USING CURRENT SCIENCE EVENTS IN AN EIGHTH GRADE SCIENCE CLASSROOM

by

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ABSTRACT

Students become more engaged in science when they see a connection to their individual lives. Through the use of current science event articles, this study investigated the impact the articles had on student interest in science, academic achievement, and awareness of science related careers. Students were evaluated on summaries written, surveys completed, drawings made of scientists, and interviews given. Although the quantitative data showed very little difference in interest before and after the treatment, the qualitative data suggests reading the articles does increase students' interest in science and science related careers.

INTRODUCTION AND BACKGROUND

Background

Washington Middle School (WMS), one of two schools in Lincoln Grade School District 52, is located in Washington, Illinois. WMS houses grades five through eight. The total population for the 2018-2019 school year was 429 students. Students in this study were in eighth grade which had a population of 113 students. The male and female student population was fairly evenly distributed with 52% males and 48% females. In this population, 9% of the students were resource students and 25% of the students were in advanced math (Algebra I). The majority of the eighth-grade student population was white/Caucasian (90%). The other races being African American (1%), African American/White (6%), Asian (1%), Asian/White (1%), and Hispanic/White (1%). Based on data collected from WMS's free/reduced lunch program, 24% of the students were considered to be of low socioeconomic status. The other students in the eighth-grade class were considered to be of normal socioeconomic status according to this program. Parent involvement at the school was high based on open house attendance, volunteerism, and attendance at school activities. Many of the eighth-grade students participated in a school related activity during the 2018-2019 school year.

I taught six sections of general science to 111 of the eighth-grade students. Two students of the total population were in pull-out classes. The major emphasis of science in eighth grade was chemistry, with a little life and earth science also being taught. My school ran a modified block schedule which means on a full week of school, I saw the students three times during the week for a total of 113 minutes. Two days of the week I saw students for 75 minutes; the third day I saw them for 38 minutes. Although not ideal, on days when there were laboratory activities, this schedule worked great. My class sizes varied from 10 students to 24 students.

Purpose

Will using current science events articles in an eighth science classroom increase students' interest in science? During the past several years, I have noticed a decline in student interest in science. Other teachers have also noticed this trend within their classes. This apathy in students is evidenced by a lack of work completion, low class participation, and minimal enthusiasm for learning. What has caused students to lose interest in school? From my research into this question, I discovered that students become more interested in subject matter if they see how it connects with their lives. Bentley (2010) states, "to the science teacher, seizing the day means producing a lesson on the spot in response to a question, an expressed student interest, or a news story about a science-related event in the outside world" (p. 23). By using current events in the classroom, I hoped to "seize the day" and make science more relevant to my students. Once I discovered the impact using current events had on my classroom, I could share my findings with others and brainstorm ideas on how to use current events within other curricula. Discussions could also be held on developing event-based curriculum or collaborating with other teachers through the use of the same current events across multiple subjects.

Research Questions

My primary research question was, “How does using current science events in an 8th grade science classroom impact students’ interest in science?” There were several sub-questions I hoped would be answered as students began to recognize the connection between classroom science and their everyday lives. These questions included:

- What is the relationship between a student’s interest in science and their academic achievement?
- How can using current events make students more aware of science-related careers?
- How will using current events in the classroom impact my teaching?

Support Team

My support team consisted of four people who were invaluable to my project. One member of my team was strictly used as a proofreader. She was a retired Language Arts teacher and was excellent at making sure my paper flowed and made sense. She was also great at catching grammar and spelling errors. A second teacher was a resource teacher and had recently completed her master’s degree. She was very knowledgeable about all the necessities of a research paper. She reviewed my data collection instruments to help ensure they were understandable to all students. She was also used as emotional support as I worked through the challenges of the project. The third member of my team was a college student. She was used as a data collection and analysis consultant and an Excel graphing specialist. Without her I would still be trying to analyze my data. The final member of my team was used in all the above areas. He was an electrical engineer who works at a university and was a very meticulous person. He was able to read my work as an outside observer of the classroom. He also provided a lot of emotional support throughout this journey.

CONCEPTUAL FRAMEWORK

A study which included 262 high school students from 2 small, midwestern cities in the United States by Hulleman and Harackiewicz (2009), discovered that when students make a connection between their everyday lives and what they are learning in the classroom, students are more likely to become interested in science, and their grade in the class will increase. Even though this conclusion was seen more in students with lower success expectations, many students could benefit from this connection. In my action research project, finding out the impact of using current science events in an eighth-grade science classroom was my primary interest.

Hulleman and Harackiewicz (2009) recommended giving surveys to students before and after treatment to determine if there were changes in their interest in science. They also suggested using a journal to evaluate how students made connections between the classroom and everyday life. Shapiro (2017) stated that students should be summarizing articles and stating why they chose the article. This could help lead to more interest in science. Students' grades were evaluated before and after treatment to determine if there was a correlation between an interest in science and student academic achievement. Another method to help determine academic growth was using group interviews that were videotaped and questionnaires to determine students' ability to explain current events (Shwartz, Ben-Zvi, & Hofstein, 2006). I used several of these methods to collect data to help me analyze how using current events impacted the students and my teaching.

Theoretical Background

There are two educational theories that support the use of current events or event-based learning activities—constructivism and situated learning (de la Chica, 2018). Each theory presents a different way to analyze the use of these methods.

The theory of constructivism was first presented by John Dewey (1938-1998), although he did not coin the term. According to Seifert and Sutton (2009), Dewey argued that if students learn by building their own knowledge, teachers should change the curriculum according to students' prior knowledge and interests. A curriculum could only be justified if it met the needs and responsibilities students would have after they have left school. Bentley (1995) quotes Dewey by stating, "everything proceeds from student interest" (p.25). He further agrees that, "the events of the real world frequently stimulate children's interest, and student interest is the ideal starting point for developing your curriculum" (Bentley, 1995, p. 25). Based on Dewey's theory, it can be argued that by introducing students to current events, they will be able to apply science concepts more directly to their own lives and will then become more interested in the material. This may lead to higher retention rates and understanding. If this method is continued throughout the students' education, they will become informed citizens which will enable them to make intelligent decisions about the world and their lives.

Jean Lave's theory of situated learning argues that information must be presented within context or a natural state of learning. Learning activities should occur within an authentic setting (de la Chica, 2018). Using current events is the perfect way to achieve teaching using authentic settings. David (2007) states that situated learning involves social interaction and collaborative learning as well as needing authentic context. Using event-based curricula which places students as experts in authentic workplace roles to solve real-life problems, demonstrates how the situated learning theory can introduce students to careers, develop an interest in science, and make a connection between classroom science and the real world all of which are topics my research project addressed.

Research Studies

The purpose of the Hulleman and Harackiewicz (2009) study was to determine if encouraging students to make connections between their lives and what they were learning in the classroom would increase interest in science and increase academic performance in students with low expectations. In their study, they had 262 high school students taught by 7 science teachers from 2 high schools in a small, midwestern city in the United States write in a journal, summaries of the class material they were studying. Students wrote about how the subject matter was relevant or useful to their lives. Regarding low achieving students, their "results showed how motivational principles can be used to increase interest and performance in science courses early in high school" (Hulleman & Harackiewicz, 2009, p. 1411). Students with high-success expectancies showed no statistically significant improvement in either category. Hulleman and Harackiewicz (2009) concluded that their intervention was successful in raising student interest and performance in early high school science classes. This study had students making connections between science class and their everyday lives. By using current events in my action research project, students were making connections just like those shown in this research study. The method of having students write in a journal was a way to collect qualitative data. Another useful piece of information from this research was how the researchers randomly selected students to participate. "Researchers randomly assigned students to conditions at the beginning of the semester by giving students booklets with identical covers but with different instructions inside depending on the experimental condition" (Hulleman & Harackiewicz, 2009, p. 1411). This was a good idea to use if a control group was going to be needed my action research project.

A study conducted by Shwartz et al. (2001) focused on the chemical literacy of high school students in Israel. Two levels of chemistry were evaluated, the basic level (10^{th} grade) and the advanced level ($11\text{-}12^{th}$ grade). There were 1,000 students in the study. There were several sections to this study, but the one that was of interest to my research dealt with chemical explanations of daily phenomena. In this section, a questionnaire was given to students which had them explain the relevance of a contextual situation to their daily lives.

> Shwartz et al. (2001, pp. 209-210) gave the following example: When a bottle of perfume is left open in a room – after several minutes the smell of the perfume fills the room. Following are several statements pertaining to this phenomenon. You need to decide whether the statement is correct or wrong. You can also choose the 'I do not know' option.

At the basic level, students' conceptual chemical literacy, described as being able to correctly explain daily chemical phenomena, was between 21% and 55%. The study determined this was a low level of chemical literacy. Shwartz et al. (2009) further determined that the basic level chemistry class introduced students to a narrow study of chemistry. Students become knowledgeable of the basic theories and language which Shwartz et al. (2009) conclude would most likely be useless for most students in their future career or jobs. Regarding the advanced chemistry class, it was determined there was a significant improvement in student achievement in chemical literacy, even though there was little improvement in reading comprehension and reasoning skills. This was thought to be attributed to the student who continued to the advanced level class being motivated to learn chemistry because of possible career interests. A final statement in the study determined that if chemical literacy was to be achieved by all students, classes needed to be offered that would increase the relevancy of chemistry in students' lives and teachers should determine the interest and needs of the students when designing curriculum (Shwartz et al., 2009). This study showed the need for relevance. By using current events, students would be led to make connections from the classroom to their everyday lives. They would begin to see the importance of classroom material outside of the classroom. Hopefully, this would also spark an interest in science and science-related careers. The sample question about perfume stated earlier would be an excellent resource to model additional questions after.

Methodology Articles

McCullough states two of her personal goals for her classroom were to "make students more aware and interested in science, and to get them thinking about science outside of the classroom" (2006, p. 30). These goals were very similar to my action research questions. Because of the similarities, her data collection methods interested me. McCullough teaches college physics and used the magazine *Science News* to incorporate current events into her classroom. Weekly, students were to read an article and write a summary of it including a brief explanation as to why they chose the article. Near the end of the semester, she had students review their summaries to determine if they always chose the same type of articles. Students were given free choice as to which articles they wanted to read. She provided a questionnaire that helped students reflect on what they had read.

McCullough also reflected on the impact of using the magazine on her teaching. She found that students talked about articles they had read that were interesting to them and were excited for the next magazine to arrive. She found that grading the summaries took very little time, and she got to know the students through their writings. She felt that she met her goals and was interested in what other goals this assignment could meet.

McCullough used many student examples in her paper that demonstrated how the students were writing their summaries, and how they felt about the assignment. This study provided me with ideas on how to incorporate current events and journaling into my classroom to increase interest and achievement in science.

> Bentley (2010) reinforced this idea by stating, educators should bear in mind the value of event-based science. Science programs should include such science, which is dependent upon both current phenomena and student interest. By 'seizing the moment,' teachers bring spontaneity to the curriculum. Also, by engaging student interest, they facilitate student development in the affective as well as the cognitive domain (p. 27).

The Wellcome Trust Report (2011) investigated students' attitudes on a variety of topics related to school science. The five areas included: views on and engagement with science, influences on science education, science in society and science careers, science outside the classroom, and improving engagement with science education.

> The study's overall goal was to explore and understand better the attitudes of science education of young people aged between 14 and 18 years, with particular reference to:
>
> - the value that young people place on science education for themselves as individuals and for society in general, and
> - the key factors determining young people's continuing engagement with both formal and informal science education (Wellcome, 2011, p. 12).

The study included 240 students age 14 – 18 years living in Scotland, Northern Ireland, England, and Wales. Twenty-two of the people in the study had left school and were working, in training, or unemployed. These people participated in the study through out-of-education interviews. Even though this study was conducted outside of the United States, the results they found were similar to what I was finding in my classroom. The study revealed that students' "enjoyment of science stemmed from its perceived relevance to 'real-life' and young people's personal interest in it" (Wellcome, 2011, p. 19). Using current events and giving students choice in the articles they read should help improve interest in science which could lead to academic growth.

One of the significant recommendations the Wellcome Report (2011) made was to make science real and applicable to students. Students reported that they want to learn science that is relevant to them. They want to be able to make informed decisions using the information they learn in class.

The Wellcome Survey (2011) used a couple of data collection methods that were interesting. One method involved the use of focus groups. Within the groups, a variety of verbal questioning techniques were used. There were whole group questions and individual questions. The individual questions were asked using the Audience Response System, a device that follows the format of *Who Wants to be a Millionaire*? A free web-based system called Poll Everywhere allowed me to collect data in a similar manner. This system allowed students to answer questions individually, however everyone could anonymously see the answers of each other which led to further discussions and questions being asked. Overall, this article provided some great insight into how students think and feel about science which I used to help plan an appropriate treatment.

Additional Article Reviews

Several articles I read reinforced what I hoped would be the outcome of my action research study, that of increasing student knowledge and interest in science. After implementing a ten-minute, current event reading routine at the beginning of each class period for a year, Ricard (2007) anonymously surveyed her students. She discovered that "95% of the students surveyed responded that they enjoyed the 10 minutes of silent reading each day and that the reading had increased their knowledge of current events in science" (p. 60). In her article, she stated her expectations for the reading time, challenges she had, and listed some magazines and websites that were available to her students. In her method, the students did not write about their articles. I liked her idea of reading a current science event article every day, but I also wanted to include a writing portion. As part of my treatment, I combined Ricard's plan with McCullough's. McCullough (2006) had students choose one journal article to read each week and write a summary including why the article was chosen. As a blend of these two ideas, students read an article every week and wrote three to four notes on that article as well as why they chose the article.

As homework, students choose another article and wrote a summary and critique on that article. Kessler, Wydeven, and Marble (2015) found that by allowing students to select articles that were of interest to them, the students began to see the importance of science in their daily lives, and they became more enthusiastic about science. Thompson (2009) noted that giving students choice in selecting articles was an important motivating factor for work completion and engagement in learning.

Throughout the many articles I read, the common theme of using current events or event-based science in the classroom to increase academic achievement and student interest in science was apparent. Many articles demonstrated the importance of making the connection between the relevance of science in students' daily lives and the use of current events. The need to use current events in my classroom became very apparent as I read the articles.

> Timmerman (2002) stated that when students are able to explore science topics that interest them—such as drug, health condition, or some other phenomenon that they or a family member has experienced—they see that science can be personally relevant and applicable to real-world situations (p. 12).

Many articles provided me with possible methods to use to implement current events in my classroom. Ideas included using a journal, reading an article every day, sharing information, using a template for their writing, and grading the writings. There were examples of websites and magazines I could use to provide choice for students to better engage them in their readings. Some websites were: Science News for Students, National Science Foundation, Daily Science, Newsela, and CNN News-Science and Space. Having physical copies of some magazines was beneficial as well. My school subscribed to Scholastic's Science World. Other magazines I could subscribe to included Scientific American, Discovery, Popular Science, and Science News.

As evidenced by many of the articles I read, bringing current events into the classroom should have a positive effect on work completion, class participation, and enthusiasm for learning. By reading the students' summaries, I would be learning more about the students I teach and about the type of science they find interesting. With this information, I would be better able to provide direction to possible future careers and even classes they might find interesting in high school or college.

METHODOLOGY

This study implemented the use of current science articles as a way to increase student interest in science. Students were able to make connections in science with their everyday lives, slightly increased their success in science, and became more aware of career opportunities in 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 (Appendix A).

Demographics

Data was collected from a majority of my eighth-grade students. After reviewing the two surveys and two Draw-a-Scientist-Tests, I chose to analyze only those students who had completed all four data collection pieces. Some students were sick for one or more of the pieces and a couple of students had moved. The final treatment group included 85 students (*N*=85) or 75% of the eighth-grade population. I wanted to use as many of my eighth-grade students as possible to ensure there was a large enough group to make my data valid and reliable.

Students this year seemed to be less motivated than past years as evidenced by lack of work completion, number of re-assessments taken, and low, class participation. As part of my school's standard-based grading system, students were allowed to re-assess on tests. Twenty-seven percent of students had taken advantage of this opportunity. When asked why they thought they didn't do well on an assessment, students respond with, "I just didn't study," and "I knew I could take it again, so why should I try the first time?" Comments like these demonstrated a lack of motivation. Before re-assessments were allowed, students knew they had to prepare ahead of time. There were still students who would choose not to, but that number was less than 23% of the students. The same was true of late work. There would always be a handful of students who turned in late work, but this year the percentage of students turning in late work was 41%. Both of these habits were an indication of unmotivated students. Many of the students were ones who had re-assessed multiple times throughout the year and were chronically late with their homework. Three students included in these percentages were resource students and struggled with all aspects of science class, from understanding the materials to turning in homework. They benefitted from re-assessing. The rest of the students were academically capable of achieving the first time if they put forth some effort.

A majority of the curriculum taught in eighth grade was chemistry. A little life science and earth science was also taught. The Next Generation Science Standards (NGSS) drive the curriculum. A variety of teaching methods were used throughout the year. The 5-Es (Engage, Explore, Explain, Elaborate, Evaluation), hands-on, lecture, and laboratories were ways information was presented to the students. STEMscope, an on-line curriculum, was adopted for use in the middle school this year. This program focused on the 5-Es, investigative science and was aligned to the NGSS.

Treatment

Originally, to increase student interest in science, students read two current science event articles of their choice every week for three weeks. For one of the articles, students wrote a summary and a critique of the article. For the other article, students wrote three to four facts from the article and why they chose the article. This was completed weekly. To introduce students to this method, I instructed them on the requirements, expectations, and the rubric for each part. For the summary, the requirements included citation information, the summary itself, and a critique of how the article applied to them and why they chose the article. I provided them with a template (Appendix B). Students were introduced to my weebly.com page which showed them where they could access various current science articles online. Students also had access to physical copies of Scholastic Current Science magazine within the classroom. Some of the resources available to the students included: Scholastic Science World, sciencenewsforstudents.org, dailyscience.com, Sally Ride Science *Cool Careers* book series for middle school, and newsela.com. Reading levels of the resources were discussed so students could choose the level most appropriate to them. The APA citation format was discussed, and samples were given as a handout (Appendix C). This handout was taped into students' logbooks for easy access. Students were also given a small reminder of what information was necessary for the notes on their second article (Appendix D). This was taped into their logbooks as well. These handouts were also available to the students through Google Classroom in case the papers were lost.

Students were given the option of completing the article summary on a worksheet form or in Google Classroom. Approximately half of the students chose each way. Personally, grading a sheet of paper was quicker for me, but it was easier to add comments where I wanted to add them on Google Classroom. It was also easier to read the typed summaries than to decipher some of the students' handwriting.

I graded the summary using the rubric found in Appendix B, and the notes were graded on completion when students were given 15 minutes to work during class. These 15-minutes gave me time to discuss with some of the students their reasoning for choosing the articles. Grading over 100 article summaries for 3 weeks took an overwhelming amount of time. So, after the first three weeks of the treatment, students only had to complete one summary and one set of notes every two weeks. Because my school runs a modified block schedule (we have "A" days and "B" days), this was very easy to implement. "A" day student assignments were due every other Thursday and "B" day student assignments were due the alternating week on Tuesday. Cutting down the number of assignments I had to grade in a week made the work much more manageable. The treatment continued for another four weeks. This allowed students to read 10 articles and complete 5 summaries and 5 notes.

For the final project students reviewed their summaries and notes to see if there was a common theme to the articles they chose. If there was, they chose a career from that field of science to complete a final project. If there was no theme, students chose a career from their favorite article or a science career in general on which to complete their project. Students researched the career and shared the information in a three- to five-minute presentation to the class. The purpose of the project and presentation was to increase student interest and knowledge in the variety of careers available in the field of science (see Appendix E for the final project assignment and rubric).

Data Collection Methods

Table 1 shows the relationship between my research questions and the data collection methods I used. To give me the best overview of the data I collected, I used both qualitative and quantitative methods to analyze my data.

Table 1.
Data Collection Matrix

	Data Collection Methods					
Research Question	Surveys	Gradebook	Drawings	Individual Interviews	Focus Group Interviews	Journal Entries
What is the relationship between a student's interest in science and the use of science current events articles?	X			X	X	X
How does increasing interest in science impact student achievement?		X		X	X	
How can using current events make students more aware of science related careers?	X		X	X	X	X
How will using current events in the classroom impact my teaching?		X		X	X	X

For my primary question, “How does using current science events in an 8^{th} grade science classroom impact students’ interest in science,” I used surveys (Appendix F), interviews (Appendix G), and student journals. One questionnaire used a Likert scale to gather initial information before the treatment was applied. The same questionnaire was given at the end of the treatment to measure interest growth. Both individual and focus group interviews were used to collect qualitative data regarding students’ interest in science and current events. Student journals were used to analyze the type of articles being read, what the students found interesting, and if they were making connections to everyday life. Direct quotes from the students’ writing were used to directly demonstrate what they were thinking.

What is the relationship between a student’s interest in science and their academic achievement? Both group and individual interviews were used to collect qualitative data to determine if students felt they were making connections, and if they felt they had improved academically in science. Quantitatively, I analyzed my gradebook to determine if there was an increase in assessment grades pre- versus post-treatment. According to Hulleman and Harackiewicz (2009), if students make a connection with classroom material and their everyday life, their academic grades will increase. My gradebook was also used to analyze whether there was improvement in homework completion.

The third question, “How can using current events make students more aware of science related careers?” was answered by several methods. Qualitatively, students were asked to draw a working scientist in their work environment before and after the treatment. This was the Draw a Scientist Test (DAST) (Appendix H). Drawings before the treatment gave me information on how students initially see scientists. I used the post-treatment drawings to analyze growth in where and how students see scientists. See Appendix I for the rubric I used to analyze the characteristics of the DAST. To help ensure validity and reliability of data, a modified version the previously published rubric modified by Jones and Bangert (2009) was used. Based on literature, eight indicators were used as the standard image of a scientist. During the individual and focus group interviews, the students and I explored these ideas and their drawings. Journal entries were also examined to gain information about careers students might possibly be interested in. This was used to direct them when they researched a career as their final project. The final project was another method used to introduce students to more careers in science.

The last question, "How will using current events in the classroom impact my teaching," was evaluated using my personal journal reflections and observations of classroom engagement. Quantitatively, I analyzed homework completion to see if making connections improved this part of their education. On questionnaires and during interviews, I asked students how they thought my teaching changed or could be changed by using current science events.

Validity and reliability of the data collection methods were attained through several methods. Questionnaires and the final project were reviewed by two of my project team members, both have spent numerous years in education. Interview questions as well as the other collection methods were reviewed by Mr. Walt Woolbaugh, my project advisor.

I had a couple of options for conducting the individual and group interviews. Option one was during my planning time, approximately 47 minutes. Students were either in physical education, art, or media. All the teachers of these classes were very flexible and allowed students to miss their class to be interviewed. Option two was during my Response to Intervention time, approximately 47 minutes. I had three students during this time; however, at the time of this research project, my class had joined with two other classes to read a novel together. I could easily leave the class with the other two teachers. Students were again in either physical education, art, or media. I discussed each option with the students and teachers affected and conducted the interviews at times that were convenient for them.

DATA AND ANALYSIS

For my study, a total of 85 eighth grade students participated. The analysis was broken into several categories based on my research questions. The categories included science interest, academic achievement, science careers, and teaching impact. Qualitative and quantitative data was analyzed in all themes using a variety of methods. The treatment ran for seven weeks from October 18, 2018 to December 13, 2018. Initial data collected gave baseline attitudinal information which was then compared to post-treatment information collected using the same instruments. The interest survey used a Likert scale with ranges from “strongly disagree” to “strongly agree.” After data was collected using this instrument, the responses were assigned a number of zero to four in order to statistically analyze the data. Students were asked to complete the surveys as honestly as possible. The figures were clumped according to these themes and are not in the order listed on the interest survey. A total of eight points were possible on the Draw-A-Scientist-Test (DAST) pictures. Drawings were assessed on the following categories and assigned a point for each item drawn--wearing a lab coat, wearing eyeglasses/googles, having facial hair, symbols of science, being male, being Caucasian, working in a laboratory, and working alone. Total points were then analyzed to determine the level of preconceptions students had regarding who and what a scientist was.

Interest in Science

Figure 1 shows the results from the interest survey questions with the theme of interest in science. There was not a statistically significant change in pre- and post-survey values for this theme based on 95% confidence intervals. The mean, with a maximum of 4 points for pre-treatment interest survey with the theme of interest in science, was 2.25. For post-treatment, this mean was 2.18. Based on the wording of the two questions asked on the survey, the slight decrease in mean represents a slight decrease, although not statistically significant, in student interest in science. However, all 12 students who were individually interviewed stated that reading the articles did make science more interesting to them. The minimal difference pre- and post-treatment could be from students not thinking about the impact the articles had on their lives, and perhaps they were just stating their feelings toward the subject matter that was currently being studied in the classroom.

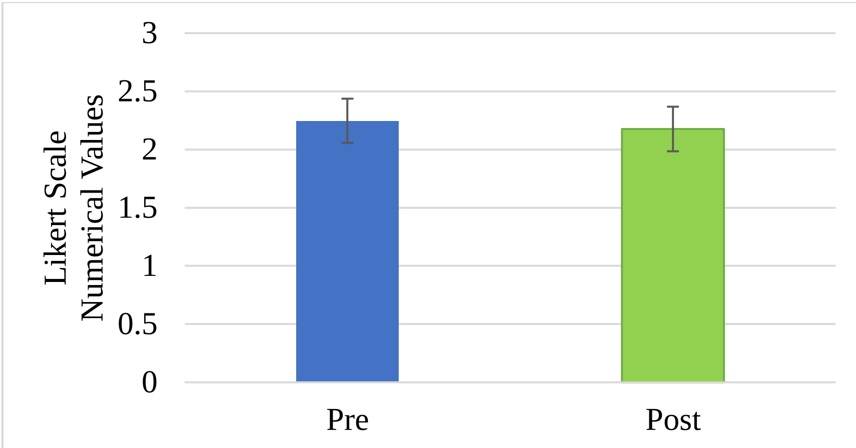

Figure 1. Mean pre- and post-treatment interest survey values, theme of interest in science, ± 95% confidence interval, (*N*=85).

Based on the interest survey, there was not a significant gain in interest in science. The results from one question on the survey, "I do not see how science applies to my daily life" can be seen in Figure 2. This Figure shows that before the treatment, 62% of students strongly disagreed or disagreed with this statement. After treatment 74% strongly disagreed or disagreed. This shows that a majority of the students could see how science applies to their lives before the treatment, and there was not a significant increase after treatment. Similar results were discovered from the other questions on the survey.

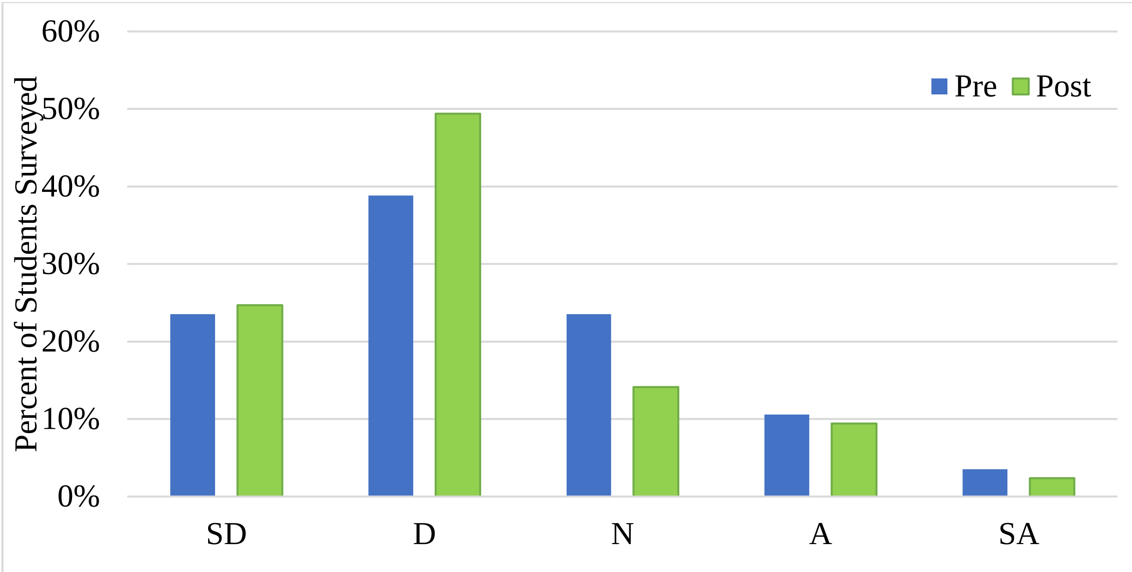

Figure 2. Percent of students in each level of agreement with interest survey question, "I do not see how science applies to my daily life," pre- and post-treatment, (*N*=85).
**Note*: SD=strongly disagree, D=disagree, N=neutral, A=agree, SA=strongly agree.

Making connections from the readings to students' everyday life can cause an increase in interest in science. One student commented,

> "In my life now my family has had cancer a lot. My grandma had breast cancer and now she has liver cancer. This article made me want to possibly look into being a doctor or researcher. The article also encouraged me to try to donate more to people who need it most."

Comments such as this one demonstrated that students were making connections. From the interviews I conducted, 60% of the students enjoyed reading the articles, 20% did not enjoy them because they did not like writing the summaries, and 20% sometimes liked reading them. These students said if the article pertained to a career interest, they enjoyed the article. If it did not, then they were not interested. Ninety percent of the students interviewed said reading the articles made science more interesting to them. A student who is interested in being an architect chose an article about wild vacation spots. She commented, "I want to be an architect, the idea of making a house that is half underwater intrigued me. I started thinking about all the design challenges that the architect must have gone through to make that house livable." Although the quantitative data shows little variation in student interest in science, many students shared, through their summaries and journal notes, how science was interesting to them.

Academic Achievement

The link between academic achievement and student interest in science, my first sub-question, was determined by measuring the frequency of late work pre- and post-treatment, and the number of re-assessments students took pre- and post-treatment. This was analyzed using my gradebook and through student interviews. Because there was no direct correlation to classroom learning and the articles students chose to read, quantitative learning was not measured. Only qualitative learning based on the information from student interviews was measured. Figure 3 represents the results of student late work pre- and post-treatment.

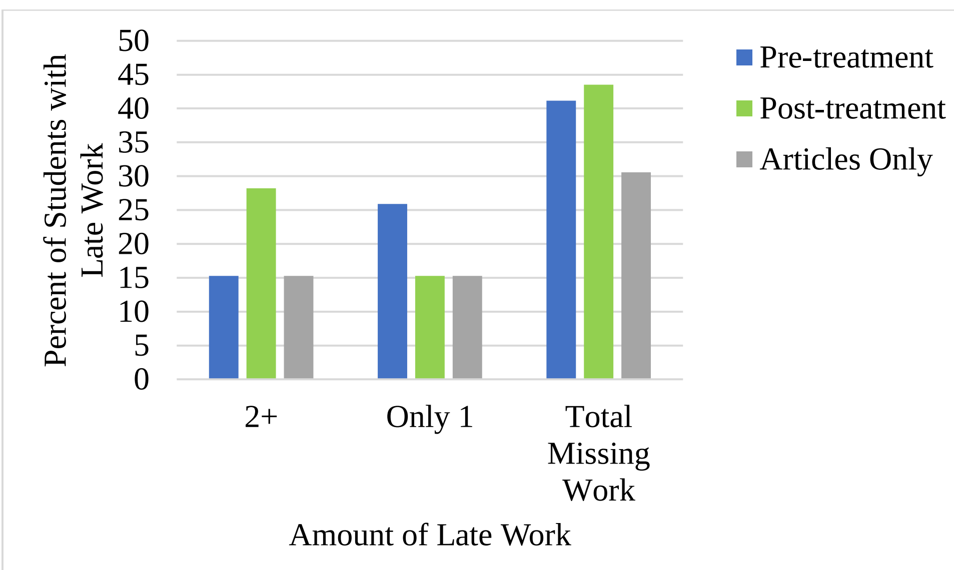

Figure 3. Percent of students with two plus and only one piece of late work pre- and post-treatment and articles only, (N=85).

The total percentage of students who turned in at least one late assignment prior to the treatment was 41%. After the treatment, this number increased to 43%. Looking at just the article summary and article notes that were required during treatment, the percentage of students turning in late assignments dropped to 31%. The decrease in late article assignments could be attributed to higher interest in the reading assignments. Most students enjoyed reading the articles. “This article to me was actually really inspiring.” “This article I found to be very interesting and helpful.” “I chose this article because I never really knew what autism exactly was.” These were some of the comments that demonstrated the high interest students had in them which could be why late assignments decreased during the treatment period.

A three-point grading system with no zeros was used in my school to assess students using a standard-based grading model. Students were required to re-assess if they earned a one on an assessment. Figure 4 shows the relationship between the number of students required to re-assess pre- and post-treatment.

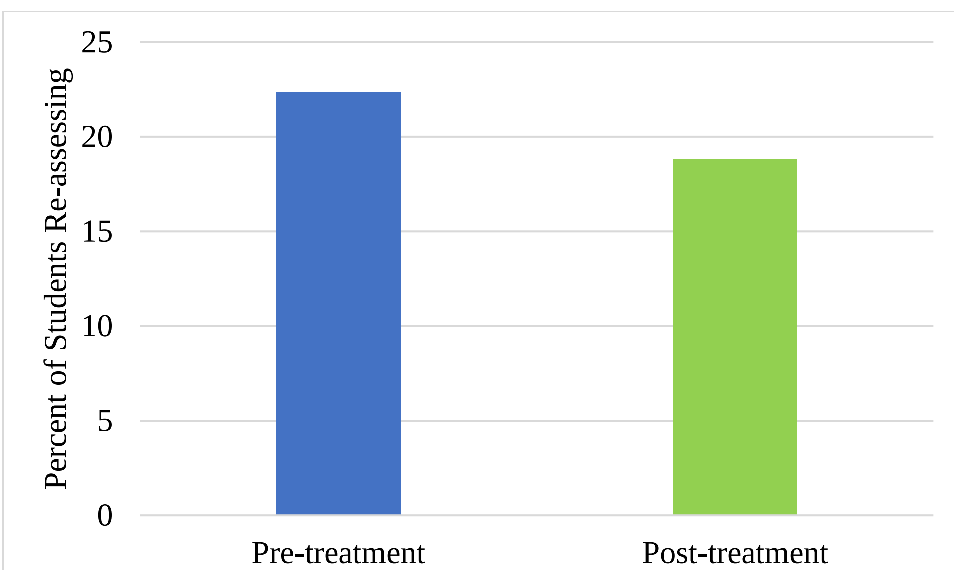

Figure 4. Percent of students required to re-assess pre- and post-treatment, (*N*=85).

According to the data, there was a slight decrease in students required to re-assess after the treatment. Pre-treatment 19 students needed to re-assess and post-treatment 16 students needed to re-assess. Some possible reasons for this might be that students were more familiar with the type of assessments I give and the types of questions I ask; or the material might have been more familiar or interesting to them. Further analysis of student re-assessments revealed that 11 students re-assessed both before and after treatment. These were assessments over material being studied in class, not over the articles read. For this reason, it was difficult to quantitatively analyze academic achievement. When asked if they thought they were more successful in science because of the articles, one student responded, “I don’t think so because I didn’t choose articles that relate to what we’re doing now.” Another student commented, “I’m successful in science anyway. The articles are just helping me with stuff that you’re [the teacher] not going over.” Of the 12 individual interviews given, 10 students responded similarly, while 2 responded that maybe they are more successful because of the articles.

Most students believed their academic knowledge of science had increased through the reading of the science articles. Students made comments like, “I now understand why scientists experimented on chimpanzees,” and “I picked this article because my friend recently has become interested in space science and I wanted to impress her with my new knowledge.” The qualitative data I collected supports that reading the science articles did increase students’ knowledge of science.

<u>Science Careers</u>

Results from the Draw a Scientist Test (DAST) revealed preconceptions students had of what a scientist looked like and the setting in which they worked. The DAST focused on my sub-question, “How can using current events make students more aware of science-related careers?” Eight indicators signified typical preconceptions. These indicators included wearing a lab coat, wearing eyeglasses/googles, having facial hair, symbols of science, being male, being Caucasian, working in a laboratory, and working alone. Figure 5 shows pre- and post-treatment data of the number of indicators students drew on their DAST. The lower the number of indicators, the less preconceptions a student had. Students with a lower score could have a more open mind to what a scientist looks like, what they do, and where they work. Students with a more open opinion of a scientist may be more likely to envision themselves as one.

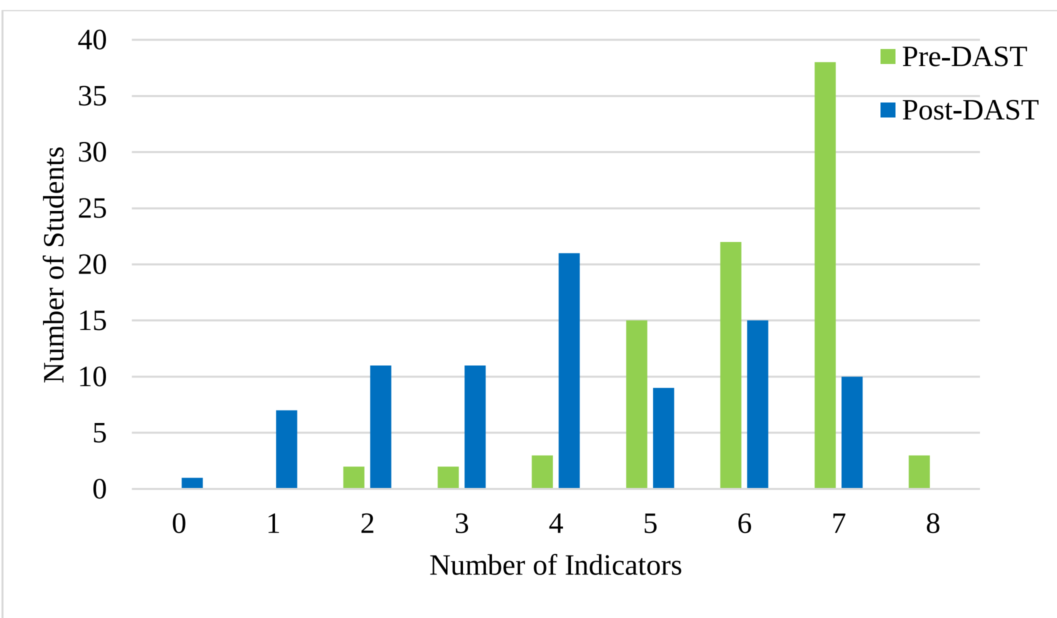

Figure 5. Number of students and number of indicators drawn by students on DAST, pre- and post-treatment, (N=85).

Before the treatment students had many preconceptions. The mean number of indictors in pre-treatment drawings was six indicators per student. Figure 6 shows one student's pre-treatment preconception on the left along with the same student's drawing post-treatment. Notice the number of indictors drawn were drastically reduced post-treatment.

Figure 6. Student's DAST drawing pre-treatment on the left with seven indicators and post-treatment on the right showing one indicator.

As demonstrated in pre-treatment Figure 6, the most common preconceptions students had of scientists were working alone and being Caucasian. Pre-treatment drawings showed Caucasian scientists in 93% of the drawings and the scientist working alone 94% of the time. Post-treatment drawings still showed a high percentage of Caucasian scientist, 94%, while post-treatment drawings of scientists working alone decreased to 66%. One possible explanation for the large number of Caucasian scientists is that 90% of the eighth-grade population is Caucasian. Students might have been drawing what they are familiar with or from past knowledge (Einstein and Newton), that was what they based their DAST on. Facial hair was the least preconceived idea students had showing up in only 5% of the pre-treatment drawings, and 4% of the post-treatment drawings. The mean of the post-treatment drawings was four indicators per student. The greatest indicator changes were scientists in laboratories and the symbols of science. Symbols of science drawn were typically test tubes, beakers, and microscopes. Figure 6, post-treatment DAST, shows a drawing of a scientist working in a natural environment. In this case, a veterinarian is helping a horse in the field. Another preconception held by many students was that scientists mainly work in laboratories. Pre-treatment DASTs showed that 91% of students drew a scientist in a laboratory. Post-treatment DASTs saw that number decrease to 46%. This indicator had the largest change in percentage. A reason for this could be attributed to the project the students completed at the end of the treatment. From the presentations given, students were introduced to many new fields of science and the environment where those scientists work. Showing scientists in their natural work environment contributed to the lack of beakers and test tubes that were prevalent in most students' pre-treatment drawings, 82% versus 76%. During an interview one student described his initial drawing as, "My thought of a standard scientist was a guy standing at or behind or next to a desk with test tubes on the side of him with random chemicals." The same student described his second drawing saying, "I always knew in the back of my mind that scientists were more than just in a lab, but I never realized how vast the outside world with science in it was until I started reading up on things." Figure 7 shows this student's pre- and post-treatment drawings.

Figure 7. Student's DAST pictures pre-treatment on the left and post-treatment on the right.

A final analysis of the DAST was the number of female students drawing female scientists. Initially, 54% of the females in the class drew a female scientist. After treatment, 63% of the females drew a female scientist. Only one male drew a female scientist post-treatment, and no males drew a female pre-treatment. When asked about her drawing, one female student replied, “I learned more about being a wildlife biologist, and it seemed really cool to me. So, I guess I kind of almost drew myself as the scientist.” See Figure 8.

Figure 8. Female student’s self-portrait of DAST, post-treatment.

Although results from the pre- and post-interest survey showed no significant difference statistically in students’ awareness and interest in science careers (Figure 9), many students commented about various careers they had learned about through the articles and the post-treatment project. One student wrote, “I chose to read, ‘Portal to the Universe’ because I want to learn more about physics and the history of our universe. When I grow up, I want to become a physicist.” Another wrote, “The article also kind of interested me into a career.”

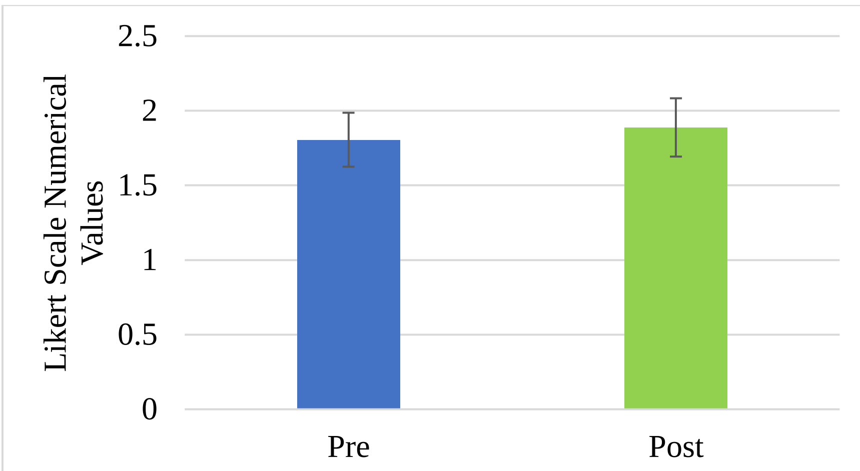

Figure 9. Pre- and Post-interest survey, theme of science careers, confidence interval of 95%, (*N*=85).

During interviews, students frequently expressed an increase in knowledge of science careers. When students were asked to name some careers they had learned about either through the articles or through student presentations, every student named at least two careers. Figure 10 shows a word wall of those science careers.

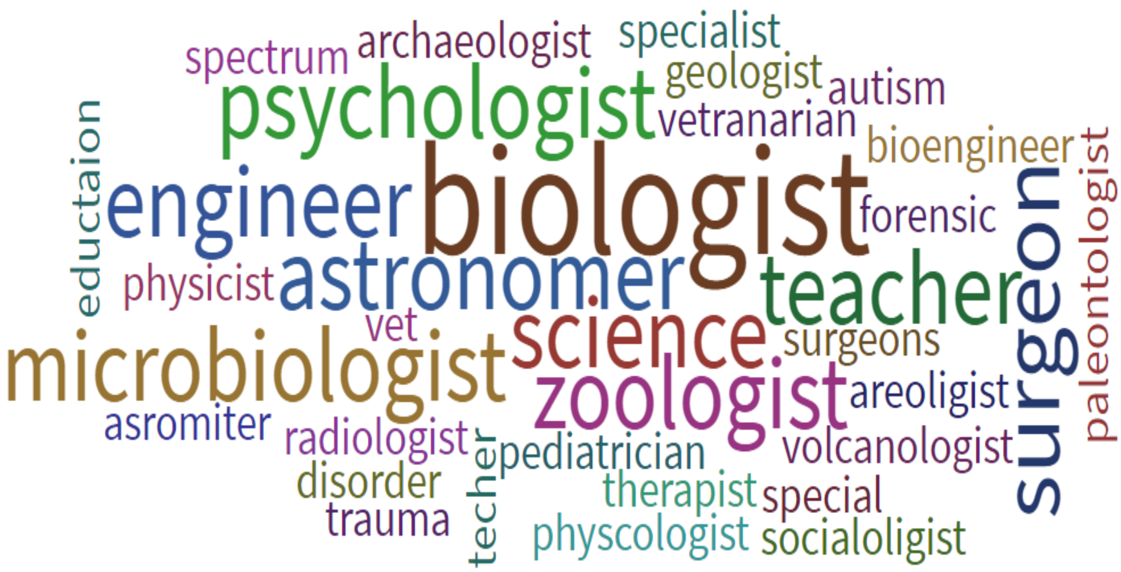

Figure 10. Word wall of scientists which students became aware of after treatment, (*N*=8).

Figure 11 shows through the interest survey, more than half of the students, 59%, could not see themselves as a scientist prior to the treatment and after the treatment a little more than half, 51%, still could not see themselves as a scientist.

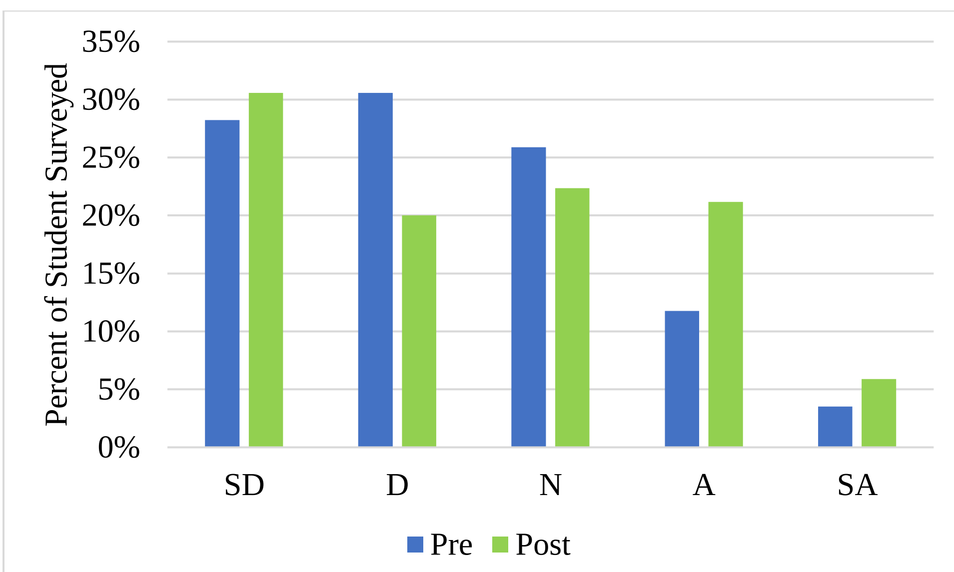

Figure 11. Percent of students in each level of agreement with interest survey statement, "I can see myself as a scientist," pre- and post-treatment, (*N*=85).
*Note: SD=strongly disagree, D=disagree, N=neutral, A=agree, SA=strongly agree

During the interviews I discovered that many students were interested in the medical field, but they did not realize that people in the medical field were scientists. One student commented, “I didn’t know that doctors were really considered a science job until [another student] presented.” And another replied, “I didn’t know those [veterinarians] were scientists until after I had done research on them.” Even though many students did not think they would go into a science career, numerous students believed they would be using science in their future career. More students might have responded differently if they had been aware that doctors, surgeons, and veterinarians were considered scientists. Even though reading the articles opened the students’ eyes to more career opportunities in science, many students were still unsure about what they want to do as a career. Because of this, students may have chosen not to commit to saying they want to be a scientist.

Teaching Impact

At the beginning of the treatment, all students were reading two articles every week and completing an article summary/critique on one article and completing notes on the other article. Although this amount of work was not overwhelming for the students, upon reflection of my journal, it was overwhelming for me to grade it all. It was taking me six to seven hours to grade only the summaries. I enjoyed learning more about my students, but I needed to reflect on a more efficient way to grade. By writing in my journal I was able to review what went well and what needed to be improved upon from the previous weeks. Without having the journal, I would have continued to struggle with how to accomplish my goals for this research project.

During individual student interviews, students were asked how the assignment could be improved. Every student thought the amount of work was not overwhelming. They liked being able to choose articles of interest to them and liked the variety of the assignment. They were able to think more deeply on one article and skim the other. One student responded, “Maybe talk about the articles in class.” From listening to students’ opinions, I can improve the assignment for next year. Students have good ideas about what can help them learn, and as teachers, we need to listen to their ideas. As research suggested, students do learn more when it is applicable to their lives.

Another way this action research project impacted my teaching is it has given me ideas on future projects. Some examples include: Why don’t girls see themselves as scientists? How can project-based learning affect a student, and Are students more motivated by traditional grading versus standard-based grading? Through this project I have begun thinking more about how teaching/learning methods affect students.

INTERPRETATION AND CONCLUSION

Is there a relationship between reading current science articles and student interest in science? After analyzing the data, I conclude that general interest in science did not quantitatively increase by reading the science articles. Refer to Figure 1. There were many students in this eighth-grade class who were interested in science prior to the article assignments. Perhaps the lack of class participation and lack of homework completion arise from another issue for this particular group of students. As demonstrated by student comments, I believe reading science articles is important, but maybe not to increase interest in science as this was already high with this group of students prior to treatment.

Is there a relationship between student interest in science and their academic achievement? According to post-survey data, quantitatively there was not a correlation to reading articles and students' interest in science. See Figures 3 and 4. This could have been because students were allowed to choose articles they were interested in, not necessarily what we were studying at the time. The material they were learning about through the articles may not have correlated with what was being learned in the classroom. Many students found that reading the articles helped them understand the science behind everyday subjects like the common cold and tennis shoes. Students enjoyed being able to choose articles they were interested in. One student commented, "I think they are fun to read. They relate to what's going on in the world. And, they are also about science, so that's good." Several students commented in their article summaries about how the topic in an article sparked an interest in a career. One student wrote, "I think this relates to my life because I might want to get a career in experimental/theoretical science, because it is an interesting field of study." Another student commented, "This article also made me want to possibly look into being a doctor or researcher." As a middle school teacher, I may never know the true impact reading these articles had on students because the students are still years away from deciding on a career, but I believe the treatment was an important part of their education because of the exposure they received to current science and science-related career opportunities.

In response to my research question, "How does using current science events make students more aware of science-related careers," I discovered through the pre-treatment Draw a Scientist Test, students had the impression a scientist was a Caucasian male wearing a white coat working alone in a laboratory. Figure 5 indicates these characteristics were the ones most frequently drawn by students. After reading the current science articles, students' preconceptions of what a scientist was and where they worked changed. They became aware of the variety of scientists and the many different environments in which they work. Prior to the treatment, 94% of the students drew a scientist alone. Post-treatment this number dropped to 66%. Although this was still a high percentage, it was 28 percentage points lower than the pre-treatment number. Likewise, pre-treatment drawings saw 91% of students drawing their scientist in a laboratory, while post-treatment drawings saw a decrease to 46%. Many students commented in their article summaries that the articles they read were about young people like themselves making a difference in the world through science. At the end of the treatment, more students were able to envision themselves as scientists doing science outside of a laboratory setting. From this data, I believe the articles did begin to help students become more aware of science-related careers.

VALUE

Using current events in the classroom has impacted my teaching in a number of ways. My district emphasizes making connections with students. Using current events in the classroom enabled me to learn more about my students. In reading their critiques, I discovered their interests, what they want to do with their lives, and how they felt about different science topics. I also learned personal information about them which I never would have discovered without being able to read the connections they made to the articles. For example, one student mentioned how she wanted to be a clinical psychologist because she really looks up to hers. Another student said she is interested in becoming a trauma surgeon and starting CPR classes because her little sister drowned, and she was unable to help her. Giving up 15 minutes of class time twice a week was challenging because I do not see the students every day and in the time I have them, it is important for them to learn the curricula material. However, making connections with my students was also important, and that was what happened during this time. I was able to talk to each student individually about why they chose an article. Sometimes I would ask them if they could see themselves going somewhere, doing something, or changing somehow. All of these questions were related to the articles they read. Often times in class, I get down to the business of science and do not have the time to “chat” with the students. This 15-minute time period enabled me to make connections with them and get to know them as a person, not just a student.

Most students enjoyed being given the opportunity to read the articles. Of the 20 students I interviewed, 18 of them thought reading the articles was important and should be continued. “They help you realize what you see on TV isn’t real,” was one student’s comment. Another stated, “We get to learn about what was happening in the world of modern science.” From this comment, I learned that students want to learn material that is relevant to them. I have always wanted to implement some project-based learning into my classroom. This could be a future action research project—to determine if students’ academic achievement, retention of material, and homework completion increases with the use of this teaching method. Making science relevant to students might help them make connections to their lives which in turn might point some of them toward careers in science.

From my conversations with the students, I discovered that a majority of them made connections between science and their lives; however, in my opinion, more students need to start discussing science outside of the classroom. I believe that if students were to talk more about science, they would discover more opportunities within the field of science. If they were discussing science with their parents or other adults, these people would be able to share their ideas and possibly point students in the direction of science careers. If they were discussing science with their friends, they would learn to support their thoughts with data they learned through the current science articles or material from class. This would help them become better at supporting their thoughts and reasoning with evidence. By using the current science articles, I hoped to motivate students to talk more with their family and friends about science issues. According to the data, this did not happen. To encourage this next year, I could have students discuss the articles in the classroom. From my reflections, I think next year I will select several articles that pertain to what we are learning in class. Students will be allowed to choose which of the articles they want to read, then they will discuss the article with each other and develop a quick presentation that highlights the main points of the article and how it connects to the classroom material. I would also like to guide students to choose articles that are from sources other than Science World. Most students seemed to choose only articles from this source. Many of my students were able to understand material at a level that was high than this source. Next year I plan to encourage and even require certain students to select other sources. I could occasionally group students based on reading ability and assign a higher-level article to those groups.

Although the survey data showed little improvement and growth in any of my research questions, next year I will continue to have students read current science articles. The gains in science literacy, real world science knowledge, and science-related careers are important enough to continue the treatment. During individual interviews, students said they thought reading two articles every two weeks and completing notes on one article and a summary on the other was a fair assignment, not overwhelming. Upon reflection, I feel that both the students and I got more out of the summary and critique assignment than the notes assignment. One student summed up the assignments as saying, “It [reading the articles] helps me to understand the world that I live in a little bit more. I can relate to the things around me.”

REFERENCES CITED

Bentley, M., (1995). Carpe Diem. *Science activities: classroom projects and curriculum ideas,* 32:3, 23-27.

Chambers, D. (1982). Stereotypic images of the scientist: draw a scientist test. *Science Education*, 67(2), 255-265. Retrieved March 30, 2019, from http://kbsgk12project.kbs.msu.edu/wp-content/uploads/2011/02/draw-a-scientist-test.pdf

David, L. (2007). Situated Learning Theory (Lave). *Learning Theories. Retrieved April 2, 2018, from* www.learning-theories.com/situated-learning-theory-lave.html

de la Chica, S. (2018). Event-Based Learning: Educational and Technological Perspectives. Retrieved April 2, 2018, from pdfs.semanticscholar.org/7927/af96698421c6881c3bd5c3e694a0956bc205.pdf

Hanna, N. R. (1998). Newsworthy research. *The Science Teacher, 65*(3), 50-52. Retrieved April 2, 2018, from search-proquest-com.proxybz.lib.montana.edu:3443/docview/214628688?accountid=28148

Hulleman, C., & Harackiewicz, J. (2009). Promoting interest and performance in high school science classes. *Science,326*(5958), new series, 1410-1412. Retrieved March 11, 2018, from www.jstor.org.proxybz.lib.montana.edu/stable/27736597

Jones, R. & Bangert, A. (2006). The CSI Effect. *NSTA WebNews Digest*. Retrieved September 25, 2018, from http://www.nsta.org/publications/news/story.aspx?id=52803

Kessler, G., Wydeven, A., & Marble, S. (April, 2015). Increasing science literacy through weekly article abstracts. *In-Sight*. Retrieved April 6, 2018, from www5.esc13.net/thescoop/insight/2015/04/increasing-science-literacy-through-weekly-article-abstracts/

McCullough, L. (November/December, 2006). Science news and the science classroom. *Journal of College Science Teaching*, 36(3), 30-33.

Ricard, M. (Summer, 2007). Current events in science. *The Science Teacher,* 74(5), 56-60.

Seifert, K., & Sutton, R. (2009). The Learning Process, *Education psychology*, 2nd Edition (pp 23-40). The Saylor Foundation. Retrieved April 2, 2018, from www.saylor.org/site/wp-content/uploads/2012/06/Educational-Psychology.pdf

Shapiro, D., (2017). Teaching about science in the news. *NSTA Reports,* Retrieved March 12, 2018, from nstacommunities.org/blog/2017/05/03/teaching-about-science-in-the-news/

Shwartz, Y., Ben-Zvi, R., & Hofstein, A. (August, 2006). The use of scientific literacy students. *Chemistry Education Research and Practice*, 7(4), 203-225. Retrieved April 2, 2018, from pubs.rsc.org/en/content/articlepdf/2006/rp/b6rp90011a

Thompson, A. (2009). Reading: The Future—final report of the 2008 national year of reading. London, UK. The National Literacy Trust. Retrieved April 6, 2018 from literacytrust.org.uk/research-services/research-reports/reading-future-final-report-2008-national-year-reading/

Timmerman, B. (March, 2002). Keeping science current. *Science Scope*, 25(6), 12-15.

Wellcome Trust Report. (2011). *Exploring young people's views on science education*. London, UK. Retrieved April 5, 2018, from wellcome.ac.uk/sites/default/files/wtvm052732_0.pdf

APPENDICES

APPENDIX A

IRB EXEMPTION LETTER

INSTITUTIONAL REVIEW BOARD

For the Protection of Human Subjects
FWA 00000165

MONTANA STATE UNIVERSITY

960 Technology Blvd. Room 127
c/o Microbiology & Immunology
Montana State University
Bozeman, MT 59718
Telephone: 406-994-6783
FAX: 406-994-4303
E-mail: cherylj@montana.edu

Chair: Mark Quinn
406-994-4707
mquinn@montana.edu
Administrator:
Cheryl Johnson
406-994-4706
cherylj@montana.edu

MEMORANDUM

TO: Kathy Mattus and Walter Woolbaugh

FROM: Mark Quinn *Mark Quinn CJ*
Chair, Institutional Review Board for the Protection of Human Subjects

DATE: October 5, 2018

RE: *"The Effects of Incorporating Current Science Articles in Science Instruction at the 8th Grade Level" [KM100518-EX]*

The above research, described in your submission of October 5, 2018, 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.

_X_ (b) (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability, or be damaging to the subjects' financial standing, employability, or reputation.

____ (b) (3) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior that is not exempt under paragraph (b)(2) of this section, if: (i) the human subjects are elected or appointed public officials or candidates for public office; or (ii) federal statute(s) without exception that the confidentiality of the personally identifiable information will be maintained throughout the research and thereafter.

____ (b) (4) Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available, or if the information is recorded by the investigator in such a manner that the subjects cannot be identified, directly or through identifiers linked to the subjects.

____ (b) (5) Research and demonstration projects, which are conducted by or subject to the approval of department or agency heads, and which are designed to study, evaluate, or otherwise examine: (i) public benefit or service programs; (ii) procedures for obtaining benefits or services under those programs; (iii) possible changes in or alternatives to those programs or procedures; or (iv) possible changes in methods or levels of payment for benefits or services under those programs.

____ (b) (6) Taste and food quality evaluation and consumer acceptance studies, (i) if wholesome foods without additives are consumed, or (ii) if a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the FDA, or approved by the EPA, or the Food Safety and Inspection Service of the USDA.

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

APPPENDIX B

ARTICLE SUMMARY TEMPLATE

AND RUBRIC

ARTICLE SUMMARY

Name: ____________________________________ Class Period: ____________

Citation (see examples):

Area of Science (circle one): Biology Physic/Chemistry Earth/Space Tech/Comp

Summary Paragraph (at least 7 sentences – 3 key ideas):_______________________

____

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Critique Paragraph (at least 7 sentences):_____________________________________

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Rubric for Current Science Event Article Heading:

	1 Below Grade Level	2 Approaching Level	3 Meets Grade Level	3+ Exceeds Expectations
Citation Information	4 or more errors in formatting	1-3 errors in formatting	0 errors in formatting	
Key Ideas	Less than 7 sentences with key ideas stated but no details given.	Less than 7 sentences, some key ideas stated with some details.	Exactly 7 sentences that restate key ideas and provide details that give a clear, detailed description of each key idea.	More than 7 sentences with key ideas clearly explained using very detailed descriptions.
Critique	Less than 7 sentences that only state why you chose the article.	Less than 7 sentences that evaluate the article, including why you chose the article and your thoughts, feelings, and opinion of the article's conclusion.	At least 7 sentences that evaluate the article, including why you chose the article and your thoughts, feelings, and opinion of the article's conclusion.	More than 7 sentences that evaluate the article including why you chose the article, your thoughts, feelings, and opinion of the article's conclusion, and how the article impacts your life.

APPENDIX C

CITATION EXAMPLES

CITATION EXAMPLES

If any citation goes to 2 lines, indent the second line. Single space within citation.

Magazine in Print: (like Science World)

Last, F.M. (Year, Month Published). Article title. *Magazine Title*, volume(issue), pages.

Example:

Rothbart, D. (2008, October). How I caught up with dad. *Men's Health*, 53(7), 108-113.

Magazine in a Database: (like Science World, Discover, or Science online)
Last, F.M. (Year, Month Published). Article title. *Magazine Title*. Retrieved date from URL

Example:

Folger, T. (2018, July). What causes the weight of the world? *Discover Magazine.* Retrieved October 14, 2018 from http://discovermagazine.com

Magazine Published Directly Online: (like Daily Science, Science News for Students, or Newsela)

Last, F.M., & Last, F.M. (Year, Month Published). Article title. *Magazine Title.* Retrieved date from URL

Examples:

Nasar, S., & Gruber, D. (2006, August). Manifold destiny. *The New Yorker*. Retrieved August 26, 2018 from http://newyorker.com

Bradley, K. (2012, December). The trick to tomatoes. *Green Lifestyle Magazine*. Retrieved September 9, 2018 from http://www.gmagazinecom.au/features/3530/trick-tomatoes

Book:
Last, F.M. (Year Published) *Book Title.* City, State: Publisher.

Example:

Rowling, J.K. (2001). *Harry Potter and the sorcerer's stone.* London: Bloomsburg Children's.

APPENDIX D

NOTES EXPECTATIONS

Article Notes

- Cite your source. See examples.
- 3-4 key ideas from article.
- 3-4 sentences as to why you chose the article. If you use “Because it looked interesting,” you should also include why it looked interesting. You can also include your thoughts, feelings, and opinion of the article and how it applies to your life.

APPENDIX E

SCIENCE CAREER INVESTIGATION

PROJECT AND RUBRIC

SCIENCE CAREER INVESTIGATION PROJECT

Over the past 8 weeks you have been reading current science articles to help you discover more about the science around you, the different career opportunities in science, the places scientists work, and how science relates to your life. For this project, you will review your summaries and notes, and determine if there was a theme in your choice of articles. If there was a theme, you will investigate a science career within that theme. If you do not notice a theme in your choice of articles, was there a topic or scientist that really stood out to you? Either way, choose a science career and start finding out more about it. (If you are having problems deciding on a career, click on one of the links below for some possibilities.) For this project you will turn in the career information worksheet, prepare a presentation using Google Slides, and present your information to the class.

Career Information Sheet Due: ____

Slide Presentation and Presentation Due:____

Science Career Possibilities and Research Information Sites
https://www.sciencebuddies.org/science-engineering-careers
http://carnegiestemgirls.org/stem-resources/careers/
https://docs.google.com/document/d/129Gk5W8W9DOEcy0TvqG__Y-JY1zlRoEYyFscsxR0bjc/edit
https://study.com/article_directory/Glossary_of_Career_Education_Programs.html
https://www.bls.gov/ooh/life-physical-and-social-science/home.htm

The following is information you need to include in your Google slide presentation:

- Career title/name
- Picture of the scientist doing their job
- Description of career -- responsibilities
- Personal qualities that are important in order to be successful in this career -- patience, trustworthy, intelligent, dependable, personable, physically fit, etc.
- Skills needed -- computer, good with hands, observation, communication, etc.
- Education/training required -- length of education/training, type of licenses, certificates, diploma, credentials, continuing education
- Work environment/setting -- indoors, outdoors, with lots of people, in an office, traveling, government, academia; hours worked each week; conditions-dirty, loud, heavy lifting, temperature, etc.
- Employment outlook -- how easy/difficult is it to find a job, field increasing/decreasing, promotional opportunities, number of jobs available
- Salary -- starting, career high, median, overtime
- Benefits -- health/dental insurance, paid vacations, sick days, holiday, company car/phone

- Why did you select this career? How well do you match up with this career? Are you sincerely interested in pursuing this career? Why/Why not? Do you have the skills necessary for this career or are they ones you could develop?
- Cite your sources!!!

If you have time, you can include the following information.

- Courses our high school offers that would be beneficial in this career and why
- Colleges in Illinois that offer a program in the career along with information about the college—location, classes needed, length of program, and cost

Starting December 17, you will be presenting your career to the class. It is up to you to become the expert on your career and be able to explain and answer any questions the class or I have of you.

Your information worksheet will be graded on completion.

Your presentation will be graded on the following:

- Being prepared --all slides are completed and you have practiced your presentation.
- Your knowledge -- research is evident, you are able to answer questions confidently and accurately.
- Professionalism -- you act in a professional manner during your presentation.
- Time -- you are expected to talk about your career for 3-5 minutes.

SCIENCE CAREER INFORMATION SHEET HEADING:

DUE: ________________________________

1. Was there a theme to your article choices? YES NO
   If yes, what was the theme?____

2. What science career are you exploring? ________________________________

3. Define the career.

4. On another sheet of paper, draw a picture of your scientist at work.

5. What personal qualities are needed?

6. What skills do you need to be successful?

7. What type of education/experience do you need?

8. What is the work environment/setting like?

9. What is the job outlook?

10. What is the median salary and benefits?

11. Watch at least 1 video about this career.
    - Video Name: _______________________________________
    - Length: ____
    - Website Link: _______________________________________
    - What did you learn about the career from the video?

12. Why did you select this career? Write a paragraph that includes why you would/would not want this career. Do you have the skills necessary to become this scientist or could you develop them? Be sure to include what you like about it and what you do not like about it. Do you know anyone who has this career? Are there any other questions you have about this career?

____
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FINAL PROJECT RUBRIC

Name: ____ Block _______

Career Information

Category	3	2	1	0
Title of Career	Title of career is clear to audience.	Title is present but not clear.	Title is hard to find.	Not included.
Description of Career	Fully describes career; includes responsibilities.	Describes career but does not include responsibilities.	Briefly describes career.	Not included.
Picture/Drawing Scientist at Work	Picture/Drawing shows a real scientist in their work environment and is in color.	Picture/Drawing shows an unrealistic scientist in their work environment.	Picture/Drawing shows an unrealistic scientist, who is not in their work environment.	Not included.
Personal Qualities	Lists and explains qualities that are important for success in this career.	Lists qualities that are important for success in this career.	Mentions qualities.	Not included.
Skills	Lists skills and explains why they are needed for this career.	Lists skills needed for this career.	Mentions skills.	Not included.
Education and/or Training	Includes length of education/training and examples of where education/ training can be obtained. Lists any licenses, certificates, credentials, etc., required.	Includes length of education/training and examples of where education/ training can be obtained.	Education/training is mentioned.	Not included.

Category	3	2	1	0
Typical Work Environment/ Setting	Thoroughly describes work environment/ setting.	Describes work environment/ setting.	Mentions work environment/ setting.	Not included.
Employment Outlook	Clearly discusses how easy/difficult it would be to find a job in this field, includes statistics.	Discusses how easy/difficult it would be to find a job in this field, not does include statistics.	Mentions finding a job.	Not included.
Pay Scale	Includes beginning, median, and top salaries including the year the data is from.	Includes beginning, median, and top salaries	Only gives part of salary data.	Not included.
Benefits	List and explains benefits available.	Lists benefits.	Benefits are mentioned.	Not included.
Why/Why Not?	Thoroughly explains why career was chosen; provides opinion on whether or not suited to career and why; states interest in pursuing career or not and why.	States why career was chosen; provides an opinion on whether or not suited to career; states interest in pursuing career or not.	Only mentions why career was chosen.	Not included.
Citations	Cites all sources correctly.	Cites some sources correctly.	Sources are mentioned, not cited.	Not included.
Presentation: Time Frame	Presentation falls within the 3-5-minute time frame.	Presentation is within 1 minute over or under the time frame.	Presentation is over or under 1 minute of the time frame.	Presentation is not given.

Category	3	2	1	0
Presentation: Eye Contact	Constantly scans the audience at all times.	Occasionally scans the audience.	Only focuses attention on one person, does not scan audience.	Does not look at audience at all.
Presentation: Completeness of Content	Thoroughly explains all points.	Majority of points thoroughly covered; some points glossed over.	Majority of points glossed over.	One or more points left out.
Extra Credit	High school classes and colleges with career program identified and explained.	High school classes and colleges with career program identified.	High school classes or colleges with career program identified.	Not included.
Extra Credit		All part of project completed on time		All parts not finished on time

TOTAL POINTS: ______________ GRADE: _______________

Grading Scale: 3 = 40-45 2 = 30-39 1 = 29 or below

APPENDIX F

INTEREST SURVEY

Participation in this research activity is voluntary and participation or non-participation will not affect your grade in any way.

Heading: ____

Please answer the questions as thoughtfully and honestly as possible. Please place an ‘X’ in the box indicating whether you agree or disagree to the statement and to what extent.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I do not see how science applies to my daily life.					
I will not be using science in my future career.					
Science helps me to understand the world around me.					
World issues cannot be explained using science.					
I never talk about science with my family or friends.					
When I read about science issues outside of school, I can relate it to something I have learned in science class.					
When I watch TV and there is a scientific topic covered, I can relate it to something I have learned in science class.					

APPENDIX G

INTERVIEW QUESTIONS

Interview Questions for all Sub-Questions.

1. Can I ask you some questions about the current science events articles you have been reading and the activities you have been doing for class?

2. Is it okay for me to record you during this interview?

3. Tell me how your school year is going.

4. What are you looking forward to in high school? Why are you looking forward to that?

Sub-Questions	Interview Questions
1. How does using current science events in an 8th grade science classroom impact students' interest in science?	1) Do you like science class? a) What do you like about class? Why? b) What do you not like about class? Why? 2) Do you find science interesting? a) What do you find interesting? Why? b) What is not interesting? Why? 3) Did you like reading the current events articles? Why? a) Which article did you find most interesting? Why? b) Which article did you find least interesting? Why? 4) If reading current events was not an assignment, would you continue to read current science articles? Why? a) What type of articles would you continue to read? Why? b) What type of articles would not want to read? Why? 5) Did reading the articles make science more interesting to you? Why/Why not?
2. How does increasing interest in science impact student achievement?	1) Do you feel your science knowledge has increased by reading these articles? Why/Why not? a) What is something you have learned? b) What is something you would like to know more about? Why?

	2) Do you feel you are more successful in science because you are reading these articles? a) Why? b) Why not?
3. How can using current events make students more aware of science related careers?	1) How has reading these articles shown how science is important in your everyday life? 2) How has reading these articles helped you understand the world around you? 3) Looking at your original DAST, why did you draw your scientist as a male/female? 4) Why did you draw them the race you did? 5) Where did you come up with your ideas of what a scientist looks like? 6) What made you draw your scientist with ___________? a) crazy hair b) glasses c) a lab coat 7) Why did you draw them in a laboratory/outside? 8) Why did you include _____ in your drawing? a) test tubes, beakers b) a futuristic car c) a danger sign/stay out sign 9) Why did you draw them working by themselves/together? 10) Can you name some science careers that you are now aware of that you were not before? a) What are they? b) What do you think a work day would be like as this scientist? 11) Do you think having pre-conceived notions of what a scientist is leads students to ignore careers in science? a) Why? b) Why not? 12) Are you now interested in a science career? If so, what is it?

4. How will using current events in the classroom impact my teaching?	1) What was the best thing about using current science events in the classroom? Why? 2) Do you think it is worthwhile to continue using them in the classroom? a) Why? b) Why not? 3) Tell me some ways that science applies to your life. 4) What do you think could be done to improve using current science events? 5) Has reading these articles caused you to get excited about science?

APPENDIX H

DRAW A SCIENTIST TEST TEMPLATE

SCIENTIST DRAWING **Heading:**

Directions: Imagine a scientist at work. What does the scientist look like? What would the scientist be wearing? Where would the scientist be? Using color, draw a picture showing what you imagine a scientist looking like and where that scientist would be. You may turn your paper horizontally if you choose.

APPENDIX I

DRAW A SCIENTIST TEST CHECKLIST MODIFIED

Draw a Scientist Checklist Modified
Jones and Bangert, (2009, np)

Drawing Attribute	Coding			
Lab coat	Yes	No		
Eyeglasses/Goggles	Yes	No		
Facial hair	Yes	No		
Symbols of science (microscopes, beakers, etc.)	Yes	No		
Gender of scientist	Male	Female	Neutral	Both
Ethnicity	Caucasian	Diverse	Neutral	
Setting	No Background	Laboratory	Outdoors	Other
Social	Alone	Others	Animal	