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The Pow Factor: Graphic Novels in the Classroom

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The Pow Factor: Graphic Novels in the Classroom

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Thesis Submitted in Partial Fulfillment of the Requirements for the
Degree of Master of Arts in Education

California State University, Monterey Bay

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GRAPHIC NOVELS

The Pow Factor: Graphic Novels in the Classroom

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GRAPHIC NOVELS

Abstract

Increasing reading comprehension skills and intrinsic motivation in students has consistently been a top priority for schools across the country. In order to promote a growth in these skills, teachers search for materials and strategies to help those students who struggle with reading. Research has demonstrated that graphic novels can be an effective tool in improving reading comprehension and motivation with students who lack motivation for reading. This study used a quantitative experimental design with two groups to compare students' reading comprehension and intrinsic motivation scores. The control group ($n = 27$) received direct instruction with the science basal text and the treatment group ($n = 27$) received graphic novel instruction. Independent and paired samples t-tests were conducted to determine the difference in reading comprehension and intrinsic motivation scores between the two groups. The results of this study suggest the use of science based graphic novels used with the treatment group doubled the reading comprehension and intrinsic motivation scores.

Keywords: Reading comprehension, intrinsic motivation, graphic novels, direct instruction, basal.

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Literature Review

Education has seen many changes throughout the course of history, but two things have been consistently important: motivation and reading comprehension. These two concepts have been instrumental in the academic success of students, especially with the current curriculum and standards (Guthrie et al., 2006). Motivation and reading comprehension are conjointly related in that they rely on one another for overall achievement. Reading comprehension can only be achieved if the student is motivated and engaged in what they are doing. In other words, for students to understand what they are reading, they must have a certain level of intrinsic motivation (Guthrie et al., 2006)

Reading comprehension is the ability to read any kind of text and understand it completely (Guthrie et al., 2006). These skills include finding the explicit information within a text and inferring about the plot and characters. Essentially, students are reading to comprehend and understand the text, not to learn how to read. This means that students not only need to understand the text, but apply it to their lives both professionally and personally. Reading comprehension is an essential life skill as students leave high school and either pursue higher education or a profession. In order to get into college, high school students must take the Smarter Balanced Assessment Consortium (SBAC). The SBAC measures reading comprehension skills needed to be successful at the college level (Gavigan, 2011). In addition, third through fifth grade students are also tested with the high-stakes SBAC, in which they are tested to determine advancement within elementary school and if they are doing well and how they compare against the grade level standards.

In order for students to improve their reading comprehension skills, they must

have a certain level of intrinsic motivation. Students' level of *intrinsic motivation* within school refers to their sense of interest in learning without the presence of external motivators. Students who are not intrinsically motivated may engage in off task behaviors such as: putting their heads down, talking to their neighbors and playing with things in their desk (Ryan & Deci, 2000). When students are not motivated to read, their comprehension test scores decline and they are unable to understand what the text is trying to convey (Guthrie et al., 2006). Reading comprehension is dependent upon motivation and student motivation is impacted by the level of interest in the reading materials provided. It is vital for students to be intrinsically motivated, so they can build their reading comprehension skills and be more successful.

Extrinsic motivation refers to the use of tangible rewards or incentives to get students motivated and excited about the lesson at hand. According to the Self-Determination Theory, students who are engaged in the subject matter being taught without an extrinsic motivator are more likely to rise to meet school expectations and comprehend more of what is being taught in class (Ryan & Deci, 2000). When intrinsically motivated, a person is moved to act for the fun or challenge rather than because of external products, pressures or rewards (Ryan & Deci, 2000). Intrinsic motivation lies within each child and can be promoted through inspiring materials and projects used within the classroom.

When teachers provide more engaging materials for students, classroom learning and comprehension increases. Additionally, intrinsic motivation has been documented to have a direct effect on reading comprehension (Guthrie et al., 2006). If students are not being intrinsically motivated in school, they will not be able to fully grasp and

comprehend the assignment being asked of them.

When students are intrinsically motivated, they are engrossed in engaged reading. Engaged reading is strategic, as well as conceptual and students who are able to engage as they read will improve their comprehension surrounding the reading material (Guthrie et al., 2006). Thus the increase in the reading comprehension of the students is ultimately due to the interest and motivation within the learning process itself. If students are motivated and engaged within themselves, they are more likely to understand and comprehend the text (Ching & Fook, 2013). Increased competence in reading, due to motivation, increases school achievement rates and can have a profound effect on each student's academic achievement (Guthrie et al., 2006). This means that if students are comprehending more of what they are reading, they are more likely to be successful in their educational career.

Graphic novels incorporate text and visual illustrations in order to give the reader both a literary and visual understanding of the story itself. Graphic novels use visuals to capture the young reader's attention. With the text and the illustrations in the graphic novels, students are able to visually see the story play out before them and get a better conceptual understanding of the story. According to Gavigan's (2011) research, visual literacy can help a struggling student comprehend the text because it combines text and illustrations to support and accommodate students who are challenged. The promotion of graphic novels helps provide struggling students with assistance in the form of visual literacy.

Graphic novels have not been introduced into classrooms as an academic literacy tool for students because it is often thought of as a non-academic recreational read

(Gavigan, 2011). Graphic novels have therefore, not been studied by researchers in this context as a specific academic tool. Schools are unable to deviate from the materials being implemented by the new Common Core State Standards (CCSS) and thus graphic novels are being impeded (Guthrie et al., 2006). Students can be more successful in school and in their future career with the introduction of graphic novels to improve reading comprehension skills. With struggling readers having more difficulty with the more rigorous materials being provided in the CCSS system, it is imperative to use graphic novels to assist in reading comprehension (Guthrie et al., 2006).

The issue of promoting graphic novels within classrooms is commonly thought of as a struggle because of the materials that are provided to schools (Ching & Fook, 2013). These materials come in the form of a basal text and three to four workbooks per student, with a rigid schedule of what to teach every day with no deviation. These materials that conform to the CCSS model are sometimes too expensive for districts and the teachers are expected to transform the No Child Left Behind framework to meet the CCSS guidelines instead (Gavigan, 2011). With little money and resources left, devoting time to getting graphic novels as an extra comprehensive material for struggling readers is unrealistic for districts. This means that this incorporation of graphic novels comes from the teacher's own personal time and money, which are both very limited.

With very little research about graphic novel incorporation in classrooms, it is difficult to convince teachers of graphic novels' positive achievement benefits. Teachers understand the concept of visual literacy and the benefits, but funding it themselves and finding the time to incorporate it can present an issue. The CCSS standards can allow for new teaching strategies, but they are not provided. With CCSS standards being very

rigorous, using graphic novels can help struggling students get excited about school and can assist children in the comprehension of subjects and concepts within their grade level curriculum (Ching & Fook, 2013). CCSS that are actively put in place will allow teachers to use novelty teaching strategies and materials within the classroom to excite students. Through the use of new materials and focusing on the learning process, teachers can help students fully comprehend each concept that he or she is trying to convey. Throughout this study, the researcher will explain how graphic novels can efficiently be used to teach students who are not motivated in school and are struggling to do well within the realm of comprehension.

Motivation Predictors of Reading Literacy

Becker, McElevany, and Kortenbruck (2010) observed the longitudinal relationship between intrinsic and extrinsic motivation in terms of reading literacy and the promotion of self-efficacy for students from grade 3 through 6. Becker and colleagues (2010) focused on how basal text, as well as motivational tactics, influenced each student's proficiency level and their self-efficacy within an academic setting. The results demonstrated that with a high extrinsic motivational tool in the classroom the students suffered and had poorer reading skills; however, when students are more intrinsically motivated, they are more likely to have a better reading proficiency (Becker et al., 2010).

Reading proficiency is dependent upon intrinsic motivation and the use of more engaging materials (Becker et al., 2010). Graphic novels are tools that can be used to increase reading proficiency due to the level of interest within the realm of intrinsic motivation (Ching & Fook, 2013). Graphic novels are a very important pedagogical tool to improve proficiency because they combine visual art within the book, as well as

reading for literacy and conceptual understanding (Ching & Fook, 2013). Visual literacy provides support for struggling readers and is able to show what the text is saying to the reader.

Versaci (2001) observes the engagement and benefits of using graphic novels as a supplemental English resource. Graphic novels facilitate a cross between a standard basal text and a picture book by incorporating and blending the visual and the textual harmoniously (Versaci, 2001). Versaci (2001) poses the argument of traditional literature versus graphic novels and the incorporation of visuals by stating that graphic novels help acquire analytical and critical thinking skills (Becker et al., 2010). Graphic novels were found to facilitate more analysis than a traditional basal text, due to the blend of visuals and text. This facilitation is due to the promotion of intrinsic motivation through the use of graphic novels within the classroom (Ching & Fook, 2013).

Motivation and Engagement

One theory that helps teachers understand why graphic novels could be an asset as a learning tool in classrooms is the Self Determination Theory, specifically focusing on intrinsic motivation (Ryan & Deci, 2000). More precisely, intrinsic motivation is defined as doing an activity for the satisfaction it brings you. When someone is intrinsically motivated, they are moved to do an activity for the satisfaction it brings them rather than for a reward or an external motivator. The absence of intrinsic motivation can result in a decrease of school performance and an increase of the use of extrinsic motivation (Wiersma, 1992). Promoting intrinsic motivation helps students' school achievement rates and can further their reading comprehension skills (Guthrie & Wigfield, 2000). When teachers provide more engaging materials for students, classroom

learning and comprehension increases (Ryan & Deci, 2000).

Since graphic novels are a novelty item within the classroom, students are immediately intrigued and are willing to do the assignment being asked of them without an external motivator (Berlyne, 1965). Berlyne (1965) observed that students were more interested in the intermediate level of novelty because it was a new material that they do not typically use in day to day classroom activities. Based upon this research, textbook usage within the classroom may result in learning that is extrinsically motivated. A child who is learning from a textbook and doing worksheet questions is not experiencing a novelty situation with new materials and so the child may be doing these tasks to please the teacher or earn a good grade. Using new materials and strategies for teaching and learning, teachers are allowing students to experience new situations in which students are more engaged.

In order to be more effective in the classroom, the lessons being taught should incorporate new novelty materials and ideas without the use of external factors such as prizes and rewards. Extrinsic incentives are only motivating if the reward remains instrumental to the student, so when that reward is taken away or not being offered the engagement and motivation no longer exists (Cerasoli, Nicklin, & Ford, 2014). When schools rely on the “carrot and stick” approach, they in turn are creating students that will only complete a task for a reward and not for the educational benefit. This approach, called the undermining effect, relates to the idea that presenting rewards or incentives undermines the intrinsic motivation being instilled in students (Cerasoli et al., 2014). The deterioration of school achievement is due to the lack of intrinsic motivation brought on by the use of external motivation and non-novelty materials (Cerasoli et al., 2014). This

deterioration leads to unmotivated readers who struggle in comprehension from the lack of motivation and interest.

Unmotivated readers. Students who face challenges in literacy and comprehension often view reading in a negative light and tend to be intimidated by text alone. Graphic novels incorporate the concept of visual literacy that is not intimidating to struggling readers and gives them the opportunity to read and visually see the conflicts and the story line within the novel (Gavigan, 2011). Graphic novels help struggling readers become intrinsically motivated by allowing them to see the author's intentions within the details of the story not only in the written details, but in the visual illustrations as well. For example, Gavigan (2011), found that as adolescents who struggled with reading were eager and excited for silent reading every day because of the introduction to graphic novels. Furthermore, students were motivated to read in a variety of formats and more likely to be successful in school (Gavigan, 2011). This study displays the importance of intrinsic motivation and the contributions of graphic novels for academic success.

Graphic Novel Incorporation

Within the California State Department of Education's website, there is a project called, The USA Project, which contains lesson plans, graphic novel samples, directions and summaries of how to implement graphic novels into a teacher's curriculum. The USA Project included data in which students were tested to produce a baseline on their comprehension skills and were tested again after the graphic novels were introduced. The results, according to the County Office of Education (2009), indicated that the students increased their knowledge of ELA comprehension by seven points and their math

comprehension by nine points. The results of the project met or exceeded its objectives and showed that if students are provided with novelty resources, they are able to comprehend more about the subject or concept they are studying because they are intrinsically motivated.

Critical thinking skills within graphic novels. Besides motivation and engagement, graphic novels begin thought provoking discussions and help develop critical thinking skills. Ching and Fook's (2013) study encompassed the idea that students would develop more critical thinking skills from history, if it was put in a more engaging format. Graphic novels incorporating historical concepts that adhered to the Thinking like Historians model were used, so students would be thinking critically while reading the graphic novel. This study drew conclusive correlations between the graphic novel format (visuals and text) and the critical thinking skills used to reflect for discussion.

Furthermore, students who had both visual pictures and text scored higher than students who solely had the visuals and the students who solely had the text (Ching & Fook, 2013).

These students who received both the visual and the text in the graphic novel were found to have been more stimulated through questioning the story in both formats. The conclusion drawn from this is that the graphic novel supported and fostered the critical thinking skills being developed through the problem-solving process within the story.

(Ching & Fook, 2013). When a school is having the students merely memorize information and not fully, conceptually understand it, they are not promoting their own intrinsic motivation and therefore, cannot be engaged in critical thinking skills.

Motivation and critical thinking skills are dependent upon one another because without one the student would not become academically proficient in his or her grade level

(Gavigan, 2011). The solution to the problem of disengagement and motivation is to provide more novelty materials, such as graphic novels, that the students can relate to positively.

Purpose

The intention of this study is to identify if a relationship exists between motivation and comprehension amongst fourth grade students, in particular whether or not graphic novels improve the comprehension and motivation of students in science. A positive relationship between comprehension, motivation and graphic novels in the fourth-grade level supports the need for graphic novels in the elementary school setting (Ching & Fook, 2013; Gavigan, 2011). This result could influence the use of graphic novels within elementary schools. Since motivation and comprehension are essential for academic success, more engaging materials being used within the classroom, like graphic novels, could become a universal tool in student learning and success (Ching & Fook, 2013).

Method

Research Questions

Question 1: Does the use of educational science graphic novels increase 4th grade students' motivation to read?

Question 2: Does the use of educational science graphic novels influence 4th grade students' reading comprehension?

Hypothesis

Based upon the research in this field, it is hypothesized that the students' comprehension and motivation in science will improve with the use of graphic novels in the classroom (Ching & Fook, 2013).

Research Design

This study is a quantitative, experimental study with a situation producing pretest-posttest design. In this study, there is one treatment group and one control group. The control group consists of one 4th grade classroom and this classroom will receive no intervention or treatment, just the use of the science basal text (Pearson, 2008). The treatment group consists of one similar 4th grade classroom which received an intervention through the use of science graphic novels. The control and the treatment group participated in this four-week study.

Independent variable. The independent variable in this study is the four-week graphic novel intervention facilitated by the researcher. Graphic novels are books combining reading material and sequential art to help readers visualize a story and to see the complexity of emotions displayed by the characters (Carter, 2007). All of the work done with the graphic novels, such as discussion and explanations for some story elements, will be done in the classroom of the researcher.

Dependent variable. The dependent variables in this study are motivation and reading comprehension. Motivation is a direction of behavior which causes the behavior to be repeated through a motive (internal or external) and is measured by if the students want to continue to use the new medium on a consistent basis (Ryan & Deci, 2000). For the purpose of this study, motivation is measured through the use of the Elementary

Reading Attitudes Survey (ERAS; see Appendix A) as their pre and posttest. Reading comprehension is conceptually defined as the process of making meaning and interpreting conflicts within a text and is operationally measured by how well the students understand the concepts within the material being used (Carter, 2007). For the purpose of this study, comprehension is measured through the use of the Pearson California Science Unit 1 Test (see Appendix B) within the basal text (Pearson, 2008).

Setting and Participants

This study takes place at an elementary school on the Central Coast of California. The elementary school consists of 530 students and 20 teachers. The school is 77% Hispanic, 17% White, 3% Filipino, 2% Asian, 1% Black and 0% American Indian and Pacific Islander. Approximately 74% of students participate in free and reduced lunch programming.

The participants of this study are comprised of students between the ages of 9-10 and are elementary school students. These students are enrolled in two fourth grade classrooms.

Treatment group. The treatment group is a fourth grade classroom consisting of 27 students between the ages of 9-10. 14 students are Male (52%) and 13 students are Female (48%). Of the students, 20 are Hispanic (74%); 4 White (14%); 3 Asian (11%). Within the treatment group, 14 students are English Learners (EL; 52%), 10 students are English Only students (EO; 37%), and 3 students are Redesignated Fluent English Proficient (RFEP; 11%). There are 3 students in the class that are in Special Education (SPED; 11%). The class has a total of 18 students who are Socioeconomically Disadvantaged (SED; 66%).

Control group. The control group is also a 4th grade classroom in the same school that also has 27 students, all between the ages of 9-10. 16 students are Male (59%) and 11 students are Female (41%). 22 students are Hispanic (82%) and 5 students are White (19%). Within the control class, 16 students are EL; (59%), 7 students are EO; 26%) and 4 students are (RFEP; 15%). There are two students who are SPED (.074%) and 23 students are SED; (85%).

Measures

The pretest and posttest survey questions were both taken from the ERAS (McKenna & Kear, 1990). McKenna and Kear (1990) developed and implemented the measure to compare scores from students within one school. Reliability and validity results were established and the survey possesses adequate levels of internal consistency (1990). The ERAS measure has been used frequently within many studies regarding motivation (Kazelskis, Thames, & Reeves, 2005; Kush & Watkins, 1996; Worrell, Roth, & Gabelko, 2010).

The ERAS is a 20-item questionnaire that measures motivation and a student's attitude towards reading by asking students to answer on a Likert Scale format of 1-4 (1 = Very Upset Garfield [not at all], 2 = Mildly Upset Garfield [slight dislike], 3 = Slightly Smiling Garfield [interest], 4 = Happiest Garfield [high interest]); if students feel happy and agree with each question or if they dislike and disagree with each question. The questions ask the student how they feel about different elements in reading. Question examples include: "How do you feel about taking a reading test?" and "How do you feel when you read out loud in class?" This measure asks students to determine how they feel

about each element of reading and their own emotions towards reading. The responses are totaled to a number which tells the educator students' motivation towards reading.

The pretest and posttest comprehension test were both taken from the Pearson California Science Unit 1 Test (Pearson, 2008), which is the test from the basal text offered within the elementary school. This basal text has been tested for validity and reliability based upon the California Science Standards. This test is a multiple-choice scale and includes questions like: "Which material conducts electricity?" "What causes a balloon to stick to a wall with static charge?" and "What is an electric current?" The test consists of nine multiple choice questions. All the answers to all the questions come from the book. It also comes with a graded rubric for each section of the test. This test should take approximately 25 minutes for students to complete with no additional time.

Validity. The validity of the ERAS was measured by comparing the teacher's analysis of each student's reading interest and motivation and how the students scored their feelings towards reading on the ERAS (McKenna & Kear, 1990). Further researchers state that between the first administration of the survey to fourth-six graders and the second administration of the survey (7 days), the mean score from all the students increased 0.80 (Kazelskis et al., 2005). In this study it was predicted that a short period of time between the first administration of the survey and the second administration of the survey would not demonstrate a lot of growth. This was also confirmed by the findings in McKenna and Kear's (1990) study. Evidence for concurrent validity has been cited and found by multiple studies that also compared the first administration data to the second administration data of the ERAS survey.

The basal texts pretest and posttest will be used to measure student's comprehension of scientific concepts relating to electricity. The assessment text used will be the 2008 *Pearson California Science* textbook. The basal text is valid because it is designed by experts in the field and it is based on the California State Standards (Pearson, 2008).

Reliability. For Pearson's basal text, stability and reliability has been founded by the consistency of the assessment. The pretest and posttest has been graded by the researcher and the partner teacher to ensure inter-rater reliability. The answers for grading and the rubric being used are found within the teacher's guide of the basal text (Pearson, 2008). The ERAS survey shows high levels of test-retest reliability and stability (Worrell et al., 2010). This was also confirmed by multiple studies that proved the stability of the test and how reliable it is (Kazelskis et al., 2004). The pretest and posttest of the ERAS survey has been graded by the researcher and the partner teacher to ensure inter-rater reliability.

Intervention

The intervention for this study is the use of the *Electricity* graphic novel in the intervention group. Students participated in a four-week intervention centered on graphic novel use in the classroom for increasing motivation and comprehension. The study included two components: (1) reading the graphic novel inside the classroom; and (2) a twenty-minute written reflection on the key concepts of electricity learned that week. The reflection helped the students reflect on what they learned during the week and help relate the information surrounding electricity to themselves and their daily lives. The reflection included for the treatment group was included to mimic the reflective tasks included in

the basal reader. The graphic novel will cover the concepts of electricity including: static electricity, the flow of electricity, electrons, circuits, conductors and insulators. The same concepts will be taught in the basal text to the control group.

Procedures

The graphic novel intervention was researcher led in the intervention group. The reflection aspect of the study was teacher led by the researcher in the intervention group. This reflection occurred at the end of the week on Thursday for about 15 minutes every week. This study lasted four weeks. Both the control and the treatment group took both pretests (ERAS and Pearson Unit 1 Test). At the end of the four-week intervention, both the control and treatment groups took the posttest assessment and survey.

Data collection. The data for both classes in this study were collected over a period of four weeks. The students in both the treatment and control groups were given the ERAS (Worrell et al., 2010) and the *Pearson California Science* textbook (Pearson, 2008) pretests to measure the level of motivation, interest and comprehension in relation to electricity and reading. The same tests were administered again to both the treatment and control groups four weeks later, after the graphic novel was read.

Fidelity. The researcher maintained fidelity to the study by having the Teacher on Special Assignment (TOSA) come in while the intervention was occurring to validate the fidelity to the study. The TOSA came in 20% of the time to establish 100% fidelity to the intervention. She also came into the control classroom to ensure that no intervention was being used. Students were told to not discuss their science graphic novel with the other class, so as to not “Make them feel bad.” Students were not named in the study and will retain complete anonymity.

The researcher ensured fidelity to intervention the researcher would be the only facilitator and educator in the intervention group. The partnering teacher would teach the basal text according to the plan that was provided throughout the text. Participants in the study, in both the treatment and the control group, were not informed of the study, nor its purpose. The partnering teacher and the researcher created goals and objectives to ensure the validity of the study. The time allotments for the intervention in the intervention group and the science instruction within the control group did not exceed 20 minutes twice a week. The intervention did not exceed past four weeks.

Ethical Considerations

The researcher ensured participant confidentiality by making sure that the names of the participants and the school site was not released in the study through the use of pseudonyms. The graphic novel intervention was not potentially harmful to any participant, nor were there be any emotional risk or conflict. All of the graphic novel work was done within the classroom and did not require students to go anywhere else in the elementary school. The students did not have to add any additional time outside of school to this intervention. This study did not intervene on any subject throughout the week and was taught during the designated science time. The researcher used the measures named within this study and did so accurately without deviation.

Validity threats. Many steps were taken to reduce threats to validity in this study. Sampling bias was avoided by including two classes of fourth grade students within the study, as opposed to individuals. It was ensured that both the treatment and control classes had the same number of students and the same age group. Overall academic skill level was matched between both classes and there were similar demographics to

eliminate any outliers. The researcher reduced the threat of researcher bias by following the plan for the treatment group without differing.

Data Analyses

All data were entered into the Statistical Package for the Social Sciences ® (SPSS®) for Windows, version 24.0.0 (SPSS, 2016). No names or identifying information were included in the data analysis. Before analyses were conducted all data were cleaned to ensure no outliers were present (Dimitrov, 2012). Independent (control and treatment groups) and paired (pre test and post test) sample t-tests were conducted to determine the significant difference in motivation and comprehension scores on the ERAS (Worrell et al., 2010) and Pearson California Science Unit 1 Test (Pearson, 2008). Further, before interpreting the analytical output, Levene's Homogeneity of Variance was examined to see if the assumption of equivalence has been violated (Levene, 1960). If Levene's Homogeneity of Variance was not violated (i.e., the variances were equal across groups), data were interpreted for the assumption of equivalence; however, if the variances were not equal across groups the corrected output was used for interpretation.

Results

The following results are organized according to the two research questions.

Research Question 1

Does the use of educational science graphic novels increase 4th grade students' motivation to read?

Two independent samples t-tests were conducted on the whole sample ($n = 27$) for both the pre-and post-assessment scores on the ERAS (Worrell et al., 2010). For the

pretest, Levene's Homogeneity of Variance was violated ($p < .05$), meaning the variance between groups was statistically different and the second line of data were used, and the t-test showed non-significant differences between the mean scores on the pre-tests between the two groups $t(34.33) = .74, p > .05$. Therefore, both groups had similar means on the pretest, and were comparable groups based on the pretest.

For the post tests ERAS, Levene's Homogeneity of Variance was not violated ($p > .05$), meaning the variance between groups was not statistically different and no correction was needed, and the t-test showed non-significant differences between the mean scores on the post-tests between the two groups $t(52) = -2.02, p = .05$. This means that the posttest results were statistically similar between the control and the treatment groups; therefore, there was no statistical difference in using the intervention versus traditional instruction on students' motivation to read.

Table 1

Results of Independent T-Tests for ERAS

	Mean	SD
Pre Test		
Treatment	1.97	.17
Control	2.03	.41
Post Test		
Treatment	2.28	.39
Control	2.10	.39

Note. SD = Standard Deviation.

After determining the differences between pre and post assessment scores between groups, two paired t-tests were run for both groups (i.e., treatment and control) to determine, if participants mean scores from pre to post were significantly different within each group (see Table 2). Results for each group were as follows: treatment group,

$t(26) = -9.98, p < .001$; control group, $t(26) = -3.95, p < .001$. These results tell the researcher that while both classes made significant progress, the treatment group made more progress than the control group because they started with a lower overall mean on the pretest and achieved a higher mean on the posttest (see Table 2). Therefore, even though the hypothesis was not confirmed because the posttest scores were not statistically different, the treatment group made more progress than the control group. Further, the treatment group standard deviation score increased (from .17 to .39) which tells the researcher that their scores were not close together and were not statistically closer to the average. Meaning that the treatment group scores were not as consistent and had more variability across their data than the control group.

Table 2

Results of Paired T-Tests for ERAS

	Mean	SD
Treatment Group		
Pre	1.97	.17
Post	2.28	.23
Control Group		
Pre	2.04	.41
Post	2.10	.39

Note. SD = Standard Deviation.

Research Question 2

Does the use of educational science graphic novels influence 4th grade students' reading comprehension?

Two independent samples t-tests were conducted on the whole sample ($n = 27$) for both the pre and post assessment scores on the Pearson Unit 1 test. Results for the pretest were: Levene's Homogeneity of Variance was not violated ($p > .05$), meaning the

variance between groups was not statistically different and no correction was needed, and the t-test showed non-significant differences between the mean scores on the pre-tests between the two groups $t(52) = .55, p > .05$. This value shows that the scores are not far apart in reference to the similarity between both the control and treatment groups on the pretest (see Table 1).

Results for the post-test were: Levene’s Homogeneity of Variance was not violated ($p > .05$), meaning the variance between groups was not statistically different and no correction was needed and the t-test showed non-significant differences between the mean scores on the post-tests between the two groups $t(52) = -1.62, p > .05$. This means that statistically there was not a large difference between the two scores on the post test and the original hypothesis was not accepted.

Table 3

Results of Independent Samples T-Tests for Unit 1 Test

	Mean	SD
Pre Test		
Treatment	57.37	25.70
Control	61.22	25.69
Post Test		
Treatment	76.89	16.52
Control	68.19	22.47

Note. SD = Standard Deviation

After determining the differences between the pre and post assessment scores between groups, two paired t-tests were run for both groups (i.e., treatment and control) to determine if participants mean scores from pre to post were significantly different within each group (see Table 4). Results for each group were as follows: treatment group, $t(26) = -6.26, p < .001$; control group, $t(26) = -3.65, p < .01$. This means that both groups

had a statistically significant difference in their mean from the pre to the post test. Further, the negative t values show an increase in the mean from the pre to the post test score for both groups.

The treatment group had a mean of 57.37 on their pretest and they increased their mean by 19.52 to 76.89 with a standard deviation decrease of 9.18. The control group had a mean of 61.22 on their pretest and increased their mean by 6.97 to 68.19 with a standard deviation decrease of 3.22. These results tell the researcher that while both classes made significant progress, the treatment group made more statistical progress than the control group. Additionally, their standard deviation score decreased which tells the researcher that their scores were closer together and statistically closer to the average (Table 4). Therefore, although the hypothesis was only partially accepted, the treatment was effective at increasing students' mean scores on the achievement measure and was able to produce more consistent data across students.

Table 4

Results of Paired T-Tests for Unit 1 Test

	Mean	SD
Treatment Group		
Pre	57.37	25.70
Post	76.89	16.52
Control Group		
Pre	61.22	25.69
Post	68.19	22.47

Note. SD = Standard Deviation.

Discussion

This study aimed to explore a graphic novel intervention for the benefit of improving reading comprehension and motivation skills in fourth grade students. Due to the new implementation of the CCSS in the United States, reading comprehension, and

motivation in all content areas of education is essential to every student's educational advancement. This study included 27 students who received instruction with science themed graphic novels as an intervention and 27 who received direct instruction using the basal text only. The main difference between the two groups of participants (control and treatment) was the use of the science themed graphic novel in place of the basal text that the control group used.

The results of this study partially confirm the hypothesis that with the intervention in place, the treatment group would improve their reading comprehension and motivation. Although the treatment group improved in both comprehension and motivation, their posttest scores on the motivation survey were not statistically different than the control group ($p = .05$) nor were they for the comprehension posttest ($p > .05$). Therefore, the hypothesis was partially confirmed as the treatment group made higher gains in both motivation and comprehension, however this change was not enough to be statistically significant.

The participants who used the graphic novels were able to reflect on what they learned each week and see visual representations of the text in the graphic novel. Gavigan (2011) discovered that illustrations in graphic novels open the door to reading for struggling and challenging readers because they are able to understand the text through the visual pictures as opposed to the print alone. Students in the control group did not receive the same visuals and in this particular study they may have had difficulty connecting to the story text. Although the students in the control group did make progress in their reading comprehensive understanding of the science material and in their reading motivation scores, it was not as significant of an improvement as the treatment group.

The treatment group started this study at a lower mean than the control group for both the Pearson science test and the ERAS, but nearly doubled their scores from the pre to the posttest and surpassed the control group.

The results found in this study were very similar to the results found within Gavigan's study (2011) who found students who are provided the opportunity to learn with visuals that correspond to the text, are more likely to improve their vocabulary scores and bridge the gap to other novels they might not have tried before. In the Lepper, Iyengar, and Corpus study measuring achievement and motivation, it was also found that students learning with visuals through the use of intrinsic motivation did better on classroom assessments, than those without visuals and motivated by extrinsic motivation (2005).

Incorporating graphic novels in the classroom creates a visual learning environment that provides students with illustrations to support themselves with the basal text. Students who were in the treatment group were able to reflect on the material being taught in the California Science curriculum with their weekly reflection, while the control group did not. Guthrie and colleagues (2006) discovered that when students reflect on what they learned that week with the introduction of a novelty stimulating reading material, they will increase their reading comprehension skills and motivation skills on the standardized test. That result indicates an effect on how the level of interest and motivation with a new and stimulating reading material increases the level of reading comprehension within that class. This is very similar to this study in that both studies incorporated the use of stimulating reading material as well as having the students reflect on what they have learned each week. Both studies measured the class's reading

comprehension and intrinsic motivation. This study and Guthrie and colleagues' study (2006) saw that with the use of a novelty reading material, each student's motivation and reading comprehension scores increased.

Limitations and Future Studies

One of the limitations for this study is the use of convenience sampling as the sampling method. This could have impacted the study because it is not randomized and relied on what was most convenient for the researcher. Another limitation for this study is the small sample size used. With a larger sample size in the study, more data could have been produced and the reliability could have been stronger. The last limitation for this study is the lack of a gender subgroup, to see if there are relationships between the two genders involved.

Based on the limitations in this study, the researcher has the following recommendations for any future studies. One recommendation would be to have a more specific sampling method besides convenience sampling, such as random sampling. This is beneficial because the researcher could see if the results would still be the same with a random sample of students. Additionally, future researchers should have a larger sample size across more than one grade level. This is important because a larger sample size would give the researcher more data and more reliability in the results.

Another recommendation would be to have the grade levels compared through a gender subgroup to identify different relationships between reading comprehension, motivation, and gender. This would be imperative because this data would tell the researcher if there were any differences in reading comprehension and intrinsic motivation scores between the two genders. Future studies in this area should have the

treatment replicated with different content areas in elementary education to see if similarities can be made. If the same study is done with different content areas, the researcher could determine if subject matter had any effect on the reading comprehension and intrinsic motivation scores of the students in the treatment group.

Summary

In conclusion, the use of graphic novels can have a direct impact on the reading comprehension and motivation of fourth grade students (Guthrie et al., 2006). Creating a sense of interest and motivation in students is essential to improving not only reading comprehension, but school achievement levels (Lepper et al., 2005). Students who struggle with reading find it very difficult to get motivated enough to read and comprehend what they are reading (Lepper et al., 2005).

This study has displayed that students who have a multitude of different attitudes towards reading can be motivated enough to comprehend the text through the use of visual literacy. This motivation stemmed from the use of graphic novels within the classroom. The treatment group students in this study were able to increase their intrinsic motivation and double their reading comprehension scores by learning from a different type of novel that incorporated text and illustration in an interesting format. Overall, this study has shown that students were able to increase their intrinsic motivation and reading comprehension scores by using graphic novels within the classroom. Thus, teachers should use graphic novels more in the classroom in order to help the wide array of readers and researchers should continue to research their effectiveness in improving motivation and comprehension in students.

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Appendix A

Elementary Writing Attitude Survey (ERAS) Sample Page

Elementary Writing Attitude Survey

Name _____ Grade _____ School _____

Please circle the picture that describes how you feel when you read a book.

1.

How would you feel writing a letter to the author of a book you read?



2.

How would you feel if you wrote about something you have heard or seen?



3.

How do you feel writing a letter to a store asking about something you might buy there?



4.

How would you feel telling in writing why something happened?



Appendix B

Unit 1 Pearson California Science Test

Name _____ Date _____

Chapter

1. What is an electric charge in matter?
 - a. a unit of electricity
 - b. energy carried by objects
 - c. energy carried by insulators
 - d. a special kind of atom

2. What is an electric circuit?
 - a. an electric battery
 - b. an electric light bulb that is turned on
 - c. a pathway that electric current follows
 - d. a unit for measuring electricity

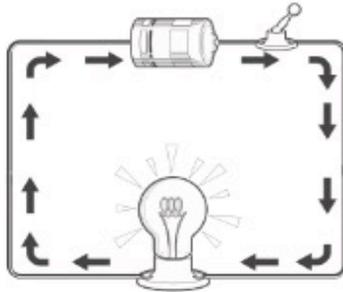
3. What are the two types of electric charges?
 - a. high and low
 - b. solid and liquid
 - c. elements and compounds
 - d. positive and negative

4. Objects with the same electric charge
 - a. repel each other.
 - b. attract each other.
 - c. are called insulators.
 - d. are called conductors.

5. What is static electricity?
 - a. a high voltage carrier
 - b. a positive charge on an object
 - c. a positive charge on an object
 - d. built-up electric charge on an object

6. What is an electric current?
- an electric circuit with all lights on
 - an electric circuit with continuity
 - static electricity
 - a continuous flow of electric charge

7. What happens when the circuit shown is opened?



- Electric current will not flow through the circuit.
 - Electric current will flow through the circuit.
 - The bulb will light.
 - The circuit will be continuous.
8. Which material conducts electricity?
- copper wire
 - cork
 - rubber
 - wood
9. What causes a balloon to stick to a wall with static charge?
- positive and negative charges repel
 - two negative charges attract
 - two positive charges attract
 - positive and negative charges attract