studies cited in the research and that gives it some validity.

The teaching of the PLAN strategy followed Pearson and Gallagher’s (1983) steps of explicit instruction as cited by Radcliffe, et al. in 2008. Modeling the strategy for
the students, providing scaffolding during guided practice, and structuring time for
independent strategy use by students so they could internalize the process were all
components of the teacher’s instruction. This was done in a way that was
“developmentally responsive to the cognitive needs and characteristics of middle-level
students” as well as their “social-emotional needs” (Radcliffe, Caverly, Hand, & Frank,
2008, p. 406). This is important because it gives the students motivation to learn the
strategy when it is tied into their emotional wellbeing.

Manz (2002) describes a method for previewing textbooks that uses the acronym
THIEVES: Title, Headings, Introduction, Every first sentence in a paragraph, Visuals and
vocabulary, End of chapter questions, and Summary. She describes how to introduce the
method in class and gives examples of its use by students from elementary through
college.

THIEVES was used by Dohrenwend (2010) in his annotated readings for middle
school students. The teacher combined this with “side notes” for audio recordings that
included a textbook preview followed by an oral reading of the textbook. The included
side notes were the things that he would point out if he were reading the book out loud to
the students such as figures, diagrams, captions, and vocabulary helpers. The recordings
are made available to the students through a learning management system like
Blackboard. This was the only article I found that referred to the use of THIEVES
textbook previewing strategy.

I found two lesson plans online that were based on the THIEVES previewing
strategy. The website ReadWriteThink.org has published a detailed lesson by Lassonde
(Using THIEVES to Preview Nonfiction Texts, 2012) that is targeted specifically to
sixth-eighth grade students. Another was published on the British Colombia Universal Design for Learning wiki (BC UDL Wiki, 2010) and included a template to be used in a composition notebook.

Despite the lack of references by published journal articles, I felt that the elements of THIEVES were important to my students so I chose this as the first reading strategy to share with my students. I chose PLAN as my second reading strategy because it included previewing the textbook with concept mapping and a written summary at the end. This fit nicely with what I understand about effective reading strategies and also incorporated the writing aspect which gives it value as a tool for incorporating the Montana Common Core Standards into the science classroom.

METHODOLOGY

I used two different treatments with my students and alternated those with non-treatment phases. In our textbook about cells, the first chapter was a non-treatment phase. I did everything as I would do in the treatment phase except that I did not teach any type of reading strategy. The order of events for a chapter in the non-treatment phase is as follows:

1. Read section 1 and complete a Reading Study Guide as homework
2. Perform an activity or lab that reinforces the content from that section
3. Take an end of section quiz as a formative assessment
4. Repeat steps one through three until the end of the chapter is reached.
5. Take the end of chapter test as a summative assessment with an open science notebook available
All of the Reading Study Guides (Appendix A), quizzes (Appendix B), and tests (see Appendix C) were from the textbook publisher. The activity or lab was something chosen by me to help reinforce the key concepts of the section. Some examples include designing a comic strip to illustrate the parts of the cell theory, or conducting a lab to look at microscopic organisms found in pond water.

During the treatment phase that utilized the THIEVES reading strategy, I developed a guide (Appendix D) that could be inserted into the students’ science notebooks. I spent the first part of the class period explaining why previewing was an important strategy and brainstorming with my students what the letters of the acronym stood for. We then went through our textbook to make sure that each student recognized the particular elements such as the headings, the end of chapter questions, and the summary. Students then worked with a partner that I selected for them to complete the guide in their notebooks. I kept record of the number of questions they asked for clarification of the assignment. The following day students showed me their completed guide and then received the Reading Study Guide and a section reading assignment. The only difference, then, from the non-treatment phase was that during the THIEVES treatment students would fill out a guide in their notebooks for each section before receiving the Reading Study Guide and reading assignment. After we did the first section as previously described, they completed the THIEVES guide for section two independently.

The third chapter was a non-treatment phase, but in the fourth chapter I implemented the PLAN reading strategy. Due to its use of concept mapping, and my
students’ unfamiliarity with that process, I consciously created concept-mapping activities in the lessons leading up to this treatment phase. I did not want my data to be a reflection of their learning curve of the skill of making a concept map. During this treatment phase, students created a concept map of the main ideas of the text before they read the section, and then marked the parts of the map for which they already had some understanding. As they read the section, they added information to their map for any concept they were unfamiliar with. Finally, they wrote a brief summary of what the section was about. The summary was written in the form of a letter to an absent classmate. This allowed me to help my students structure their writing. They used each heading as the topic sentence for a paragraph, with the supporting sentences including things such as definitions of vocabulary words or steps in a process. The rest of the treatment was the same as the non-treatment phase; when students had completed their summary, they were assigned the Reading Study Guide and the quizzes, activities and labs, and end of chapter test were all assigned accordingly.

I chose to use all of my students as subjects in my AR project because I teach the same class for all six periods each day. When I piloted these reading strategies the previous year, my former students were adamant that I could not withhold these new skills from any particular group of students. I therefore taught every class the reading strategy and used different chapters of the book as non-treatments instead of different class periods. My sample group had 53 males students and 51 female students. A total of 12 of those students are strategic learners with either an Individualized Education Plan (IEP) or a 504 plan, which is for students that don’t receive special education assistance, but still require some form of modification. These students did everything the same as the
rest; only some had additional help from a classroom aide. Some of them also required extra time for assignments. The end of chapter test given to these 12 students was modified from the test taken by their regular education peers.

The research methodology for this project received an exemption by Montana State University’s Institutional Review Board (Appendix E) and compliance for working with human subjects was maintained. Upon receiving the informed consent from their parents (Appendix F), my students completed an online survey (Appendix G) that questioned their attitudes and current strategies towards reading a textbook. They took the same survey once the treatment phases were complete (Appendix H). The purpose of this survey was to determine if implementing textbook reading strategies had any impact on their attitudes toward reading textbooks. The survey was a combination of Likert style responses and open-ended responses.

During the AR project, I kept a journal that was a combination of written reflection and recorded audio reflections. The information in these journals was used to help determine the effect each textbook reading strategy had on my teaching. After both treatments were complete, I wrote a more extensive reflection to give more insight into how my teaching was impacted by the use of these textbook reading strategies in my classroom. Student interviews were conducted with two methods following the treatments. I had several students that volunteered to be interviewed. I also selected a random sampling of two students from each class period to come in for a focus group. Both of these sessions allowed me to get more specific input about how these reading strategies affected individual students’ learning and attitudes.
I strived to find validity in my results through the triangulation of my data. Each of my research questions had three different instruments to measure my results. I composed the surveys and interview questions myself. The formative assessments (quizzes), summative assessments (unit tests), and homework scores (reading study guides) were from the textbook publisher McDougal-Littell, which ensured that they were unbiased and closely based upon the textbook. The following table shows the data collection methods for each of the questions I asked in my AR project.
Table 1.  
*Research Matrix.*

<table>
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<th>Research Questions</th>
<th>Method and Reason</th>
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| **Main Question:** What is the effect of textbook reading strategies on student comprehension of science content in a seventh grade classroom? | **Formative Assessments**  
Ongoing check for understanding to see if anything needs to be changed in teaching strategy |
| **Sub-Question 1:** Which textbook reading strategy will be most effective in helping students comprehend the content of the science textbook? | **Formative Assessments**  
Ongoing check for understanding to see if anything needs to be changed in teaching strategy |
| **Sub-Question 2:** What is the impact of incorporating textbook reading strategies on students’ attitudes toward textbook reading? | **Pre- and Post-treatment Survey**  
Quantifies student attitudes towards reading. |
| **Sub-Question 3:** What is the effect of each textbook reading strategy on my teaching? | **Teacher Journal (paper and audio)**  
Insight into daily teaching attitudes and outcomes |
|                                                                                  | **Tally Sheets**  
Keeps score of students’ questions and misunderstandings. |
|                                                                                  | **Post-treatment Self Reflection**  
A look back at how the project went and speculation about the implications of the project in the future. |

**Method and Reason**  
- **Reading Study Guides:** Check for understanding of content as each section of chapter is assigned.  
- **Academic Grade Summaries:** A variety of assessments to determine students’ overall comprehension, including application in the laboratory setting.  
- **Post-treatment Student Interviews:** Determines student preference for a particular strategy.  
- **Post-treatment Student Interviews:** Gives insight into students’ attitudes towards textbook reading.
DATA AND ANALYSIS

Assessment and Academic Grades

The data collected to measure content comprehension included summative and formative assessments, homework scores, and academic grades for two quarters of the school year. Formative assessments scores showed little correlation to the treatment and in fact showed a sharp decrease during the final treatment unit. Summative assessments showed very little variance between treatment and non-treatment units. Homework scores showed an improvement over the course of the treatment, but could not be directly correlated to a specific reading strategy. Academic grades showed a similar number of students improved their academic grade to the number of students who had a grade that declined during the course of the AR project.

Formative Assessments

Formative assessment (Appendix B) scores showed little correlation to the treatment protocol, and, in fact, fell sharply during the final unit that used PLAN as a treatment (see Figure 1). The sharp drop in scores happened during a time of the school year during which many, including myself, struggled with missing school due to illness. Both of the lowest modes during unit 4 were quizzes that were administered by a substitute teacher. This could be connected to the value of my quick review of key concepts from each section of text immediately prior to formative assessments. I also
required students to make up this assessment if they were absent, so many students during that time period were coming back a few days or sometimes a week later to make up the quiz and at that point they had mostly forgotten what the main ideas of the text were.

Figure 1. Each unit consisted of a single chapter broken into three sections. The mode score for each section quiz that was administered to 104 students are represented here. The section three quiz for unit one and unit three were not administered due to time constraints during the school year.

Failing scores on the formative assessments were not always an indicator of a failing grade on the summative assessment for that unit. Many of the students that failed the formative assessments were students with an IEP and their summative assessment scores were high due to the modifications and assistance they received on the test. Nearly all of these students had reading scores that were on the low end of the spectrum (see Table 2). A couple students did not fit this pattern. They did not have IEPs and had advanced reading scores. During units one and four, one student failed every single quiz
yet still managed to earn an 84% and 71% on her summative assessments. This may have been because they were allowed to use their science notebooks on the summative assessments but not on the formative assessments. Another student had a similar pattern for the fourth unit. He failed every quiz on unit four, yet earned a 91% on the chapter test. These are typically “A” students who likely were unprepared for the quizzes, or are skilled at using their notebooks to help them earn passing scores on the tests.

**Summative Assessments**

![Bar chart showing summative assessment scores by unit](image)

*Figure 2.* The end-of-chapter test for each unit was administered to 104 students. The median score for each test was surrounded by the box, which included the first and third quartile. The maximum and minimum scores were indicated with the whiskers.

The data indicated that there were only subtle differences in final summative assessment (Appendix C) scores between treatment and non-treatment units (see Figure
2). Using a reading strategy did not seem to have a direct impact on student test scores as indicated by Figure 2. The median score for each of the non-treatment unit summative assessments was 73 and the median score for each of the treatment unit summative assessments was 72. The minimum score of 13 on the first non-treatment unit did improve to 30 on the THIEVES treatment unit, but then fell back down to 25 for both the second non-treatment unit and the PLAN treatment unit.

The student that received the score of 13% on the first test did fail every summative assessment over the course of the four units, yet she was able to improve her score with each test. Her scores for the following three chapter tests were 36%, 50%, and 59%. She was one of seven students that saw a continuous increase in their test scores for each unit. Four of these seven were considered to be advanced readers (see Table 2) and that was interesting because many of these advanced readers were more likely to see their overall grade decline (see Figure 5). These four students may have seen a grade improvement for a variety of reasons, but it could be that their content comprehension was improved through their application of the textbook reading strategies.

There were 31 students that performed better on the summative assessment during treatment units than during non-treatment units and 27 students that had the opposite pattern of performing better on the non-treatment unit tests. The students that scored better on the treatment units consisted of 77% advanced readers and 23% proficient readers. The students that performed better during the non-treatment unit tests were 33% advanced readers and 67% proficient or nearing proficient. Students that were already skilled readers seemed to benefit the most from the reading strategies when it came to their summative assessments. They likely held an advantage in that they already could
read well enough that the assignments associated with the reading strategies were less challenging than they were to those students who have more difficulties with reading.

Some of the students that were interviewed explained how the reading strategies might have helped them on the summative assessments. One student, when asked about her preference said, “I liked PLAN. THEIVES had you write down just titles and stuff like that and with PLAN you wrote definitions and pictures and when you took a test you could visualize what you wrote when you made the PLAN.” Another student, an advanced reader with a “B” average, made a similar statement:

PLAN was easier to understand because it was more visual and we had to work with it and it was just more hands on than THEIVES and I think that the concept maps really helped on the test when we were allowed to use our notes. They were really helpful.

That same student also pointed out that there was a correlation between the two reading strategies because the features of the textbook that they had to record in THIEVES were the same features that they used to develop their PLAN. This observation was valuable to me because it really got to the core of what I was trying to teach them with the textbook reading strategies. They needed to learn how textbooks are organized and the key features of all textbooks in order to ensure their success in future academics.
Homework Scores

![Mode of Reading Study Guide Scores by Unit](image)

*Figure 3.* Each unit consisted of a single chapter of the textbook that was further divided into three sections. The mode score was calculated for the total number of students completing the reading study guide for that particular section of the textbook.

The reading study guides did show an overall improvement in scores over the course of the project, but there did not seem to be a direct correlation to the reading strategy treatments (see Figure 3). This improvement in scores could have been a cumulative effect, with better understanding or awareness of the textbook features that the reading study guides used as cues to help the students find the information. There were five of the reading study guides that had a mode of “zero” which indicates that several students either forgot to complete them or simply chose not to do them. There was one “zero mode” reading study guide for each of the first three units and two for the fourth unit. None of the zero scores were a result of an attempted effort that didn’t earn points. These missing scores were ignored when calculating the mode.
During the interviews, one student pointed out their understanding of the correlation between the reading strategies and the reading study guide assignments:

I thought [learning a reading strategy] was helpful because when you get a worksheet, like the reading study guides, in the beginning we didn’t know how to read the books and I think now its really helped me a lot. It helps me understand what to do when I read.

This comment was very valuable to me because my initial idea for this AR project stemmed from my observation that many of my students struggled so much with correctly completing the reading study guides. These worksheets (see Appendix A) literally follow a section of the textbook by printing the heading or subheading in bold, including the page number, and then asking a student a question that can be answered by reading the text between that heading and the next. Sometimes there will be a graphic organizer to fill in with the main ideas instead of an actual question to answer. It was rewarding to hear that this student was now more confident in her ability to correctly complete the reading study guides.
Figure 4. Students’ final academic grades for the second and third quarters were analyzed for any change that was equal to or greater than two percentage points. Students were then sorted into three categories; Improved, Declined, and No Change.

The final quarter grades did not align precisely with the treatment and non-treatment units so they were analyzed for overall improvement or decline over the course of the AR project. The majority of the AR project happened during the 2nd and 3rd quarters so I calculated any change in the students’ final quarter grades that was equal to or greater than two percentage points and then sorted students into three categories; improved, declined, or no change (See Figure 4). Grade changes can occur for several other reasons such as; increased or decreased parental involvement, participation in sports or other extracurricular activities, prior knowledge of the content, home life, substance abuse, or social issues. There were 16% of my students that saw little or no change to their final grades from quarters two and three. Improved scores were earned by 40% of
my students, while 44% of my students observed a decrease in their final grade from quarters one and two. Each quarter consisted of a non-treatment unit and a treatment unit in part or entirety.

Students were grouped by their reading levels as determined by their sixth grade scores on the State of Montana’s Criterion Referenced Test (CRT). These reading levels can determine the type of instruction they receive in the Language Arts, but have no bearing on their science class as there are no differentiated classes, only differentiated instruction. Each class period of science should be a mix of all reading levels, though some classes have a larger number of “Advanced” readers or “Nearing Proficient” readers due to the scheduling of differentiated classes in the Math and Language Arts departments. The number of students assigned to each reading level is shown in the table below.

Table 2.
Number of students in each reading level according to their sixth grade CRT tests.

<table>
<thead>
<tr>
<th>Reading Level</th>
<th>Definition</th>
<th>Number of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced</td>
<td>CRT scores of 283-300</td>
<td>65</td>
</tr>
<tr>
<td>Proficient</td>
<td>CRT scores of 250-282</td>
<td>19</td>
</tr>
<tr>
<td>Nearing Proficient</td>
<td>CRT scores of 225-249</td>
<td>8</td>
</tr>
<tr>
<td>Novice</td>
<td>CRT scores of 200-224</td>
<td>5</td>
</tr>
<tr>
<td>Unknown</td>
<td>These students had no scores associated with their file.</td>
<td>7</td>
</tr>
</tbody>
</table>

The “Novice” group consisted of five students, of which four have an IEP. Two of those IEP students are in my classroom for the socialization aspect and are graded as “pass” or “fail.” Their reading levels are similar to those of students in the first grade and second grade. I did not realize the fifth student had such a low reading score until I
analyzed this data and I was surprised that he did not have an IEP or 504 in place. According to his English teacher, the other two indicators that would place him in a strategic English class had not been met. Three out of the eight students in the “Nearing Proficient” group received modified assessments due to their IEP status. One student in the “Proficient” group had an IEP and none of the “Advanced” readers had an IEP.

![Change in Final Grades by Reading Level](image)

**Figure 5.** Students were sorted into three categories to indicate an increase, decrease, or no change in their academic grade during the action research project. Each of these three categories were further divided into four groups based on the students’ reading level; advanced, proficient, nearing proficient, and novice.

When I compared reading levels to change in final grade, I found that the largest percentage of students to experience an increase in their final score belonged to the “Proficient” and “Nearing Proficient” reading level groups (see Figure 5). The students in
the “Advanced” and “Novice” reading level groups were more likely to have their grades decline. The “Novice” readers had the highest percentage of members show a decline in their scores. This number is an outlier since some of the members in that group are far below grade level in their reading skills. My assessment is that their reading level is so low that learning the textbook reading strategies and the extra work that was associated with those strategies actually caused their grades to decrease.

While it is tempting to look at these data and conclude that the textbook reading strategies helped “Proficient” and “Nearing Proficient” readers improve their scores, it is rarely this straightforward. Of the 15 “Proficient” readers that improved their score, five of them improved it by more than ten percentage points. Those five also happened to have an increased level of parental involvement in the form of regular phone and email communication with me. Six out of the seven “Advanced” readers that showed improved scores of ten or more percentage points had increased parental involvement as well. This emphatically demonstrated the positive influence of parental engagement in the educational process. The three “Nearing Proficient” readers that showed an improved score did so with only a few percentage points, less than a single letter grade, and showed no increase in parental involvement. These few students may have been showing an improved score that was directly tied to the textbook reading strategies.

Students who are considered “Advanced” in their reading level, yet showed a decline in their grades, were analyzed further to try and determine what factors might have led to the decline. This group consisted of mostly A and B students with only one F student. The students whose grade declined by ten or more percentage points were equally divided between the following possibly influential categories: excessive
absences, dramatic home life, and unknown decline that continued through the school year despite parental involvement. The rest of the students who declined by less than ten percentage points were some of those I would consider my best students, easily capable of earning an A in science. It was surprising to see that they were the students who had grades that declined during the treatment. I speculate that these students felt rather confident in their reading skills and perhaps did not “buy in” to the new reading strategies.

The other “Advanced” students that showed little change were students I would classify as B students. They tended to do as much as they needed to get a good grade, but generally did not go above and beyond requirements in order to earn the A. They sporadically missed assignments, or returned them incomplete. The “Advanced” group that did show improvement consisted of mostly B and C students. This group contained students that showed self-motivation. These are the students who would stay after class and ask to see their grade, or ask if they had any missing assignments. It seemed that the students who improved in their final grades between the second and third quarter tended to be students that fell in the middle of the spectrum for either or both their reading skill levels and/or overall science grade. In my classroom, this demographic is often overlooked because they are “passing” and the burden to improve their scores often rests upon them. The lowest tier of students tend to consume the greatest amount of my energy in the form of communications with home and interventions to improve their scores such as coming in for additional help at lunch recess or after school. In conclusion, it would appear that students that have the foundation of proficient reading skills combined with
intrinsic or parental-influenced motivation seemed to benefit the most from learning a
textbook reading strategy.

**Pre-Treatment and Post-Treatment Survey Responses**

Similar to the assessment and academic scoring data, there were subtle changes in
student attitudes before and after the treatment. Students were very clear in their
preference for the PLAN reading strategy. Student confidence in the four different units
remained fairly consistent, with slightly higher confidence levels in the units that
contained content which many of them were familiar with from their sixth grade science
instruction the previous year. Student enjoyment from reading textbooks decreased
slightly, but the overall trend in the data indicated that their responses were less
polarized. Fewer students chose the “strongly agree” or “strongly disagree” categories
and more students chose the “undecided” category in the post-treatment survey. A similar
“depolarizing” pattern occurred when students were asked to rate their boredom with
reading textbooks as the number of students who found reading textbooks boring
decreased, yet the number of students who were undecided increased.

My assessment of the data indicates that this pattern may have several different
factors playing into it. One is the physical, social, and emotional development of seventh
grade students over the course of just a few months. In the beginning of seventh grade,
the students are still sixth graders in their appearance and disposition. Many of them do
not know each other well because the nature of lower and upper elementary classrooms
keeps groups of students isolated from each other, and middle school throws them all
together in a variety of configurations. As the months pass by, they become more
comfortable with each other and also experience some of the physical and emotional
changes that come into play as they enter puberty. This rapid time of development is
likely to play a role in shifting attitudes toward schoolwork.

Another factor may be related to the perceived amount of “work” associated with
the new textbook reading strategies. As one student put it, “I think its good reading
textbooks, but doing PLAN and THIEVES puts more pressure on you than just doing a
reading assignment. I liked reading textbooks before, but when you assign a reading
strategy, it just seems like more work.” Over the course of seventh and eighth grade, the
workload for students steadily increases. They tend to find that having seven different
teachers instead of two or three generally means that they have an increase in homework
and projects assigned to them. This can lead to some students who are not up for that
challenge to shift their attitudes about school. Other students find it more interesting and
enjoy the challenge, and so their attitude improves.
Reading Strategy Preference

**Figure 6.** Upon concluding the AR project, students were asked to rate their agreement with a statement of preference for each of the reading strategies used during the treatment phases.

Although the assessment and academic scoring data appears to show little difference between non-treatment and treatment units, indicating no particular advantage to one strategy over the other, the students clearly indicated their preference for PLAN in both the survey results (See Figure 6) and the student interviews. When asked in the post-treatment survey, 24% strongly agreed and 37% agreed that they preferred the PLAN reading strategy while only 13% disagreed or strongly disagreed with that statement and 24% were undecided. When given the statement that they preferred the THIEVES strategy, 7% strongly agreed and 40% agreed that they preferred that strategy while 27% disagreed or strongly disagreed with that statement and 26% were undecided. If the
“strongly agree” and “agree” categories are combined, this indicates that 61% preferred PLAN and 47% preferred THIEVES. The method by which I inquired about their preference, asking them to rate each strategy rather than choose their favorite strategy, prevented a neat 100% total response.

During the interviews with 18 students, 13 of them expressed a preference for PLAN while five stated that they preferred THIEVES. Those students that preferred THIEVES were all males and my perception was that they found it easier to accomplish. “I liked THIEVES because it was easier. You just had to look in the book. I didn’t like PLAN because you had to do all that stuff, and you might as well just do a big project for all the work it took.” Another student said that he “liked THEIVES because it was in sections and that helped me read it better. I liked how it was all in order.”

Some of the things all of these boys had in common included average to below average grades in not only science, but also all of their core class. These are boys who on their own would prefer to do as little as possible, as exhibited by several missing or incomplete assignments, yet with parent involvement have been shown to sometimes bring up their grades. A couple of them, despite parental involvement, continue to fail the majority of their core classes at school. They all are proficient or advanced readers so their struggles stem from other things such as Attention Deficit Disorder (ADD), substance abuse, dramatic home lives, or simply being students that do not thrive in the traditional classroom setting found in the majority of the schools in our nation.

Those students who preferred PLAN were nearly all female and the majority of them had an advanced reading ability. Although many of them were “B” students, academic grades for the group ranged across the spectrum. One had an IEP and is
considered a novice reader with a reading level equivalent to a second grader and she admitted to struggling with and disliking the reading assignments, but she very much enjoyed writing the letter to an absent classmate. This student had an aide that provided her with the concept map, so the writing part was the only component she completed on her own. She said, “I don’t like to read. The words are really hard. I have to have my mom and dad help me. Sometimes my dad makes me read out loud and I hate that.”

Some of the students who preferred PLAN disliked THEIVES for the same reason the other students preferred that strategy. They felt it was challenging because it was so specific in what it was asking of them. One student said,

I thought PLAN was a lot easier and it was fun and it was like teasing your brain when you gave us the bubbles and we had to go find the rest of them and all the answers and definitions and it kind of… we got more familiar with the book. I didn’t like how THIEVES we had to be so specific.

The general consensus among those that liked PLAN was that it was more helpful to them in their understanding of the chapter, though some students stated a preference for either the concept map or the written letter. “PLAN helped me get it more, and it was easier to refer back to. Also the letter to a student helped me review it and I just liked how it helped me understand the chapter better.” Another student said:
I liked PLAN because of the concept map. You can look back and you had all your definitions in there. With THEIVES if you look back you just had titles and headings and stuff. Also it was easier to write the letter because you had the concept map and it was all in there, you just had to put it into a different format.

Upon conducting the interviews, I felt that the difference in preference for one strategy or the other was based on the type of learner that was using the strategy. Students who wanted something cut and dry and very specific seemed to prefer THIEVES, while students that liked to express some creativity preferred PLAN. I agree with students that felt the PLAN strategy had more substance and therefore more long-term benefits. This was especially important in light of the fact that students in my classroom are allowed to use their science notebooks on the chapter tests.

**Student Confidence in Content**

Student confidence in their understanding of the content was measured in the post-treatment survey (See Figure 7). Students seemed to have the most confidence in the first and fourth units with 63% of students reporting feeling confident or strongly confident. The second unit had 54% of students reporting that they felt confident or strongly confident in their understanding of cell processes such as osmosis, respiration, and photosynthesis. The third unit had 57% of students reporting that they felt confident or strongly confident in their understanding of the cell cycle. During the course of teaching these units, the students clearly had some experience with the content of each
unit. When these students were in sixth grade, some were taught about the parts of a cell (Unit 1) and how to complete Punnett squares (Unit 4). It is my assumption that this experience helped boost their confidence in those topics. I did not ask students in the post-treatment interview about how confident they felt in their knowledge of the topics we learned during the four units. If this question had been included, it would have reinforced aspects of these survey findings.

![Student Confidence in Understanding of Content for Each Unit, N= 104](image)

*Figure 7.* Upon completion of the AR project, students were asked to rate their confidence in the subject content for each of the four units; Cells (Non-Treatment), Cell Processes (THIEVES Treatment), Cell Cycle (Non-Treatment), and Meiosis and Heredity (PLAN Treatment).
Student Enjoyment in Reading Textbooks

Figure 8. Students were asked before and after the treatments to rate their agreement with statements relating to their enjoyment of reading general textbooks and reading science textbooks.

General attitudes toward textbook reading showed some subtle changes in the pre- and post-treatment survey. The clearest pattern demonstrated by the data when students rated their enjoyment in reading textbooks is a shift from a very polarized response pre-treatment to a more undecided response post-treatment. The number of students who strongly agreed or agreed with the statement that they enjoyed reading interesting things in science textbooks decreased from 51% pre-treatment to 41% post-treatment. The number of students who strongly agreed or agreed with the statement that they enjoyed reading textbooks in general decreased from 48% pre-treatment to 24% post-treatment. This seems to indicate a decrease in enjoyment in reading textbooks, however the number
of students who disagreed or strongly disagreed with the statement that they enjoyed reading science textbooks decreased from 42% pre-treatment to 22% post-treatment. The number of students who disagreed or strongly disagreed with the statement that they enjoyed reading textbooks in general decreased from 51% pre-treatment to 43% post-treatment. The number of students that were undecided about their enjoyment in reading science textbooks increased from 7% pre-treatment to 36% post-treatment. The number of students that were undecided about their enjoyment in reading textbooks increased from 1% pre-treatment to 33% post-treatment. According to some of my interview responses, part of this indecision may have to do with their desire to socialize with friends or spend time with family rather than do homework assignments that involve reading.

The survey data indicates that learning the two textbook reading strategies did not overwhelmingly cause the students to find more enjoyment in reading science textbooks or textbooks in general. However, when looking at the data regarding enjoyment of reading science textbooks specifically, it seems that there was a relatively minor decrease of 10% in enjoyment and a rather significant decrease of 20% in students that did not enjoy reading science textbooks. That 30% change appears to show up in the increase of students who were “undecided” post-treatment, which may indicate the potential for those students to perhaps make the shift towards more enjoyment in reading science textbooks given more time and practice. My students came from a variety of backgrounds in their previous science instruction, with some of them receiving more hands-on instruction and some of them spending more time working through packets. In our school, the seventh grade is the first time that students experience content specific
teachers. Their perception of “science textbooks” could have been different at the beginning of the school year; dependent upon which type of science instruction they had in their previous grades.

Their final survey results may have been based in part on their feelings towards their current science textbook, which could be quite different to what they were used to in their upper elementary classrooms. Those previous books are what they based their pre-treatment survey results on, as they had not seen their seventh grade textbook at the time of the initial survey. During the interviews, some of the students explained to me how different their textbooks in seventh grade were compared to what they recalled from their previous science books. “In 4th grade all the textbooks had boxes that contained all the information, but now when you go to read about something it is all mixed up with other information.” Some students really struggled with the expanded vocabulary used in their middle school textbooks. “Our books now have so many big words in them, it can be really confusing.” It seemed that many of them were struggling with extracting information about vocabulary terms or science concepts from the text.

I don’t like it when they [Reading Study Guides] ask us about a word, like “what does it do” and instead of just saying ‘it does this’ it’s like ‘there’s this and this and this” and then later in a different paragraph you’ll find the answer.

Another student explained, “When I don’t understand something in science, my dad always tries to get me to look at his old college textbooks,
because he is a scientist, and they are really hard to find anything.” A potential follow-on exercise might be to have them examine a collection of science textbooks ranging from lower elementary through college level so that they could compare how the textbooks are similar and how they are different. Perhaps this would allow some of them to “buy in” to the idea that a strategy for reading textbooks could be a valuable skill to have.

**Student Boredom in Reading Textbooks**

![Bar chart showing student boredom associated with reading textbooks](image)

*Figure 9.* Students were asked before and after the treatments to rate their agreement with the statement, “I think reading textbooks is boring.”

When students were asked to rate their boredom in reading textbooks pre- and post-treatment there was a 50% decrease in students who strongly agreed with the statement that reading textbooks was boring. The number of students who disagreed or
strongly disagreed with that statement, thereby stating that they did not think reading textbooks was boring, decreased slightly from 27% pre-treatment to 24% post-treatment. Although the number of students who were undecided increased from 13% pre-treatment to 27% post-treatment, the results indicate a slight positive shift in the students’ attitudes toward reading textbooks.

Some of the positive feedback that I heard during the interviews showed how learning the reading strategies improved students’ attitudes toward textbook reading assignments. One of the students who did feel that way pointed out:

I think my attitude has changed since the beginning of the year, like our first reading assignment I was like “Oh my gosh! We have to read!” but when we started to learn strategies about how to do it, it became really easy and it was really helpful and my attitude changed a lot in a positive way.

Another student said:

I like to read, but I do lots of afterschool activities so it can be a challenge to get it all done so lots of times I just skim over the chapter. I would say I am a better skimmer now that we did the reading strategies.
There were some students that also had negative feedback about their experience with the reading strategies. As the lone male in the group of students that preferred PLAN explained, “It didn’t really help me because I never really liked reading much. It just goes in one ear and out the other. I feel like I remember the other stuff instead of reading.” When pressed to explain the “other stuff” he explained that he meant when the teacher explains concepts, or he goes into the lab to do hands-on activities. It should be noted that this student was one of those that showed a steady improvement in his summative assessments over the course of the project. He did have parents that held him accountable and contacted me occasionally, but he also may have benefited from the reading strategies despite his lack of enjoyment in reading.

Effect of Reading Strategies on My Teaching

The purpose of conducting action research is to make data driven decisions in the classroom. I wanted to examine how teaching textbook reading strategies might help my students and determine if these strategies should become incorporated into my teaching. I wanted to examine how each of the strategies affected my teaching.

In teaching the reading strategies, students had far more questions and confusion while learning the THEIVES strategy than while learning PLAN. I did not expect this because I felt that the guide for THEIVES that students had in their notebooks was very thorough and walked them through the textbook features in a clear step-by-step fashion. Student questions on the first day of introducing THIEVES indicated a lack of understanding about what the features of the textbook were called, and in some cases it
seemed that they were unaware of the existence of some features such as the introduction.

The following table is a compilation of the tally sheets I kept during the first day of teaching each of the reading strategies. The ease of introducing PLAN was one of the reasons that I preferred the PLAN reading strategy.

Table 3. Student Response to Reading Strategy Introduction

<table>
<thead>
<tr>
<th>Reading Strategy Introduced</th>
<th>Total Number of Questions During Introduction of Reading Strategy</th>
<th>Examples of Common Questions Asked by Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>THIEVES</td>
<td>36</td>
<td>• How do we turn a heading into a question?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• What are visuals?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Where is the introduction?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• What is the title?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• How do I tell the difference between headings and subheadings?</td>
</tr>
<tr>
<td>PLAN</td>
<td>4</td>
<td>• Can we draw the stages of meiosis or do we need to explain them?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Can my concept map span across my notebook onto the next page?</td>
</tr>
</tbody>
</table>

Once we had spent the first day doing THIEVES together as a class, I made some slight alterations to the guide for their notebooks to make it even more specific for the second section of the chapter. These included changing the instructions for the “End-of-Section” questions to include one thing they would need to know to answer each question and also numbering the section for “Headings” to remind the students to change three headings into questions. A few students told me they found the new version of the guide more helpful.
When I assigned the third section of the chapter, the students were responsible for filling out the THIEVES guide (Appendix D) as homework. When I checked the guides, I kept a record of which components seemed to still be causing the most confusion or were left incomplete. While the Title, Headings, Introduction, and Every First Sentence parts only had one or two questions in each category, the Visuals and Vocab had five, the End-of-Section questions had twelve, and the Summary had six. This may have been in part because those last three sections of THEIVES required more output from students.

I did observe that students seemed to have a hard time reading the questions at the end of a section and writing down what they needed to know in order to answer the question. They wanted to put their energy into finding the answer to the question instead of simply listing the type of information they needed to be watching for as they read. Much like they struggled the first day in turning headings into questions, they seemed to also struggle with going the “other way” in turning questions into statements. This may have been something they were uncomfortable with because they had not had much practice doing it in the past.

I expected students to have far more questions about PLAN because in the past when I have attempted to use concept maps with my students they tended to seem very confused about how to create the map. I attempted to scaffold instruction for PLAN through the use of two concept maps prior to teaching the reading strategy. The first concept map I introduced to the students was delivered to them by me as a form of note taking. This showed the students how the map was constructed and what words were included in the map. The second concept map involved a set of terms, examples, and definitions that students cut from a sheet and then arranged in their science notebooks.
They checked with me before gluing the pieces into the proper order. This activity allowed the students to construct the map based on the hierarchy and connections of the content.

When we used PLAN for the first time, I modeled the concept map on the board in front of the class and we used the features of the text such as the title, heading, and subheading to determine the layout of the map. Vocabulary words were attached to the subheading bubbles and as students read the chapter, they added the definitions. Creating the map out of the text features seemed to make the mapping process less confusing for the students. I indicated to them the locations on the map where they would need to “Add” information and then allowed them time in class to read and add to their maps.

The following day we spent time composing a note to an imaginary missing classmate as the “Note” component of PLAN. I instructed the students to use the second tier of their maps as the main idea for each paragraph and the attached tiers as the supporting sentences within each paragraph. This seemed to be the easiest way to have the students “Note” what they had learned in a consistent manner. One student commented, “If you asked us to summarize the whole section, I would have no idea what to write. Writing from the concept map makes it seem really easy.”

The second time we used PLAN, I created an empty “template” map on the board and we worked, as a class, to determine what words would go into the bubbles. They determined on their own what would be added to the map as they read. The note to an absent student was their homework. There were no questions as they worked and I observed students initiating the use of color on their maps.
The third time the students were assigned the use of PLAN, I simply told them there should be a certain number of bubbles on their map and they completed the assignment as homework. The following day I checked their work and was pleased to see that the only component that some students seemed to forget was the L in PLAN, or the “Locate” part in which they were to place check marks next to the topics they already knew something about. They completed the note to an absent student as homework. Students checked each other’s work and used highlighters to mark the key words from the chapter in the note. We did not overly concern ourselves with spelling and grammar because during the course of this treatment, I participated in a Common Core training session where non-language teachers were encouraged to implement writing for the sake of writing and not to avoid it because of the time necessary to grade these items. This also took some of the pressure off of students who might not be strong writers or spellers.

Both reading strategies took approximately the same amount of time, two class periods, to introduce and complete. THIEVES was assigned as homework after the initial introduction so it didn’t take up a significant amount of class time. PLAN was also assigned as homework after the initial introduction, but I always helped them get started with their concept maps, which took more class time. I was very impressed with the final product from PLAN and felt it was something that my students could use in the future to help them study for quizzes and tests (Appendix H). My journal had entries about how colorful and elaborate some of the concept maps were and to see my students write an entire page or two filled with a summary of the chapter was rewarding because they often are “minimalists” when asked to write a conclusion to a lab. While THIEVES was relatively straightforward and students had a final product in their notebook, it didn’t
have the depth and creativity that the final product of PLAN had. My recorded journals pertaining to THIEVES had a tone of exasperation; “I can’t believe how hard it is for them to make questions out of headings!” My recorded journals about PLAN had a tone of excitement; “I love how so many students are using colored pens and pencils to color code their concept maps to match the headings and subheadings in the book!” My experiences with both of these strategies led me to have a preference for PLAN because it was easier to teach, the final product showed my students’ creativity, and it was exciting to see my students understand the process so readily.

Although initially teaching the strategies was not particularly time consuming, completing the strategies three times in each of the two treatment units did take up several instructional days. As one student bluntly stated, “I liked all of it except that it took forever!” Another student said, “I liked PLAN because it helped me understand it better, but I didn’t like how long it took. It took a lot of time!”

The amount of hands-on lab activities had to be reduced in order to complete my data collection within the AR project time frame. This was disappointing to my students because they have a strong preference for that type of instruction. I sought to explain to them the value in their reading a section of the textbook before or after conducting a lab activity, and how the reading can support what they learn in the lab. One student summarized many students’ opinion it nicely by stating, “PLAN helped a little bit, but the hands-on-stuff is really what helps me learn the best.”
The primary purpose of this AR project was to determine the effect of teaching a textbook reading strategy on student comprehension of science content. This turned out to be a relatively difficult metric to judge. To find an answer to my first question, I used formative and summative assessments along with homework scores to determine if students had a better understanding of the units during which a reading strategy was implemented. The assessments showed little difference between treatment and non-treatment units, with the formative assessments having a range of scores between 45% and 100% (see Figure 1) and the summative assessments having a median of 72%-73% (see Figure 2). The homework did show an improvement in scores amongst the students that completed the assignments (see Figure 3) with two out of three reading study guides in the last unit having a mode of 100%.

During the fourth unit, in which the student preferred strategy PLAN was implemented, formative assessment scores were at their lowest (see Figure 1). This indicates a strong correlation between my presence and my students’ success. I missed five days of school within four weeks during the course of Unit Four. My students also were missing large amounts of school during that period; there were days during that time period in which I was missing up to 25% of my students in any given class. Several students were out sick for four or five days or more at a time and were extremely overwhelmed by missing work, quizzes, and tests for all of their classes when they returned. It is highly likely that these factors had a noticeable impact on my results for Unit Four.
As is nearly always the case in teaching, I was constricted by time. Our class periods have been shortened this year and although it was only by five minutes, the total impact when that amount of time is calculated over the course of the school year is equivalent to the loss of twenty instructional days. This means that several labs and activities have already been cut from the year’s course plan. Completing the reading strategy for each section of the two treatment units took several days and this meant that additional lessons had to be cut from the schedule. Had I not felt limited by time constraints, I would have incorporated more formative assessment techniques during the course of my AR project. I think that this would have improved my ability to determine the effectiveness of the reading strategies on student comprehension of content.

I was extremely pleased to see the improvement in reading study guide scores (see Figure 3). Although some students chose not to attempt these assignments, those that did showed an increase in scores over the course of the four treatments. These types of assignments were one of my main motivations for pursuing this particular AR project. I was always slightly shocked when a student would raise their hand for help on a reading study guide and tell me they couldn’t find the answer when they were on a completely different page than the questions referenced. I didn’t understand how they could have this “guide” that followed the book exactly and not be able to locate an answer. I know that many of my students self-admittedly try to find the answers to the reading study guide without actually reading, and I think the ability to recognize text features and understand how the book shares the most important concepts helped my students improve their scores on these types of assignments.
There were five of the reading study guides that had a score mode of zero (see Figure 3). My student group during the year of my AR project consisted of some of the most apathetic students I had seen in my five years of teaching. I felt this was a systemic problem as it was observed that this apathy seemed to have roots at home. The entire staff of our school was shocked to see how very few parents came to our open house parent-teacher conference nights. Most of us averaged only one parent per hour, which is in contrast with years past when we would see ten or more per hour. Our scheduled conference nights also had less than a 50% turnout rate for parents who had previously committed via telephone conversations to coming in to meet. Some of our students had parents who would never return phone calls or emails and did not seem to mind if their child received failing grades in all of their core classes. The sheer numbers of students in a given class that were failing, borderline, or missing assignments was unlike anything my teaching team, which includes a veteran teacher of 30 years, had ever witnessed.

Although this was concerning to me as I conducted my AR, I focused on the many students who did not fall into this category. When compiling my data, I chose to ignore those scores that indicated a failure to attempt the assignment. I wanted my data to measure the students that were attempting to do the work and not be skewed by those students who failed to return the assignment.

To find the answer to my second question, I was interested in determining which textbook reading strategy would be most effective in helping students comprehend the content of the science textbook. Based on the responses I had from students, from the moment I introduced PLAN until my final post-treatment interviews, it was clear that this strategy was preferred by many of my students. I also found the PLAN strategy easier to
teach. There were far fewer questions about the process when I introduced PLAN (Table 3) and students that were interviewed preferred PLAN by 74% to THIEVES at 26%. I initially thought they would prefer THIEVES since it was so specific, and concrete thinkers, as seventh grade students tend to be, usually appreciate that style of assignment. The notebook guide seemed like it would be easy to complete and since they didn’t have to do any actual reading to complete it, I thought they would be able to complete it quickly.

There are several reasons why PLAN was such an effective strategy for my students in particular. The first can be credited to the scaffolding of instruction in developing a concept map. I was nervous that students would struggle with the mapping, but after using concept maps just a few times in preparation for PLAN, they seemed to have no problem developing their own maps by the time we were wrapping up the treatment phase.

The second reason I think PLAN is an effective strategy is due to its value at a cognitive level. Concept mapping has been studied extensively as a tool in the classroom and the method by which it helps students code information into their long-term memory has been debated. One source I found explained that:

Students who have learned to read or construct concept maps may be better able to identify the internal connections among concepts presented in text. The act of translating information from a text format to a node-link format may require that learners process meaning more deeply than they normally do when reading text or listening to a lecture. According to this
view, learners benefit from receiving information in a text format and converting it to a map format, or vice versa (Nesbit & Adesope, 2006, p. 419).

The third reason I think PLAN was so effective and well liked by my students was the writing component. I changed the “note” component to literally mean a note to an imaginary absent classmate. As one of my students stated, “I liked PLAN because I’m just more familiar with the stuff we do in PLAN because we’ve been practicing that forever, we’ve been writing letters since like third grade. So it just makes it easy.” Asking students to write this note and assuring them that spelling and grammar “didn’t count” in the sense that it wouldn’t hurt their grade allowed them a much needed opportunity to practice their writing skills, as mandated by the Common Core Standards.

My third question asked how incorporating the two different reading strategies would affect students’ attitudes toward textbook reading. While I did not expect my students to develop a profound love for their science textbooks, I was surprised to see that their responses so drastically shifted towards the neutral or middle of the spectrum. Their response to the statement “I enjoy spending time reading interesting things in my science textbook” was 46% (N= 104) strongly agree and 5% agree before the treatment (see Figure 8). After the treatment, their response to the same statement was 4% strongly agree and 37% agree. This meant their responses had shifted from strongly agreeing to simply agreeing, and 10% of those students that originally enjoyed reading science books were now undecided or no longer agreed with that statement. When asked their agreement to the statement “I think reading textbooks is boring” there was a similar
response in which the number of students strongly agreeing decreased, as did the number of students that strongly disagreed with the statement. The number of students that were undecided increased in the post-treatment survey for each of these statements. This trend of “depolarizing” was seen in each of the survey statements pertaining to attitudes towards reading textbooks. The indecisiveness my students exhibited is characteristic of middle school students whom are transitioning from childhood into their teen years. Their responses may have been an indication of the difference between textbooks from their elementary years (Pre-Treatment) and their first middle school textbooks (Post-Treatment).

I found it disconcerting that there was such a sharp decrease in students that strongly agreed that reading textbooks was enjoyable, but there was an equally sharp decrease in students who strongly disagreed with that statement (Figure 8). I have posited alternative explanations to the seemingly obvious one that showing them how to read their textbooks caused them to enjoy reading less. The students completed the post-treatment survey the last day of school before Spring Break, which could have contributed to a mood of impatience and dissatisfaction. The decrease could be due to the “work” that was associated with the reading strategies. As one previously quoted student said, “I liked reading textbooks before, but when you assign a reading strategy, it just seems like more work.” This AR project introduced two completely new strategies to the students alongside a new textbook, which was of a higher level than they had read in the past. Their interview responses indicated some positive appreciation for the strategies, or at least some component of either strategy, that might lead to some future use in my students’ academic careers.
The student interviews gave me the best insight into student attitudes towards reading textbooks. They seemed to be overwhelmed with the new level of complexity found in their middle school textbooks. Some of them liked to read, but many of them felt that they were not good at it, and this caused them to not like it. If reading textbook interfered with their social plans, they tended to like it less. Some students felt that reading textbooks was boring and others admitted that they often didn’t read at all, preferring to scan the reading assignment for the answers they needed for their homework. Despite this anticipated loathing of reading assignments, most of them gave me positive feedback about learning the textbook reading strategies. One student even shared how it had helped him in another class, “When I was reading my social studies book, I saw the heading and was like, “wait a minute, there’s the answer to one of my homework problems!” So it did help me in other subjects.” These strategies might not have provided my students with an instant improvement in their grades or a change in how they feel about reading assignments, but they might have a positive impact in the future.

The fourth question I asked in this AR project was how each of textbook reading strategy would impact my teaching. As I reflected back on my experience teaching both reading strategies, I, like my students, felt that PLAN would be more useful to me in my teaching. I did find that THIEVES had value to me as another tool, and there were obviously some students who preferred that strategy so I would not eliminate it from my repertoire. My journal indicated that students were more confused during THIEVES and frequently questioned if they were on the right track or asked for clarification for specific sections (Table 2). While I had planned ahead to scaffold for the part of PLAN that I felt
they were inexperienced with, concept mapping, I did not anticipate they would struggle to recognize basic features of a textbook. One thing I mentioned in my journal was finding a way to scaffold instruction for THIEVES in such a manner that they would be more familiar with the text features before attempting THIEVES. I did make note that THIEVES was easier to grade than PLAN was, but that isn’t always best for students. I particularly enjoyed watching how some students personalized their concept maps with colored pencils and highlighters. I also enjoyed reading the letters to an absent student because they were occasionally humorous and always gave insight into the writing skills of my students.

I think that what my students learned in THIEVES actually helped them better understand PLAN. THIEVES allowed them to learn about the features of the text and examine how the book was laid out. This knowledge must have been beneficial as they were able to construct concept maps using things such as the headings, subheadings, vocabulary, and visuals. If I could change anything about the way in which I taught THIEVES, I would try to fine-tune the final step of “Summarizing” what the student already knew and understood about the chapter after completing the preview. I think I would make this step a writing exercise with some sort of guidance, similar to the “Note” in PLAN.

The third and final time my students completed the THIEVES handout, I kept a tally in the gradebook showing which features they got wrong or did not complete. That data indicated that after the “End of Chapter Questions,” which had 15 incorrect/incomplete tick marks, the “Summarizing” section was the next most often thing to be incorrect/incomplete with eight tick marks. To contrast, when students wrote
the “Note” in PLAN they used the concept map as a guide to their writing. They were instructed to use each heading in the chapter to form their topic sentence for a paragraph and then all of the elements of the concept map attached to that heading were the supporting details in that paragraph. This made their writing organized and easy to read. Without that guidance, they struggled to write a simple summary in THIEVES.

There are parts of THIEVES that I might also use separately in preparation for a reading assignment. I liked the “Visuals and Vocabulary” task because many students won’t even read the captions of the visuals and there are always a portion of the students that just want to look up vocabulary words in the glossary instead of reading them within context in the chapter. The other component I thought could be used on its own was the “End of the Chapter Questions.” Some of my students had difficulty generating a list of what they should be listening for as they read the chapter in order to answer these questions. It would be a good exercise to make that list, read the textbook with the list at hand, and then answer the questions. Having a student turn the headings into questions, reading the text, and then asking them to answer the questions they composed would be a similar valuable exercise. I will likely use both of these reading strategies in the future, but it will depend on the chapter being read and what my end goal is for my students when choosing which strategy to use.

VALUE

In the midst of my implementing the PLAN reading strategy, I attended a professional development session hosted by teachers in our district. It was meant to help teachers that teach subjects other than math and reading incorporate more reading and
writing into their classrooms in anticipation of the Common Core Standards. I left that
session with a firm conviction that my use of PLAN was in line with what was expected
of me when implementing the Common Core Standards into my teaching. I feel that it is
a valuable strategy that I could share with fellow teachers and that they could implement
it from the middle school through the high school levels. It can be overwhelming as a
non-language teacher to be tasked with teaching reading or writing, but learning about
techniques that work, like PLAN, allows us to quickly implement these new expectations
into our classroom. There would also be an opportunity for me to share these textbook
reading strategies at the statewide level during the annual educators conference.

One of the teaching strategies that I incorporated into my curriculum this year was
the use of my own version of an Interactive Science Notebook. This science notebook
method relies upon the idea of an “input-output” model in which teachers give “input” in
the form of lecture notes, outlines, etc. and the students create “output” that allows them
to use their creativity to express their understanding of the content of the “input.” I feel
that PLAN is a great fit with this style of science notebook. My students are allowed to
use their notebooks on tests, because I feel that the ability to find information is one of
the most important skills their generation will need to be successful in the future. A well-
drawn concept map of the chapter could be a valuable asset to a student taking a test.

As a middle school teacher, I am tasked with guiding a very unique age
group. There has been a learning curve in my five-year career. I have learned that middle
school students are not smaller versions of high school students and they need to be
taught differently. I have learned that the content I want to share with them, Life Science,
is second to my ability to make personal and meaningful connections with my students
and help them recognize their own learning process. I try to use a variety of strategies and appeal to multiple levels of intelligence. PLAN is one more strategy that I can share with my students as I help them discover methods that will help them take responsibility for their own learning.
REFERENCES CITED


APPENDICES
APPENDIX A

READING STUDY GUIDE HOMEWORK
**Reading Study Guide B**

**BIG IDEA** All living things are made up of cells.

**KEY CONCEPT** The cell is the basic unit of living things.

**Review**
A theory is something that explains what is observed in nature.

**Take Notes**

1. Living things are different from nonliving things. (p. 9)
   1. Fill in the four-square diagram for organism.

<table>
<thead>
<tr>
<th>Definition</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Examples</th>
<th>Nonexamples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Characteristics of Life and Needs of Life (p. 10)
   2. Fill in the main idea web for the main idea shown.

   Every living thing has four characteristics.

   - Its body must be organized to meet its needs.
   - What are the three things every organism needs in order to live?
II. All living things are made of cells. (p. 11)

4. In the table below, write a definition and one example for each word.

<table>
<thead>
<tr>
<th></th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unicellular</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multicellular</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

III. The microscope led to the discovery of cells. (p. 12)

5. Why did people not know about cells before the invention of the microscope?

IV. Cells come from other cells. (p. 13)

6. Fill in the main idea web for the main idea shown.

```
   The cell theory
       ↓
    ↓ "The cell theory" is one of the basic concepts of biology.
```

V. The cell theory is important to the study of biology. (p. 14)

A. Louis Pasteur and Bacteria and Spontaneous Generation (p. 14)

7. A modern scientist is trying to repeat Pasteur's experiment. In step one, she boils a nutrient broth. In step two, she seals the broth and lets it sit for one week. For step three, explain what the broth will look like after the week has passed, and why.
APPENDIX B

SECTION QUIZ FORMATIVE ASSESSMENT
SECTION 1.1 | THE CELL IS THE BASIC UNIT OF LIVING THINGS.

Section Quiz

Key Concepts
Select the term that best completes the statement.
cell
microscope
multicellular
organism
Pasteur
telescope
unicellular
Van Leeuwenhoek

1. __________________ confirmed the cell theory by proving that the theory of spontaneous generation was wrong.

2. When an organism is made up of only one cell, it is called an ________ organism.

3. Hooke used a(n) __________________ to observe cells from the bark of an oak tree.

4. An individual living thing that carries out the activities of life is called a(n) ____________________.

5. The smallest unit that is able to perform the basic activities of life is a(n) ____________________.

6. A frog is a(n) ____________________ organism.

Extended Response
Answer the following question on the back of this paper or on a separate sheet of paper.

List two of the four characteristics of life. Describe how a bird has each of these characteristics.
APPENDIX C

CHAPTER TEST SUMMATIVE ASSESSMENT
CHAPTER 1
THE CELL

Chapter Test B

Key Concepts
Choose the letter of the best answer. (4 points each)

1. A cell is the smallest unit that can
   a. grow into an adult form
   b. be seen with the naked eye
   c. perform the basic activities of life
   d. spontaneously generate

2. An individual form of life that uses energy to carry out the activities of life is
   a. an organ
   b. an organism
   c. a tissue
   d. an organelle

3. Using a microscope, Van Leeuwenhoek was one of the first people to see
   a. spontaneous generation
   b. living cells
   c. cork cells
   d. scientific models

4. Prokaryotic cells do NOT have
   a. a nucleus
   b. cytoplasm
   c. a cell membrane
   d. genetic material

5. Which of the following would you expect to find in both animal cells and plant cells?
   a. mitochondria and endoplasmic reticulum
   b. chloroplasts and a central vacuole
   c. a central vacuole and mitochondria
   d. endoplasmic reticulum and chloroplasts
<table>
<thead>
<tr>
<th>Name</th>
<th>Period</th>
<th>Date</th>
</tr>
</thead>
</table>

6. A plant will wilt if it does not have enough water in the ____ of its cells.
   a. nucleus
   b. lysosomes
   c. central vacuole
   d. Golgi apparatus

7. Organisms that have cells with a nucleus are in the domain
   a. Eukarya
   b. Archaea
   c. Prokarya
   d. Bacteria

8. Which of the following statements is true?
   a. All eukaryotes are multicellular.
   b. All prokaryotes are multicellular.
   c. Eukaryotes can be unicellular or multicellular.
   d. Prokaryotes can be unicellular or multicellular.

9. ____ is a group of similar cells that are organized to do a specific job.
   a. A tissue
   b. An organ
   c. An organ system
   d. An organism

10. A scientific model
    a. is an exact copy of the thing it portrays
    b. makes complicated processes or structures easier to understand
    c. is used by students who study science, not scientists
    d. is an explanation of what happens in nature
Interpreting Visuals

Using the diagram, answer the following questions. (6 points each)

11. Identify each type of cell.

12. Identify structure H.

13. What is the function of structure H?

14. Identify structure B.

15. What is the function of structure B? Why does Cell 2 have this structure but Cell 1 does not?
Interpreting Visuals
Using the drawings, answer the following questions. (6 points each)

16. On the lines provided, write the names of levels of organization, include the three missing levels represented by the circles. Number the levels 1–5 from lowest to highest.

17. Is it likely that the cell pictured above is specialized? Explain.

18. What domain does the multicellular organism in the illustration belong to? Explain your answer.

Extended Response
Answer the following questions on the back of this paper or on a separate sheet of paper. (6 points each)

19. Describe Pasteur conducted experiments that disproved the theory of spontaneous generation and confirmed the cell theory. State both of these theories. Then describe how Pasteur used flasks with broth to disprove the theory of spontaneous generation.

20. Evaluate Which type of microscope would you use to study each of the following? Explain your answer.
   • the structures inside a single-celled organism
   • the surface of a single-celled organism
   • how a single-celled organism moves
APPENDIX D

THIEVES READING STRATEGY NOTEBOOK GUIDE
T: Read the title, and predict what the text will be about:

H: Look at all headings and subheadings and then turn three of them into important questions that you think the text will answer. (Example: Why... Explain... How...)

1.

2.

3.

I: Use the introduction and first paragraph to predict the main idea:

E: Quickly scan every first sentence of each paragraph. What do you think this section is going to be about?
V: List three important visuals from this section and predict how they will help you understand the text. Choose one vocabulary word and define it by reading the sentence it is contained in. *DO NOT LOOK IN THE GLOSSARY!*
1. 
2. 
3. 
4. Vocab:

E: Read the end-of-section review questions. What information do you think is important to watch for as you read the text? List the key thing you will be watching for as you read the section.
1. 
2. 
3. 
4. 
5. 
6. 

S: Summary... Find the “Big Idea” page at the end of the chapter. Read the key concepts for the section you are previewing. Write down everything you already know and understand about the key concepts for this section.
APPENDIX E

INSTITUTIONAL REVIEW BOARD EXEMPTION
INSTITUTIONAL REVIEW BOARD
For the Protection of Human Subjects
FWA 00000165

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Fax: 406-994-4383
Email: cheryl@montana.edu

MEMORANDUM

TO: Sarah Tabor and Walt Woolbaugh
FROM: Mark Quinn, Chair
DATE: November 30, 2012
RE: "The Effects of Teaching Textbook Reading Strategies to Middle School Science Students" [ST113012-EX]

The above research, described in your submission of November 30, 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:

X (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, if wholesome foods without additives are consumed, or 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 F

PARENT INFORMED CONSENT LETTER
October 22, 2012

Dear Parent or Guardian,

In addition to being a science teacher at Belgrade Middle School, I am also a student at Montana State University in their Master’s of Science in Science Education Program. As a part of this program, I will be conducting an action research study and I am inviting all of my students to participate in the study. This letter is a way to explain the study in order that you may make an informed decision regarding your child’s participation.

In my five years of teaching, I have observed that many middle school students struggle to find specific answers within their textbooks and to summarize the key concepts after a reading assignment. Further research indicated that although most students receive ample instruction in reading and summarizing fictional text, very few have received direct instruction in reading informational textbooks. I have found two methods of instruction that have been used successfully with middle school students. I would like to research how teaching these strategies to my seventh grade students might affect their understanding of science content and their attitudes toward reading informational text. If I find that a particular method is successful then I will incorporate that into my own teaching practice and share that method with my fellow educators to improve student learning throughout our school.

The data I plan to collect includes surveys about attitudes towards reading textbooks before and after the study, student scores on reading guides, formative assessments, quizzes and tests, and voluntary student interviews following the study. This study will not harm the students’ grade and all students will likely benefit from learning the textbook reading strategies regardless of their participation in the study. If you choose to allow your child to participate in the study, the data I collect from them will be used anonymously in my final paper and presentation to my graduate review committee. If I should need to use a specific example from a student, a pseudonym will be used. At no time will any of your child’s personal information be available to anyone outside of our school district. If you choose to not allow your child’s data to be used, they will not be doing anything differently than any of the other students at anytime, it simply means that their information will not be included in my study.

If you have questions before, during, or after the study, please contact me and I will be happy to answer them. This research project has permission and support from our Principal, Julie Mickolio. The data will be collected throughout the second quarter and the final results will be available for your review, if you should be interested, by June 2013. Please read the Research Subject Bill of Rights on the back of this page and fill out the bottom portion. I would like this returned to me no later than Friday, October 26th. Thank you so much for your cooperation in this matter.

Sincerely,
Sarah Tabor    Science Teacher    stabor@belgradeschools.com    406-924-2310
Research Subjects Bill of Rights

The rights below are the rights of every person who is asked to be in a research study. As a research subject, your child has the following rights:

1. To be told what area, subject, or issue is being studied.

2. To be told what will happen to you and what the procedures are.

3. To be told about the potential risks or discomforts, if any, of the research.

4. To be told if you can expect any benefit from participating and, if so, what the benefit might be.

5. To be allowed to ask any questions concerning the study, both before agreeing to be involved, and during the course of the study.

6. To be told what medical treatment is available if any complications or injuries arise as a result of the research study.

7. To refuse to participate in the study or to stop participating after the study starts.

8. To receive your signed and dated copy of this Bill of Rights and the consent form.

9. To be free of pressure when considering whether you wish to be in the study.

Please check the appropriate box below and sign the form:

□ I give permission for my child’s data to be used in this study. I have read this form and understand it.

□ I DO NOT give permission for my child’s data to be included in this project.

Student’s Name: _____________________________ Date: _________________

Signature of Parent/Guardian: ________________________________
APPENDIX G

STUDENT SURVEY PRE-TREATMENT
TEXTBOOK READING SURVEY

Participation in this research is voluntary and will not affect your grade or class standing in any way. Please choose the best response for each statement. Some statements will ask if you agree or not. Others will ask you to choose how often something happens. At the end, there are some questions about how important some common features of most textbooks are. Your answers will provide valuable information to your teacher, so please be as honest as possible in all your answers. Thank you for your time and participation!

0) During which class period do you have science? *

1) What is your first and last name? *

2) If you attended Belgrade Intermediate School last year, who taught your 6th grade science class?

3) How many school districts have you attended since you started kindergarten? * Different schools in the same town are in the SAME district (Example: Ridgeview and the Intermediate School are in the same district as the Middle School so if those are the schools you have attended, then your answer would be "1.")

4) I enjoy coming to school *
   - [ ] Strongly Agree
   - [ ] Agree
   - [ ] Undecided
   - [ ] Disagree
   - [ ] Strongly Disagree

5) Please explain your answer to the previous question. *

   

6) I enjoy reading for pleasure. *
   - [ ] Strongly Agree
   - [ ] Agree
   - [ ] Undecided
7) If you answered "Agree" or "Strongly Agree" to the previous question, what is your favorite book? □

8) I enjoy reading textbooks. * Textbooks are non-fiction, informational books usually associated with a specific subject at school.
   - □ Strongly Agree
   - □ Agree
   - □ Undecided
   - □ Disagree
   - □ Strongly Disagree

9) I think reading textbooks is boring. *
   - □ Strongly Agree
   - □ Agree
   - □ Undecided
   - □ Disagree
   - □ Strongly Disagree

10) I enjoy spending time reading interesting things in science textbooks. *
    - □ Strongly Agree
    - □ Agree
    - □ Undecided
    - □ Disagree
    - □ Strongly Disagree

11) If you chose "Agree" or "Strongly Agree" to the previous question, what is an example of something interesting you remember reading about in a science book? □

12) My teachers have taught me specific strategies for reading informational textbooks. *
    - □ Strongly Agree
    - □ Agree
    - □ Undecided
    - □ Disagree
13) My teachers help me find the main idea and supporting details when I read textbooks. *
   - □ Strongly Disagree
   - □ Always
   - □ A lot
   - □ Sometimes
   - □ Almost never
   - □ Never

14) My teachers tell me to re-read when I don't understand something in the textbook. *
   - □ Always
   - □ A lot
   - □ Sometimes
   - □ Almost never
   - □ Never

15) If you answered "Always" or "A lot," do you actually re-read the passage?
   - □ Always
   - □ A lot
   - □ Sometimes
   - □ Almost never
   - □ Never

16) Does re-reading a passage help you learn? *
   - □ Always
   - □ A lot
   - □ Sometimes
   - □ Almost never
   - □ Never

17) My teachers expect me to use what I already know to help me understand what I read in textbooks. *
   - □ Always
   - □ A lot
   - □ Sometimes
18) When given a textbook reading assignment, I first read the captions and bold or highlighted words and then go back and read the text. * Captions are the words that describe what is shown in pictures, graphs, or diagrams.

19) If you answered "Always" or "A lot", do you think this helps you understanding what you are reading?

20) When given a textbook reading assignment that includes answering questions, I search for the answers without actually reading the assigned pages first. *

21) My textbooks contain useful tips or suggestions for learning and are organized to help me better understand the main ideas. *

22) How important is the title of the chapter to your understanding of a textbook reading assignment? *
23) How important are the section headings to your understanding of a textbook reading assignment? * Section headings are usually given to different parts of a chapter.

- [ ] Very Important
- [ ] Important
- [ ] Moderately Important
- [ ] Of Little Importance
- [ ] Unimportant

24) How important are the subheadings to your understanding of a textbook reading assignment? * Subheadings are usually given to different parts of a section of a chapter.

- [ ] Very Important
- [ ] Important
- [ ] Moderately Important
- [ ] Of Little Importance
- [ ] Unimportant

25) How important are the visuals to your understanding of a textbook reading assignment? * Visuals include pictures, graphs, charts, diagrams, illustrations, or any other feature that is not text.

- [ ] Very Important
- [ ] Important
- [ ] Moderately Important
- [ ] Of Little Importance
- [ ] Unimportant

26) Which type of visual aid best helps you understand the reading? *

- [ ] Photographs
- [ ] Charts
- [ ] Diagrams
- [ ] Graphs
• Illustrations

27) How important are the captions to your understanding of a textbook reading assignment? * Captions are the words that describe what is shown in pictures, graphs, or diagrams.
• Very Important
• Important
• Moderately Important
• Of Little Importance
• Unimportant

28) How important are the vocabulary words to your understanding of a textbook reading assignment? * These are often "new" words that appear in bold or highlighted text the first time they are used in a passage.
• Very Important
• Important
• Moderately Important
• Of Little Importance
• Unimportant

29) What strategies do you use to help you learn new vocabulary words? *

30) How important are the end of section or chapter questions to your understanding of a textbook reading assignment? *
• Very Important
• Important
• Moderately Important
• Of Little Importance
• Unimportant

31) If you have any other comments you would like to share with me about reading or school or science class, please use the space below.

APPENDIX H
STUDENT SURVEY POST-TREATMENT
TEXTBOOK READING SURVEY PART 2

Participation in this research is voluntary and will not affect your grade or class standing in any way. Please choose the best response for each statement. Some statements will ask if you agree or not. Others will ask you to choose how often something happens. At the end, there are some questions about how important some common features of most textbooks are. Your answers will provide valuable information to your teacher, so please be as honest as possible in all your answers. Thank you for your time and participation!

During which class period do you have science? *

What is your first and last name? *

I enjoy coming to school *
- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

5) Please explain your answer to the previous question. *

I enjoy reading for pleasure. *
- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

I enjoy reading textbooks. * Textbooks are non-fiction, informational books usually associated with a specific subject at school.
I think reading textbooks is boring. *

- [ ] Strongly Agree
- [ ] Agree
- [ ] Undecided
- [ ] Disagree
- [ ] Strongly Disagree

I enjoy spending time reading interesting things in science textbooks. *

- [ ] Strongly Agree
- [ ] Agree
- [ ] Undecided
- [ ] Disagree
- [ ] Strongly Disagree

If you chose "Agree" or "Strongly Agree" to the previous question, what is an example of something interesting you remember reading about in a science book?

[ ]

My teachers have taught me specific strategies for reading informational textbooks. *

- [ ] Strongly Agree
- [ ] Agree
- [ ] Undecided
- [ ] Disagree
- [ ] Strongly Disagree

My teachers help me find the main idea and supporting details when I read textbooks. *

- [ ] Always
- [ ] A lot
- [ ] Sometimes
My teachers tell me to re-read when I don’t understand something in the textbook. *

- Always
- A lot
- Sometimes
- Almost never
- Never

If you answered "Always" or "A lot," do you actually re-read the passage?

- Always
- A lot
- Sometimes
- Almost never
- Never

Does re-reading a passage help you learn? *

- Always
- A lot
- Sometimes
- Almost never
- Never

My teachers expect me to use what I already know to help me understand what I read in textbooks. *

- Always
- A lot
- Sometimes
- Almost never
- Never

When given a textbook reading assignment, I first read the captions and bold or highlighted words and then go back and read the text. * Captions are the words that describe what is shown in pictures, graphs, or diagrams.

- Always
- A lot
If you answered "Always" or "A lot", do you think this helps you understanding what you are reading?

- Always
- A lot
- Sometimes
- Almost never
- Never

When given a textbook reading assignment that includes answering questions, I search for the answers without actually reading the assigned pages first.

- Always
- A lot
- Sometimes
- Almost never
- Never

My textbooks contain useful tips or suggestions for learning and are organized to help me better understand the main ideas.

- Always
- A lot
- Sometimes
- Almost never
- Never

How important is the title of the chapter to your understanding of a textbook reading assignment?

- Very Important
- Important
- Moderately Important
- Of Little Importance
- Unimportant
How important are the section headings to your understanding of a textbook reading assignment? * Section headings are usually given to different parts of a chapter.  
- Very Important 
- Important 
- Moderately Important 
- Of Little Importance 
- Unimportant 

How important are the subheadings to your understanding of a textbook reading assignment? * Subheadings are usually given to different parts of a section of a chapter. 
- Very Important 
- Important 
- Moderately Important 
- Of Little Importance 
- Unimportant 

How important are the visuals to your understanding of a textbook reading assignment? * Visuals include pictures, graphs, charts, diagrams, illustrations, or any other feature that is not text. 
- Very Important 
- Important 
- Moderately Important 
- Of Little Importance 
- Unimportant 

Which type of visual aid best helps you understand the reading? * 
- Photographs 
- Charts 
- Diagrams 
- Graphs 
- Illustrations 

How important are the captions to your understanding of a textbook reading assignment? * Captions are the words that describe what is shown in pictures, graphs, or diagrams. 
- Very Important
How important are the vocabulary words to your understanding of a textbook reading assignment? * These are often "new" words that appear in bold or highlighted text the first time they are used in a passage.

- Very Important
- Important
- Moderately Important
- Of Little Importance
- Unimportant

What strategies do you use to help you learn new vocabulary words? *

How important are the end of section or chapter questions to your understanding of a textbook reading assignment? *

- Very Important
- Important
- Moderately Important
- Of Little Importance
- Unimportant

I enjoyed learning and using the T.H.I.E.V.E.S. textbook pre-reading strategy. * This is the one that had the worksheet to fill out in your science notebook.

- Strongly Agree
- Agree
- Undecided
- Disagree
I enjoyed learning and using the P.L.A.N. textbook reading strategy. * This is the one that used the concept mapping.

Learning T.H.I.E.V.E.S. and P.L.A.N. has changed how I read textbooks in other classes/subjects. *

Using T.H.I.E.V.E.S. and P.L.A.N. improved my understanding of the topics we studied in science class. *

I will use T.H.I.E.V.E.S. and/or P.L.A.N. in the future when completing a textbook reading assignment. *

Learning textbook reading strategies has taught me to recognize the important features of a textbook.*
of the four chapters we studied in our textbook, rate your confidence in your knowledge of the cell and its parts.

- Strongly Confident
- Confident
- Undecided
- Uncertain
- Strongly Uncertain

Of the four chapters we studied in our textbook, rate your confidence in your knowledge of cell processes like osmosis, respiration, and photosynthesis.

- Strongly Confident
- Confident
- Undecided
- Uncertain
- Strongly Uncertain

Of the four chapters we studied in our textbook, rate your confidence about your knowledge of cell division by mitosis.

- Strongly Confident
- Confident
- Undecided
- Uncertain
- Strongly Uncertain

Of the four chapters we studied in our textbook, rate your confidence about your knowledge of heredity and meiosis.

- Strongly Confident
- Confident
- Undecided
- Uncertain
- Strongly Uncertain

Please use the space below to share any other comments, questions, or complaints you have about this textbook reading strategy study.
APPENDIX I

SAMPLES OF STUDENT WORK
Dear Miss Spelling,

Today we read chapter 11 in our textbook which was about how genetic information is transferred from parents to offspring. We learned about a specific trait or a gene product that is transmitted from parents to offspring. Each trait is determined by a specific gene.

Mendel is credited with discovering the basic principles of heredity. He observed and recorded the results of many experiments involving pea plants. His work laid the foundation for the science of genetics.

Specific traits are inherited in a predictable manner. For example, if a parent is tall and the other is short, the offspring is likely to be tall if the gene for height is dominant.

In the study of genetics, we also learned about hereditary traits and how they are passed from one generation to the next.

Yours truly,

[Student's Signature]