

FROM THE DINO'S PERSPECTIVE:  
SPECULATIVE FICTION IN THE SCIENCE CLASSROOM

by

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

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## ABSTRACT

This research project sought to address a concern that middle school students do not read enough to develop scientific literacy. Science fiction is used to enhance the scientific literacy of seventh grade students at White Hill Middle School in Fairfax, California. These students read the speculative fiction novel, *Raptor Red*, by Bob Bakker, a paleontologist. The novel was woven into existing life science curriculum and was used to highlight both aspects of literature and of science. The self-reported interest in science and in reading was measured and compared before and after the treatment. Students took a Science Interest Survey and the Adolescent Motivation to Read Profile.

## INTRODUCTION AND BACKGROUND

I have taught middle school science in Fairfax, California for 3 years. Fairfax is located in Marin County, just north of San Francisco, in a wealthy upper-middle class community. Over 90% of Fairfax's residents are Caucasian (US Census Bureau, 2000). I teach seventh grade life science at White Hill Middle School, the only middle school in the town of Fairfax. There are 572 students enrolled at the middle school, which includes sixth through eighth grades. In seventh grade we investigate the role heredity plays in living things, the geologic history of the Earth, classification of organisms, and other life science topics.

At White Hill Middle School, all of the teachers have a homeroom class, called *Connections*, with whom we spend an extra period of the day together. This provides an opportunity for students to read, do homework, work with a specific teacher, or receive academic support. I chose to use the students in my Connections class for my source of data for this project due to the sufficient unstructured time available. My Connections class has 18 7th grade students that I collected data from regarding interest in reading and in science.

Many children are interested in using and developing their imaginations. A free imagination, one that creates exciting new worlds and ideas, is a part of childhood. Thus, the science fiction genre should also captivate students. It seemed that a number of objectives might be achieved through the reading of science fiction. One of these would be to stimulate students' understanding and enjoyment of science since the reading of

science fiction material will occur predominantly through in-class structured and guided reading. Therefore, their reading ability and their breadth of reading content knowledge will improve and their exposure to scientific topics will develop through an analysis of current science fact and science fiction. I believe this genre of literature develops students' scientific connections and the understanding that ambiguity may be present in the pursuit and study of science. Science fiction asks the reader, "What if?" Adolescents are curious about the world around them and are speculating all the time. Speculative fiction allows students be curious and creative. Science fiction looks to the future and challenges students to turn fiction into reality.

Another reason why reading science fiction is beneficial is that many middle school students only read books that are assigned for their classes. Some do not have enough exposure to non-curricular books to realize the types of amazing stories and ideas that are available. My action research sought to determine if reading science fiction in a science classroom supports active, engaged learning, supports reading appreciation and comprehension, and develops an interest in science that may turn into a lifelong passion.

The student's and my interest in science fiction lead to the focus question for this project: Does reading science fiction increase interest in reading and science? In addition, I investigated the following sub-questions:

- Does reading science fiction increase interest in science?
- Does reading science fiction increase interest in reading?
- Do males respond to science fiction in the same way as females?
- Does reading science fiction support learning science content?

## CONCEPTUAL FRAMEWORK

The ability to communicate and comprehend scientific knowledge is called scientific literacy (Czerneda, 1999). In an increasingly science-dependent world, our ability to read and understand the science around us is becoming more important. The *National Research Council* (1996), which writes the National Science Education Standards, states that developing high levels of scientific literacy is an explicit goal. The NSES also states that scientific literacy includes understanding the role of science in society and in one's personal life. The ability to understand discussions of science that appear in popular media is considered a major aspect of scientific literacy (DeBoer, 2000).

One way to demonstrate the importance of science literacy to students is through science fiction. Science fiction is not a method that most science teachers would choose. In fact, many teachers might think this idea is a result of inexperience in teaching science (Czerneda, 1999). However, to teach science effectively, a science teacher must understand the popular cultural influences students are exposed to that affect their understanding of science (Barnett, Wagner, Gatling, Anderson, Houle, & Kafka, 2006). Books and movies like *Jurassic Park* are of interest to students and are likely to influence their understanding of the world, including the capabilities of science. When read in the context of a science class, the science can be extracted out of the book. For example, Smith, Scott, & Coskrey (1990) found that the use of science fiction in a science classroom opens the door for a focus on the science concepts around which the story is

built. All good science fiction has good science as a basis. The role of the science teacher who uses science fiction in their classes is to pull out the science and analyze it.

Science fiction asks the reader, “What if?” Adolescents are curious about the world around them and are speculating all the time. Speculative fiction allows students be curious and creative. Science fiction looks to the future and challenges students to turn fiction into reality. Often, science fiction tackles avenues of science years before accomplished scientists make it reality (Bradshaw, 2006). Middle school students, who don’t choose to read much on their own (Strommen & Mates, 2004), may find that the science fiction novel is inspiring and interesting. Adolescents need to be motivated to perform well in the classroom (Berry & Plecha, 1990; McCombs, 1996). Reading science fiction can be that motivation.

Males, in particular, are less motivated to read unless it is of particular interest to them (Sullivan, 2004). Jon Scieszka, popular children’s book writer, has created a website (Scieszka) in which he explains that boys are having trouble being as literate as females because, among other things, they aren’t as motivated to read. The discrepancy between male and female reading abilities is not new; studies from the 1960s (Gates, 1961) until the present show that females outperform males on standardized tests in the areas of reading and writing (Zambro & Brozo, 2009; Corbett, Hill, & St. Rose, 1998). In fact, the greatest discrepancy in learning achievement between genders is in literacy (Cole, 1977). Booth (2009) also shows that this literacy achievement gap is found in students in several other developed countries, not just the United States.

Evidence supports the observations that boys read less than girls (Baker &

Wigfield, 1999; Educational Alliance, 2007). Booth (2002), in a study of juvenile reading habits among all age groups, found that only 16.78 % of boys would prefer to read a book, whereas 42.44 % of girls would prefer to read a book rather than watch television. However, boys are more likely to read if they are asked to read a genre of book that suits them more, like science fiction (Jones, 2005). Pitcher, Albright, Delaney, Walker, Seunarinisingh, Mogge, Headley, Ridgeway, Peck, Hunt, & Dunston (2007) argue that with increased motivation, students will show improvements in their reading outcomes. When students are asked to read books that don't fit into their reading preferences, their motivation declines (Ivey, 1998). The genre of reading is so important to educators these days due to increasing concerns related to standardized testing Scieszka said, "When we say boys don't read, we really mean that boys don't read what we want them to read, what we think of as reading" (Sutton, 2007, p. 446). If educators can find value in the genre that interests their students, the students can begin viewing themselves as engaged and active readers (Lapp & Fisher, 2009).

## METHODOLOGY

The 18 students of my homeroom class were used for this project. I began the treatment in January of 2011. The pre-tests were administered in December before the students left for the winter break. Upon their return, the Raptor Red books were handed out and we began reading the book as a class. Over the next six weeks, the treatment continued and the students completed reading Raptor Red. On the sixth week, I administered the post-tests and interviewed the students.

In order to evaluate how my students feel about reading, I administered the Adolescent Motivation to Read Profile (AMRP) (Pitcher et al., 2007). The AMRP is a reading survey, which consists of 20 multiple-choice questions. The multiple-choice questions have two themes: *self-concept as a reader* and *value of reading*. The AMRP was administered to the 18 students before the treatment and after. I compared the distribution of responses for each question before and after treatment, analyzing each gender separately. I surveyed nine females and nine males. The average scores from the pre-test were compared to those from the post-test. A high score correlates to a higher reading motivation.

In addition to learning about how my students' reading interests are affected, I wanted to learn how my students' interest in science would be affected by this treatment. Before the treatment began, I administered the Science Interest Survey (SIS) to my students (Appendix A). The SIS asked a series of questions regarding their interest and confidence in science and in the ways in which science is taught in my seventh grade life science class. The SIS also gathered information regarding my students' opinions

regarding the topics covered in this science class and the methods by which they are taught. The SIS was also administered after the treatment was completed. I compared the distribution of responses for each question before and after treatment, analyzing each gender separately. Many of the SIS questions used a Likert scale with five responses (*Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree*) and some of the questions used to determine student interest in different topics of the year were Likert scale responses with three choices (*Interesting, Neutral, and Not Interesting*). Likert scales were converted to numeric values to aid in data analysis.

The SIS also used open-ended questions, which allowed for an explanation for their responses. The mode was compared for the Likert responses to determine if the treatment had an effect on my students' interest and confidence in science.

The treatment for this study required that the students read Bob Bakker's 1995 novel, *Raptor Red*. During the treatment, the students completed *Literature Reviews* as assignments related to the reading (Appendix B). They had to complete five Literature Reviews and had choices regarding which type of assignment they would like to complete. These assignments allowed for students to demonstrate their understanding of the textbook in whichever way they could best do so. Many students illustrated pictures of scenes in from *Raptor Red* and others preferred to do independent research on a specific topic that interested them while reading. Their responses were used to evaluate their interest in science as well their understanding of science content. These *Literature Reviews* were completed at home and during class during the reading time. Students were given a timeline to pace themselves as they read the book (Appendix C)

During the treatment I kept my own diary to record my reflections on the action research process. These teacher reflections provided data from my perspective about how this treatment had an effect on my students' learning and interest in science and reading. Teacher reflections were made regularly before and throughout the treatment. (Appendix D)

After reading *Raptor Red*, I interviewed the students with the Post-reading Interview Questionnaire (Appendix E). This interview gave me one-on-one time with each student to find out their opinions regarding reading *Raptor Red* and whether it affected their ability to learn science.

The research methodology for this project received an exemption by Montana State University's Institutional Review Board and compliance for working with human subjects was maintained. All of the seventh grade students who were a part of this study had their parents sign the Consent Form (Appendix F). The student's parent agreed to allow their child to participate in this study. All of my seventh grade students read *Raptor Red* as it was part of the curriculum, but data was collected from only the 18 students in my homeroom class. It was during this homeroom that I had ample time to interview these students and administer the surveys. Table 1 below shows the action research questions addressed in this project and the sources of data that sought to answer to these questions.

Table 1  
*Action Research Triangulation Matrix*

Action Research Questions	Data Sources		
	1	2	3
Does reading science fiction increase interest in science?	SIS	Literature Reviews	Teacher Reflections
Do males respond to science fiction in the same way as females?	SIS	AMRP	Teacher Reflections
Does reading science fiction increase interest in reading?	SIS	AMRP	Post-reading Interview Questions
Does reading science fiction support learning science content?	SIS	Literature Reviews	Post-reading Interview Questions

## DATA AND ANALYSIS

The results of the pre/post Adolescent Motivation to Read Profile (AMRP) indicated a decrease in the average scores in both the Self-Concept as a Reader and the Value of Reading categories ( $N=18$ ) (Figure 1). The *Self-Concept* score dropped from a 31.9 pre-treatment to a 31.6 post-treatment and the *Value of Reading* scores dropped from a 28.6 pre-treatment to a 28.0 post-treatment. The maximum score is 40 on either section of the AMRP. A decrease in the score on the AMRP indicates a decrease in motivation to read.

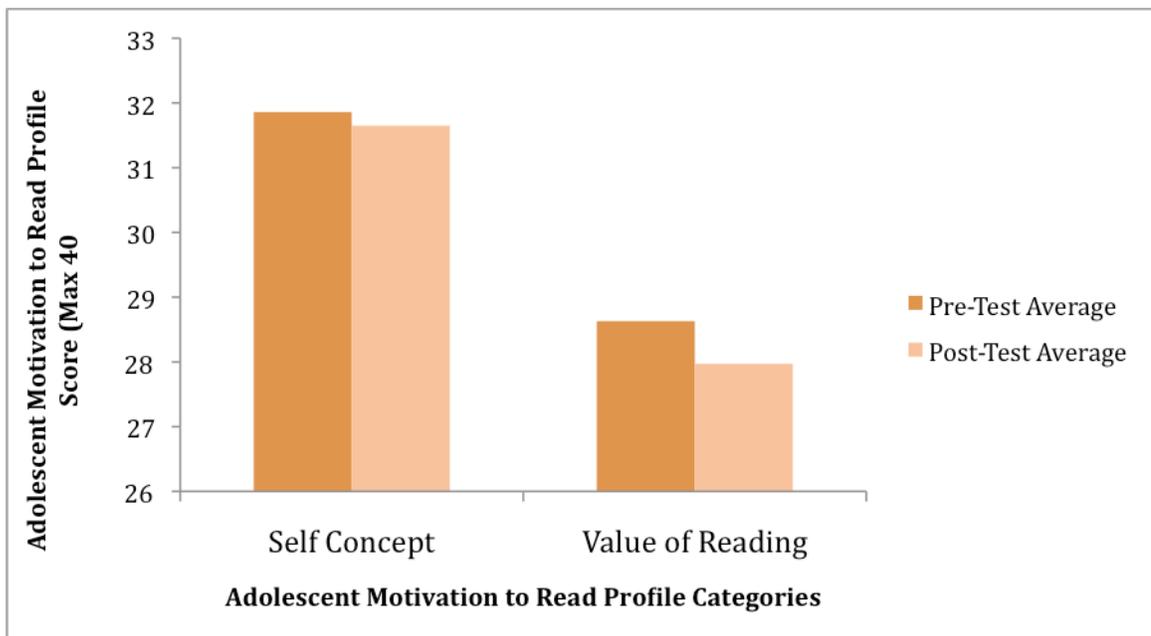


Figure 1. Adolescent Motivation to Read Profile Survey class average scores, ( $N=18$ )

When aggregated by gender, the results of the survey indicate that the students average scores on the AMRP only changed by a few points (Figure 2). The females had a

higher average score in both the *Self-Concept as a Reader* section and the *Value of Reading* section of the survey.

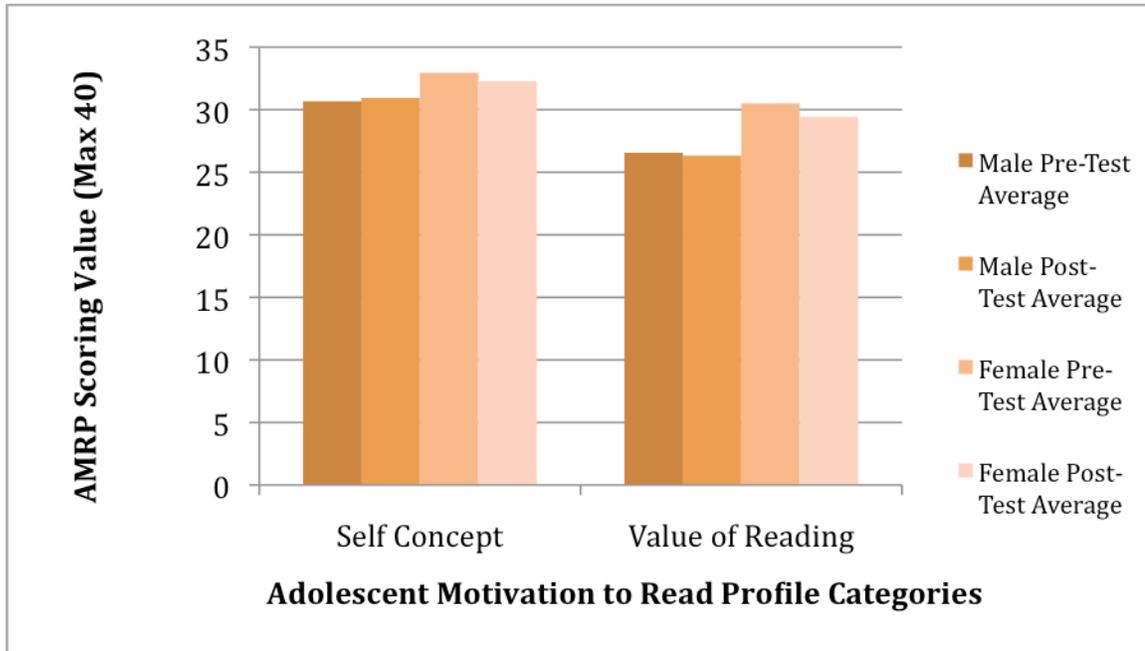


Figure 2. Data from the Adolescent Motivation to Read Profile comparing gender, (N=18)

When asked if they liked reading more or less after reading *Raptor Red*, all students reported neutral/same. One student said, "...it had no effect" on their interest in reading. Another student felt that *Raptor Red* was, "[a] fun way to learn about dinosaurs and adaptations and overall an interesting book." This data supports the results of the AMRP, which didn't show a large change in motivation to read. Four students reported that they had previously read science fiction, but only one student reported that she didn't think she would choose to read science fiction books in the future.

Students were asked to provide suggestions to how this treatment was implemented that could have lead to an increase in student interest in reading. Due to the

difficulty of this question, not all students could actually understand it or develop a relevant answer. Five students suggested giving more class time to read, a comment I heard outside of the interviews as well. Three students mentioned class or group discussions would have helped increase student interest in reading. One female student responded in the interview, “Reading it with someone... get in group and ... discuss what we liked.”

The Science Interest Survey asked students to rank their opinion regarding statements about their interest in science on a Likert Scale. I asked students if they like science (Table 2). The male average response score did not change in response to the statement, “I like science,” but the female average response score decreased, which means their responses were more positive. Females also were more positive after the treatment in their opinion that the class increased their interest in science, while the male average score showed a negative change in their opinions.

Table 2  
*Science Interest Survey Results*

Statement	Male Average Score (Pre)	Female Average Score (Pre)	Male Average Score (Post)	Female Average Score (Post)
I Like science	1.7	1.8	1.7	1.3
This class has increased my interest in science	1.7	1.8	2.0	1.3

In the *Raptor Red* Post-Reading Interviews, students were asked if reading *Raptor Red* increased their interest in science (Figure 3). Fourteen students reported *Yes* and four said *No*. One student made sure to comment that the reason he said *No* was because he was already interested in science.

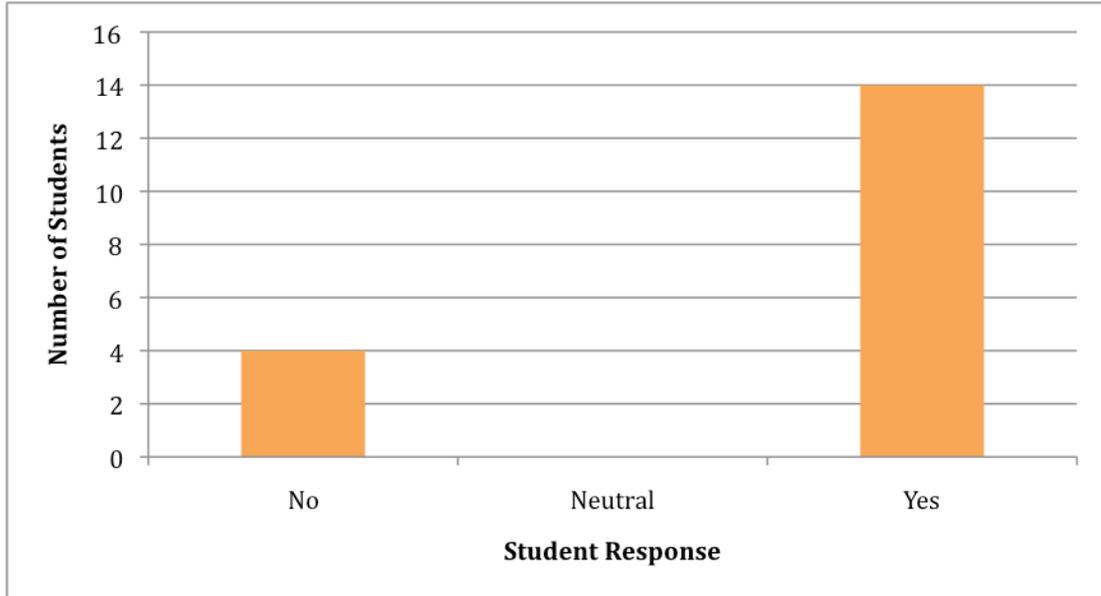


Figure 3. Interview Responses to Whether Treatment Increased Student Interest in Science, (N=18)

The *Raptor Red* Post-Reading Interview asked students whether they thought they learned about science from reading *Raptor Red* (Figure 4). For all of the students who reported *Neutral* or *Yes*, they were further asked what kind of science they learned. When asked the kind of science learned from reading the novel, all students referred to dinosaurs and 39% gave a response related to dinosaurs' adaptations. One student said, "Adaptations that some dinosaurs had during the early Cretaceous." Another 22% of the students made a statement related to dinosaur history, with one student saying, "I learned about genes and dinosaur history." The student who reported that he didn't feel that he learned science from this treatment was also the only student who didn't agree that *Raptor Red* should be continued in the seventh grade curriculum.

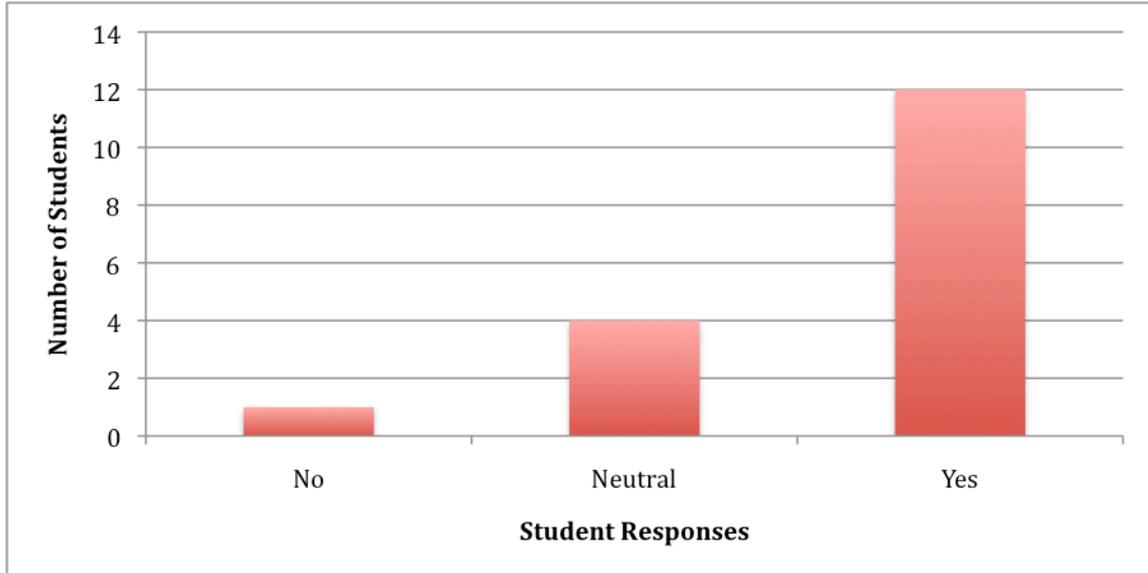


Figure 4. Interview Responses Whether Students Learned Science from Treatment, (N=18)

Students were asked in the Interview whether they think reading *Raptor Red* is a good way to learn science (Figure 5). Half of the students responded *Neutral* and the other half responded *Yes*. One student who is an avid reader added to his response of *Neutral*, “Depends on what kind of science you want to learn. It sort of helped to support learning chapters five and seven.” During the treatment, these were the two chapters in the book covered in class. *Earth History* and *Classification* were both taught with a dinosaur theme.

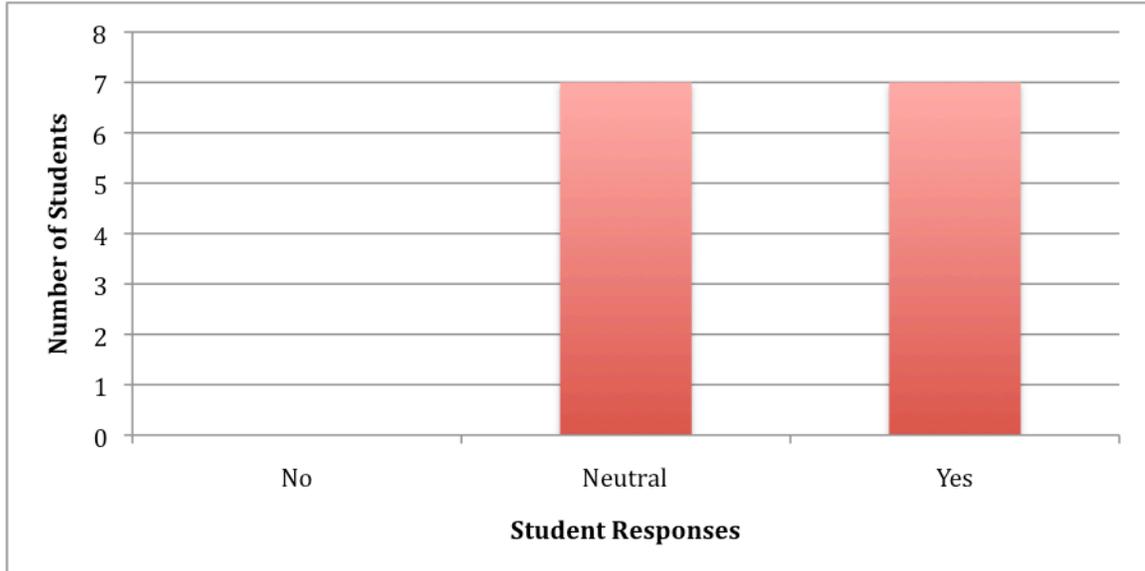


Figure 5. Interview Responses Whether Treatment was a Good Way to Learn Science, (N=18)

Seventy eight percent of the students were *Neutral* in their overall opinion of *Raptor Red*. When asked what they thought of about the novel *Raptor Red*, there was a pretty even distribution of the following terms in their responses: “It was good;” “It was confusing;” and “It was boring.” One student responded, “It was interesting, but it got boring at some parts.” However, when asked whether they think *Raptor Red* should continue to be a part of the seventh grade life science curriculum all but one student, who is a struggling reader, said *Yes*. Their reasons for suggesting keeping the book as part of seventh grade curriculum included that it was about dinosaurs and it was interesting. One female student said “[*Raptor Red* is a] fun way to learn about dinosaurs and adaptations and overall an interesting book.” Another student simply said, “Dinosaurs are interesting. I like dinosaurs.” The one student who didn’t think it should be used again reported that, “It was kind of slow moving. I didn’t like the story.” Students noted the

slow pace of some parts of the book frequently and this was the most common negative response I heard from the students. As I had noted in my Teacher Reflections, some students said they didn't 'get it.' These students also made comments about how many of the words were very big and they didn't know what they meant.'

The Literature Reviews were another method of assessing student interest, science content acquisition, and interest in *Raptor Red*. The students had four choices of assignment when completing their Literature Review. A popular choice was to draw a scene from the week's reading of *Raptor Red* (Figure 6). A literature review was due once per week for five weeks based on that week's reading of *Raptor Red*.



Figure 6. Illustrated Scene from Raptor Red for Literature Review

There were four options for students to choose from to complete their weekly Literature Review for *Raptor Red*. Besides illustrating a scene, the next most common choice among students was to choose five vocabulary terms from the reading that is new to them, define them, and include illustrations of each term (Figure 7).

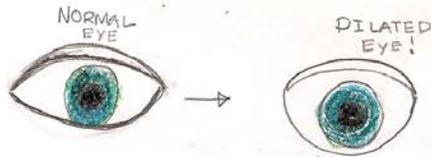
Vocab:

(10/10)  
wow  
so pretty

# Raptor Red

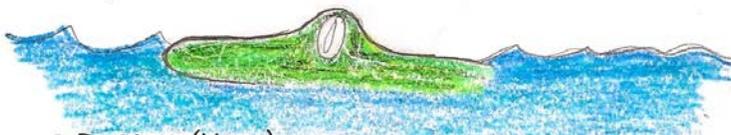
1. Dilate: (Verb)

Make or become larger, wider, or more open.



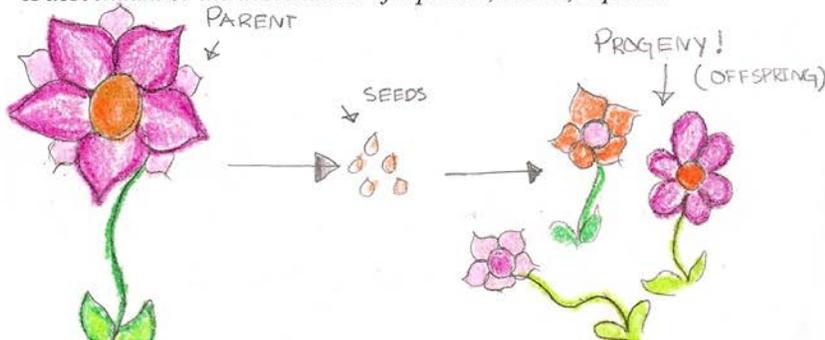
2. Submerge: (verb)

To descend from above water, to under.



3. Progeny: (Noun)

A descendant or the descendants of a person, animal, or plant.



*Figure 7. Vocabulary Terms from Raptor Red for Literature Review*

The final for this project was an in-class, five-paragraph, open-book essay chosen on a topic from a list of prompts. The essay prompts required that students use quotes from *Raptor Red* to validate their thesis. Students used knowledge gained from what they learned about dinosaurs and information provided by Bob Bakker. The essays proved to be a strong source of evidence that my students demonstrated an increased level of scientific literacy by writing an essay that weaved together scientific facts with a persuasive thesis.

## INTERPRETATION AND CONCLUSION

*Raptor Red* certainly is a challenging book to read for middle school students. I even noted in my Teacher Reflections that I didn't know what many of the terms meant and I had to look them up. Many of the difficult terms were science vocabulary words. The *Raptor Red* Literature Reviews provided a way to deal with the difficult vocabulary as one of the four options asked students to look up the definitions of words they did not know and draw a simple picture. Many students appeared to enjoy this choice of assignment either because it was easy for them or because they liked drawing the pictures. The quality of many of the pictures shows a dedication to this assignment and an interest in the topic. It became a common sight for students to congregate on the back wall of the classroom, which was covered in these pictures, and recollect each of the scenes portrayed. This assignment certainly increased the interest of the students.

One of the other options for completing a Literature Review was to look up five terms of their choice and define and draw a sketch of the term. As noted in my Teacher Reflections, there seems to be controversy regarding the use of having students look up definitions as an effective learning technique. When the students get to choose the words and they are required to synthesize a picture, this requires a higher level of thinking according to Bloom's Taxonomy. For this reason, I felt that this assignment choice was an effective method of increasing science literacy. Based on the outstanding Literature Reviews that were completed by my students, I feel that this teaching did increase my students' scientific literacy.

It appears that using data that comes from student responses can be conflicting. For example, despite the positive interest in both dinosaurs and in their nearly unanimous suggestion to keep *Raptor Red* as part of the seventh grade life science curriculum, 78 percent of the students were *Neutral* in their overall opinion of *Raptor Red*. This demonstrates how using student responses may not be the most reliable source of data. Middle school students, in particular, may be too young to fully understand the questions being asked of them and for this reason give conflicting responses from different questions and surveys. Also, as their experience as science students is limited, they may not have the necessary background to make educated conclusions about how a science unit may or may not be effective at teaching them. With a limited vocabulary, they may also be unable to express their true opinions regarding science and reading comprehension. This is a serious drawback to using student responses as a data source.

Given the limitations of student responses as valid feedback, it is also necessary to examine the results made by the teacher to best determine how effective this treatment was at answering the focus questions of this project. The data derived from the AMRP suggests little change in the students' motivation to read. One might expect to find students become more motivated to read when given something that interests them and the data certainly shows that the students were generally interested. However, the AMRP data doesn't support that. Perhaps other factors are skewing the data. It is my experience that students generally lose their interest in any class, regardless of the topic, as the year progresses. The difference between the pre-test and post-test of the AMRP may show this general decline in motivation.

## VALUE

Students may not see the benefit in reading science fiction as a method of increasing scientific literacy. There is no universal agreement on how to measure scientific literacy. Reading literature in a science classroom is a unique approach and it serves to broaden students' repertoire of literary experience. Reading literature need not be confined to the humanities. Whether this approach gains wider acceptance as a valid method of teaching scientific literacy is dependent on research that demonstrates its effectiveness at increasing students' ability to reason, describe, and question scientific phenomena.

The results of this project have made me develop further questions that could be answered through continued action research:

- Will greater scaffolding with a challenging science fiction novel help to increase interest in reading?
- What techniques can be employed to further support students who struggle with vocabulary acquisition?
- How can *Raptor Red* be used to integrate support developing scientific literacy in a biology course?

This project sought to address a concern that I have regarding middle school students and their reading abilities. As a science teacher, it is not in my explicit job description to teach literacy. However, scientific literacy is an essential part of science education, as the National Science Education Standards attest to. In this project, I used

an approach to teaching scientific literacy that used my strengths and personal interest in science fiction literature. Science education need not be textbook driven as it so often is. Instead, students should know that science can be found in various sources of literature. The basis of all good science fiction is good science. Bob Bakker's *Raptor Red* novel was written with the most up-to-date information on dinosaur biology. However, his book takes the information that paleontologists gather from fossil evidence and evidence gathered from dinosaurs' closest living relatives and illustrates the lives of dinosaurs through literature. My students demonstrated that they saw the dinosaurs in a new light. As one student said, "It wasn't just easy or hard, it was just how they lived."

I implemented this treatment in my third year teaching seventh grade science. It takes about three years to really understand the curriculum that you teach. I've always had the desire to incorporate science fiction into my science classroom and this was the opportunity. This treatment taught me the benefits, challenges, and difficulties of weaving science fiction into science curriculum. As the data showed, my students generally responded very well to this treatment and enjoyed reading this book. I attribute this to the positive relationship that I have with most of my students and the enthusiasm I displayed in the reading of this book. Choosing a topic like dinosaurs was a good choice because dinosaurs often invoke curiosity, especially in adolescents.

I'd like to continue to use *Raptor Red* in my science curriculum, wherever I teach and at whichever grade level students I have. With older students, greater depth of science can be studied, such as the physiology of dinosaurs and their relatives and dinosaur classification. It's clear to me that some seventh graders need scaffolding to

fully understand this novel. Students need to be challenged in their reading, otherwise their reading ability won't improve. This book was challenging to read for some seventh graders, but they benefit from this challenge.

In a classroom with older students, which is my eventual goal as a teacher, I'd like to incorporate more challenging science fiction literature into the curriculum. This project has taught me that the benefits outweigh the struggles of using this unique approach to teaching science. I've also learned that cross-curricular teaching helps students make connections between their different studies. This project allowed me to collaborate with members of the English department and learn more about how they teach. Literature is fun to teach and shouldn't only happen in English class.

This project was especially useful for me because I applied something that I'm passionate about into my curriculum. Using *Raptor Red* to teach science may not be appropriate for all science teachers. It's more important for the teacher to be excited about their teaching style because enthusiasm is contagious. My enthusiasm spread to my students and, for this reason, I feel that *Raptor Red* was a successful project.

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APPENDICES

APPENDIX A

SCIENCE INTEREST SURVEY

Appendix A  
Science Interest Survey

Name: \_\_\_\_\_ (confidentiality guaranteed)

Please rate the questions based on the following scale by circling your response.

1. I like science.

Strongly Agree    Agree    Neutral    Disagree    Disagree Strongly  
1.....2.....3.....4.....5

2. Science is my favorite subject.

Strongly Agree    Agree    Neutral    Disagree    Disag Strongly  
1.....2.....3.....4.....5

3. I am good at science.

Strongly Agree    Agree    Neutral    Disagree    Disagree Strongly  
1.....2.....3.....4.....5

4. Reading the textbook helps me to understand science.

Strongly Agree    Agree    Neutral    Disagree    Disagree Strongly  
1.....2.....3.....4.....5

5. I actually read the chapters that we are covering in the science textbook.

Strongly Agree    Agree    Neutral    Disagree    Disagree Strongly  
1.....2.....3.....4.....5

6. I find that the textbook is easy to understand.

Strongly Agree    Agree    Neutral    Disagree    Disagree Strongly  
1.....2.....3.....4.....5

7. I find the textbook to be helpful.

Strongly Agree    Agree    Neutral    Disagree    Disagree Strongly  
1.....2.....3.....4.....5

8. I ask myself a lot of questions during science class.

Strongly Agree    Agree    Neutral    Disagree    Disagree Strongly  
1.....2.....3.....4.....5

9. This class has increased my interest in science.

Strongly Agree    Agree    Neutral    Disagree    Disagree Strongly  
1.....2.....3.....4.....5

10. I would be interested in pursuing a career related to science (technology, medicine, research, engineering, etc.)

Strongly Agree    Agree    Neutral    Disagree    Disagree Strongly  
1.....2.....3.....4.....5

11. I read about science in sources other than the textbook (such as magazines, newspapers, on-line, etc.)

Strongly Agree    Agree    Neutral    Disagree    Disagree Strongly  
1.....2.....3.....4.....5

12. The topics we cover in the class are appropriately challenging.

Strongly Agree    Agree    Neutral    Disagree    Disagree Strongly  
1.....2.....3.....4.....5

13. **If you disagreed or strongly disagreed** with the last question, are the topics in this class

- a. well beyond your understanding (much too challenging)
- b. just beyond your understanding (somewhat too challenging)
- c. just below your understanding (somewhat too easy)
- d. well below your understanding (much too easy)

**Activities:** Choose which response best describes how you feel about whether the following class activities are *INTERESTING* to you.

<b>Warm-Ups</b>	Interesting	Neutral	Not Interesting
<b>Notes</b>	Interesting	Neutral	Not Interesting
<b>Labs</b>	Interesting	Neutral	Not Interesting
<b>Teacher Demonstrations</b>	Interesting	Neutral	Not Interesting
<b>Reading the textbook</b>	Interesting	Neutral	Not Interesting
<b>Completing the Workbook</b>	Interesting	Neutral	Not Interesting
<b>Science Videos (with worksheet)</b>	Interesting	Neutral	Not Interesting
<b>Practice Worksheets/Study Guides</b>	Interesting	Neutral	Not Interesting
<b>Computer Lab Activities/Simulations</b>	Interesting	Neutral	Not Interesting
<b>Reading a Novel (Raptor Red)</b>	Interesting	Neutral	Not Interesting

What do you like about the activities you chose as “Interesting”?

What do you not like about the activities you chose as “Not Interesting”?

**Topics:** Choose which response best describes how you feel about whether the following class activities are *INTERESTING* to you.

<b>Cells</b>	Interesting	Neutral	Not Interesting
<b>Photosynthesis/Cellular Respiration</b>	Interesting	Neutral	Not Interesting
<b>Diffusion/Osmosis</b>	Interesting	Neutral	Not Interesting

<b>Cell Division</b>	Interesting	Neutral	Not Interesting
<b>Genetics</b>	Interesting	Neutral	Not Interesting
<b>Earth History</b>	Interesting	Neutral	Not Interesting
<b>Classification</b>	Interesting	Neutral	Not Interesting

What do you like about the topics you chose as “Interesting”?

What don’t you like about the topics you chose as “Not Interesting”?

**Helpfulness:** *Choose which response best describes how you feel about whether the following class activities help you **learn science**.*

<b>Warm-Ups</b>	Help	Neutral	Don’t Help
<b>Notes</b>	Help	Neutral	Don’t Help
<b>Labs</b>	Help	Neutral	Don’t Help
<b>Teacher Demonstrations</b>	Help	Neutral	Don’t Help
<b>Reading the textbook</b>	Help	Neutral	Don’t Help
<b>Completing the Workbook</b>	Help	Neutral	Don’t Help
<b>Science Videos (with worksheet)</b>	Help	Neutral	Don’t Help
<b>Practice Worksheets/Study Guides</b>	Help	Neutral	Don’t Help
<b>Computer Lab Activities/Simulations</b>	Help	Neutral	Don’t Help
<b>Reading a Novel (Raptor Red)</b>	Help	Neutral	Don’t Help

What do you find helpful about the activities you chose as “Help”?

What don’t you find helpful about the activities you chose as “Don’t Help”?

APPENDIX B

RAPTOR RED READING LITERATURE REVIEW

Appendix B  
Raptor Red Literature Review

- \*You will complete five Lit Reviews for *Raptor Red*. See Pacing Guide for due dates.**
- \*Each Lit Review is worth ten points.**
- \*Title each Lit Review with the chapter(s) that it is in reference to.**
- \*You are highly encouraged to type your assignment (hint: more likely to receive full credit!)**
- \*You may choose any option twice (but not three times).**

These are designed to be 20-30 minute assignments. If you are taking less time than this than it is likely you won't receive full credit. If you are taking more time than this, consider rearranging your priorities.

Option 1-Science Notes

Find out more about the **SCIENCE** that is described in the chapter by researching it using books and/or the Internet. First, explain why you chose to research this science topic. Write at least **five** scientific ideas (complete sentences, of course) outlining what you have learned. You must **cite** all of the sources you use and make sure you write it in your **own** words (paraphrase). Cite your sources using the White Hill Citation guidelines (essential to receive full credit).

Option 2-Vocab

Look up **five** words/concepts/phrases that are **NEW** to you from this chapter. Using a dictionary or encyclopedia write down what these terms mean. Make sure that you find the correct definition as dictionaries/Encyclopedias usually have more than one. Include a sketch of the meaning of each word (you can use pencil).

Option 3-Plot Development

In this chapter, what happened to move this story forward? Write at least two paragraphs summarizing how this chapter has accomplished this. (This is similar to a chapter summary) What do you think happens next? (Make a prediction)

Option 4-Illustration

Illustrate a scene from this chapter that was particularly visually stimulating. Your illustrations will include color and should include dinosaurs as well as the setting. Make sure to include a brief description of the scene on the front or back of the illustration.

## Rubric for *Raptor Red* Lit Reviews

	10 points	7 points	5 points	3 point
Option 1 (Science)	The science described is related to RR, accurate, well-written, and includes the sources	The science described is somewhat accurate and well-written. Sources are not in the correct format	Sources are missing or the writing is lacks accurate or interesting science information	The science described is inaccurate and sources non-existent
Option 2 (Vocab)	5 Definitions are included and are well-written and accurate. Sketches are appropriate	5 Definitions are included, but are not correct for this context. Sketches are semi-appropriate	Definitions are poorly written, inaccurate, or incomplete. Sketches are simple	Definitions are incomplete or inaccurate. Sketches look like chicken scratch
Option 3 (Plot development)	Well-written paragraphs demonstrates clear understanding of plot development	Somewhat accurate depiction of plot development written.	Paragraph shows poor understanding of plot development	Paragraph is actually a sentence
Option 4 (Illustration)	Beautifully illustrated depiction of scene w/ brief description	Illustration could have used more color/effort Description missing	Illustration lacking vision/color Description missing	Stick figures or plain pencil

APPENDIX C

RAPTOR RED READING PACING GUIDE

Appendix C  
Raptor Red Reading Pacing Guide

The chapter under each date should be COMPLETED by the date indicated

Block	Wednesday	Thursday	Friday
Jan. 3	Jan 4	Jan 5	Jan 6
Raptor Attack Pg 7-18	Raptor Red Pg 19-31	Too Skinny for Parenthood (and too full of ticks) Pg 32-40	The Computer of Sisterhood Pg 41-51
Jan 10/11	Jan 12	Jan 13	Jan 14
The Turtle of Trinity Pg 52-61	Flood and Panzers Pg 62-72	Whackity-Whacks Pg 73-81	Reluctant Sister in Law Pg 82-85
	<b>Lit Review #1 DUE</b>		
Jan 18	Jan 19	Jan 20	Jan 21
Manure, Love, and Flowers Pg 86-99	Tank Destroyer Pg 100-109	Famine and the Wing Shadow Pg 110-121	Bubbles Pg 122-127
	<b>Lit Review #2 DUE</b>		
Jan 24/25	Jan 26	Jan 27	Jan 28
Always Go for the One That Limps Pg 128-139	Two-Tiered Drama Pg 140-144	The Cutting Edge of Bug Boppers Pg 145-153	Furball Liberator Pg 154-160
	<b>Lit Review #3 DUE</b>		
Jan 31/Feb 1	Feb 2	Feb 3	Feb 4
Cretaceous Water Lanterns Pg 161-170	Tentacles Pg 171-176	Death From the Sea Pg 177-188	Segno Caves Pg 189-201
	<b>Lit Review #4 DUE</b>		
Feb 7/8	Feb 9	Feb 10	Feb 11
Whip-Tail Pg 202-210	The End of <i>Utahraptor</i> Pg 211-219	Raptors in the Clouds Pg 220-228 Raptor Family Values Pg 229-240	Raptor Red must be completed in order to participate in final book discussions
	<b>Lit Review #5 DUE</b>		
Feb 14/15	Feb 16	Feb 17	Feb 18

**RR Essay Test**

JP

JP

JP-Yay for Ski Week!

APPENDIX D

TEACHER REFLECTIONS

Appendix D  
Teacher Reflections

1/4/11

It's the morning that I start my treatment and I'm nervous. Perhaps I'm just nervous about starting school again. I plan on reading for at least half of the period today. Outloud. I've found that most students enjoy being read to or are neutral to having their teacher read to them. I'd like for them to follow along. I spoke with Martha Crow last night about how to 'teach literature' and keep students engaged. Looking up vocab doesn't seem very useful, though I've gotten mixed opinions from different English teachers. Drawing the scene is a great task. I'll have a few questions per chapter for them to answer. She agreed that an essay test final is a good idea. I'll make sure that the essay topics are warm-ups. I should be able to finish this book in six weeks. Preferably 5.5 weeks and then I can go over essay structure and formatting. We could do a practice essay. I'll give them a rubric. I still need to make my "Post Raptor Red Interview Questions."

1/5/11

We read the first chapter the first day back [from winter break] and the second chapter the second day. Death is prevalent in both chapters and I could see that the students were visually shaken up by it. I like to think that I'm a dramatic reader. One student asked "Are you going to read more today? You have a good voice for this book." I've been asking students randomly what they think of the 'dinosaur book' and to be honest. I've gotten "It's not what I would normally read" from an advanced reader to "I like it! It seems interesting." As I predicted, the low readers (a few per class) were slightly distracted while I read to them. There's an intense amount of new vocab (I don't even know it all!) and I'm sure that they are lost for some of the book. I do feel, however, that all students can understand the book enough to follow the plot. I wrote the outline for how they will complete assignments for each chapter they read. They will have options for which chapters and which assignments. Hopefully the autonomy will make them feel empowered. I'll have Martha check what I wrote. Clear rubrics for these assignments were made, too.

1/28/11

The students are giving me positive feedback regarding reading Raptor Red. They are able to relate what they are reading about in Raptor Red to what we are learning about regarding dinosaurs and their relatives living during the Mesozoic. For example, they expressed familiarity with the marine reptiles that we discussed during class because Raptor Red explores the marine ecosystem of the Cretaceous. I haven't received all positive feedback, however. Two of the girls in my Connections class are not enthusiastic about the book, which I surmise because they don't want to read it when I give them class time and they say things like "I don't get it." They are also behind where they should be in the book, even though I gave all of my students a pacing guide. I'm absolutely loving the Lit Reviews that I am receiving! The kids are choosing between four options and many choose to make illustrations of the scenes from Raptor Red. I've begun hanging them on my wall and the room is developing a 'dinosaur' feel. My 8<sup>th</sup> grade students are jealous that they didn't get to read this book when they had me last year. However, they aren't so jealous when I tell them that the final is a 90 minute essay about Raptor Red.

APPENDIX E

POST-READING INTERVIEW QUESTIONNAIRE

Appendix E  
Raptor Red Post-Reading Interview Questionnaire

1. What did you think about the novel Raptor Red?
2. What was your overall opinion of Raptor Red?  
Like                      Neutral                      Dislike
3. Do you think you learned about science from reading Raptor Red?  
Yes                      Neutral                      No
4. Specifically, what kind of science did you learn from reading this novel?
5. Do you think reading Raptor Red is a good way to learn science?  
Yes                      Neutral                      No
6. Did reading this book increase your interest in science?  
Yes                      Neutral                      No
7. Did reading Raptor Red increase your interest in reading? As in, do you like reading more or less or the same compared to before you read this book?  
Yes                      Neutral/Same                      No
8. Have you previously read any science fiction or books of this genera?  
Yes                      Not Sure                      No
9. Do you like science fiction?  
Yes                      Don't know                      No
10. Do you find this genera interesting? Why or why not?  
Yes                      Neutral                      No
11. Do you think you will chose to read books of this genera in the future?  
Yes                      Maybe                      No
12. Would you recommend keeping Raptor Red in the 7<sup>th</sup> grade science curriculum?  
Why or Why not?
13. What kind of changes to how it is implemented could be made to make Raptor Red increase student interest in reading?
14. What kind of changes to how it is implemented could be made to make Raptor Red increase student interest in science?

APPENDIX F

INFORMED CONSENT FORM FOR STUDENTS IN THE STUDY

Appendix F  
Informed Consent Form for Students in the Study

The purpose of this research project entitled "From the Dino's Perspective: Speculative Fiction in the Science Classroom" examines the effect that incorporating speculative fiction has on student interest in science and reading. For this project, students will be asked to complete the "Adolescent Motivation to Read Survey" and the "Science Interest (and Confidence) Survey." These data collection instruments fall within the area of common classroom assessment practices.

Identification of all students involved will be kept strictly confidential. Most of the students involved in the research will remain unidentified in any way, and their levels of environmental interaction will be assessed and noted. All students will be personally interviewed regarding their interest and background in reading. Nowhere in any report or listing will students' last name or any other identifying information be listed.

There are no foreseeable risks or ill effects from participating in this study. All treatment and data collection falls within what is considered normal classroom instructional practice. Furthermore, participation in the study can in no way affect grades for this or any course, nor can it affect academic or personal standing in any fashion whatsoever.

There are several benefits to be expected from participation in this study. In addition to developing a closer rapport with students, I expect that the results will better help me teach to their abilities and interests. This project is for my professional growth and I'm very passionate about the use of literature in the science classroom. I feel that the reading speculative fiction is an exciting approach to developing scientific literacy.

Participation in this study is voluntary, and students are free to withdraw consent and to discontinue participation in this study at any time without prejudice from the investigator.

Please feel free to ask any questions via e-mail, phone, or in person before signing the Informed Consent form and beginning the study, and at any time during the study.

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

Parent signature: \_\_\_\_\_ Date: \_\_\_\_\_

Thank you!

-Brennan Brockbank



7<sup>th</sup>/8<sup>th</sup> Grade Science Teacher

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