

2014

The Usefulness of Graphic Novels as Information Sources for Nonfiction Reading

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Abstract

The purpose of this study was to further understand students' ability to comprehend science content information after reading graphic novels. Students were also monitored for interest and enjoyment of the graphic novel format when reading about astronomy, Earth, and space. This descriptive study sought to describe what students learn about science content when reading from graphic novels, what changes occur in students' comprehension statements after reading graphic novels, and the interest and enjoyment students have when reading graphic novels. Participants met four times, for 45 minutes, to read and discuss graphic novels, as well as rate their interest and enjoyment of graphic novels. Results showed when reading graphic novels to learn about science content, three students increased their comprehension scores and one maintained her comprehension score for the topic of astronomy. Considering the topic of Earth all students who were present increased their comprehension score. With the topic of space, three students increased their scores and one student maintained his score. In response to the open-ended question, students were able to readily supply facts learned from reading graphic novels about science topics. At the same time, students struggled to process those science related graphic novel facts into meaningful explanations and/or conclusions. Overall, students became more interested in each of the three topics after reading the graphic novels. Each student also rated their enjoyment of science related graphic novels as above average, with each student rating each graphic novel with a four or five with five being highest. This research does not suggest graphic novels should replace textbooks but can be an excellent supplemental informational text to use for students' learning of science.

THE USEFULNESS OF GRAPHIC NOVELS AS INFORMATION SOURCES
FOR NONFICTION READING

A Graduate Research Paper
Submitted to the
Division of School Library Studies
Department of Curriculum and Instruction
In Partial Fulfillment
Of the Requirements for the Degree
Master of Arts
UNIVERSITY OF NORTHERN IOWA

by
Sarah Holub
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ABSTRACT

The purpose of this study was to further understand students' ability to comprehend science content information after reading graphic novels. Students were also monitored for interest and enjoyment of the graphic novel format when reading about astronomy, Earth, and space. This descriptive study sought to describe what students learn about science content when reading from graphic novels, what changes occur in students' comprehension statements after reading graphic novels, and the interest and enjoyment students have when reading graphic novels. Participants met four times, for 45 minutes, to read and discuss graphic novels, as well as rate their interest and enjoyment of graphic novels. Results showed when reading graphic novels to learn about science content, three students increased their comprehension scores and one maintained her comprehension score for the topic of astronomy. Considering the topic of Earth all students who were present increased their comprehension score. With the topic of space, three students increased their scores and one student maintained his score. In response to the open-ended question, students were able to readily supply facts learned from reading graphic novels about science topics. At the same time, students struggled to process those science related graphic novel facts into meaningful explanations and/or conclusions. Overall, students became more interested in each of the three topics after reading the graphic novels. Each student also rated their enjoyment of science related graphic novels as above average, with each student rating each graphic novel with a four or five with five being highest. This research does not suggest graphic novels should replace textbooks but can be an excellent supplemental informational text to use for students' learning of science.

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CHAPTER 1

INTRODUCTION

A fifth grade teacher enters the library looking for texts to help support a unit she will begin teaching soon. With an increased emphasis from the Common Core State Standards (CCSS) on nonfiction reading, the teacher librarian immediately retrieves books from the nonfiction section. As the teacher librarian hands the teacher a graphic novel, a look of horror passes over the teacher's face. When asked about her reservations about using a graphic novel the teacher replied, "the kids can't really learn anything from a graphic novel; there are too many pictures." With the proliferation of graphic novels in the last few years, this scene is becoming all too familiar. Reid and MacDonald (2013) are "reporting sales growth of 6% in the third quarter of 2013, according to the annual industry White Paper delivered by ICv2 CEO Milton Griep at Comics Ahead!" (para. 1). With the increased sales, graphic novels are in a pivotal position to reach teachers and students within the classroom.

Research Problem

With convergence of the Common Core State Standards and emphasis on nonfiction textual reading, graphic novels are quickly gaining popularity with students. A graphic novel is defined as, "a novel or complete story in comic book format with a beginning, middle, and end and continuing character and plots" (Bruggeman, 1997, p. 26). While not technically a story or novel, nonfiction texts with graphic and textual elements of graphic novels have been included under this rubric. "The response to graphic novels has fueled an explosion of publications in this format" (Killen, 2013, p. 57). As students are accepting graphic novels as quality nonfiction, teachers are showing

resistance in accepting graphic novels as quality nonfiction. Ruppel (2006) noted the disconnect, “Despite the endorsement by many librarians, many teachers have been reluctant to include graphic novels in their curricula” (p. 2). Teachers may think there are few benefits to using graphic novels as quality sources of nonfiction and are unsure how to incorporate graphic novels into their classroom. Lapp et al. (2012) report that although some teachers are willing to use graphic novels and other graphica, there are barriers that prevent their use such as “lack of instructional models, lack of graphic novels in the classroom, and their own level of comfort with the genre” (p. 23). Some educators also operate under the assumption that graphic novels lack substance in comparison to other literary forms. On the other hand, the Cooperative Children’s Book Center (2007) concludes, “there are graphic novels that relate to subjects across the curriculum, while the format itself offers opportunities to engage various types of learners” (para. 4).

The Common Core State Standards (National Governor’s Association, 2010) allow teachers and parents to know the exact skills students are to achieve at the end of each grade level with the goal their being career and college ready upon graduation. When looking at the Common Core State Standards, graphic novels are an excellent choice to use independently or pair with traditional novels to teach specific skills. The following are examples from the English Language Arts Standards for fifth grade that may be taught using graphic novels:

CCSS.ELA-LITERACY.RI.5.3 Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.

CCSS.ELA-LITERACY.RI.5.4 Determine the meaning of general academic and

domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

CCSS.ELA-LITERACY.RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.

Students are able to use factual details from graphic novels to further understand the relationship between Earth and the asteroid belt. While reading and conversing about graphic novels, students are also able to use context clues and discussion to determine the meaning of text. With the help of a table of contents, glossary, and index, students are easily able to locate answers to questions in both traditional nonfiction texts and nonfiction graphic novels.

Living in the highly visual environment students face today, the visual literacy component provided by graphic novels is appealing to them. Dallacqua (2012) asserts that, “students are able to use the illustrations provided in graphic novels to comprehend the content and interpret meaning from those same illustrations” (p. 368). The visually appealing format may provide comprehension strategies for students who would otherwise struggle to comprehend traditional, nonfiction text. According to *The Lexile Framework for Reading* (2012), “the combination of art and text appeal to readers of all abilities, but particularly motivate a struggling reader to engage with a text” (para. 6).

Purpose

The purpose of this project is to further understand students’ ability to comprehend science content information after reading graphic novels. Students were

monitored for interest and enjoyment of the graphic novel format when reading about astronomy, Earth, and space.

Research Questions

1. What do students learn about science content while reading graphic novels about science topics?
2. What changes are evident in students' science comprehension statements after reading graphic novels about science topics?
3. In what ways do students demonstrate their interest and enjoyment of the visuals and text when reading graphic novels about science topics?

Assumptions

It is assumed that students and some teachers will want to use graphic novels as a viable format for learning and information gathering.

Limitations

This research is an exploratory study that includes only students within one school. Its application to students in other settings will depend upon the similarity of the settings and student populations.

CHAPTER 2

LITERATURE REVIEW

The purpose of this research project was to determine the usefulness of nonfiction reading in graphic novel format. Research related to this issue falls into three categories: graphic novels and visual literacy, graphic novels and comprehension, and graphic novels as nonfiction in content areas. The following studies provide a foundation for further study into graphic novels and their effectiveness as information sources.

Graphic Novels and Visual Literacy

Pantaleo (2013) sought to understand students' meaning making in the context of the graphic novel format by engaging students in discussion of illustrated texts and by assigning students to create their own graphic texts. She later interviewed students to gain insight into their intentions as they designed their products. Of particular importance was the multimodality of students' work as well as their understanding of the conventions of the graphic novel for meaning making. To explore their meaning making, she concentrated on the student products at the individual panel level, i.e., the unit of meaning within a graphic novel.

Pantaleo's (2013) study was limited in its size and may be unique in that it was completed in an international school. Nevertheless, the findings raise important issues regarding the support needed for meaning making from graphic novels. Eight female students and 12 male students from a fourth grade classroom in British Columbia, Canada volunteered to complete the study. Student ethnicity of participants was as follows: European-Canadian (14), Chinese (2), Korean (1), South Asian (1), and biracial (2).

Language Arts report cards indicated student abilities from exceeding to minimally meeting grade level expectations.

Using a semi-structured interview format, Pantaleo (2013) encouraged students to openly talk through their graphic narratives. Students were encouraged to explain their use of border colors, border styles, intensity, shapes and sizes, and sequencing. Pantaleo (2013) determined that all students provided reasons to explain size and shapes and intensity of panels, while one-third of the students provided reasons to explain border color. Finally, 16 students provided reasons to explain sequencing of their panels.

Data analysis focused on follow-up interviews of 20 students who explained their decision-making as they designed their products. Findings suggested that students benefited from learning the conventions of the graphic novel itself to deepen their meaning making, both as creators, and by extension as readers. The researcher suggested that students need explicit instruction to read critically and to understand deeply both the visual and textual messages.

Thomas (2010) was similarly interested in the connection between text and illustrations. Thomas explored how the relationship of text and illustrations can influence students' understanding. The qualitative case study took place in a Department of Defense school in Europe and included six-second grade students. The students, four boys and two girls, were considered at or above grade level. With the hope of building student awareness and vocabulary to enhance story retellings, the study began as students were introduced to the basic elements of art.

Thomas (2010) used the think-aloud method, during the study, while reading stories to students as a group. Think-aloud was used to model the importance of

dissecting the illustrations to aid in better understanding the text. Finally, students read the stories together as pairs. With group discussions, verbal retellings, pictorial drawings, and student interviews, Thomas concluded that all students conveyed textual and visual understanding of picture books and information picture books with the assistance of think-aloud modeling.

Likewise, Walker (2013) was interested in visual literacy via the use of graphic novels. She conducted a multiple case study wherein each of the six reported cases represented one student. During a four-week workshop with 14 eighth grade minority students, the researcher investigated the use of graphic novels to teach traditional literacy skills as well as new literacies related to integrated visual-textual reading. Using graphic works and basic literacy skills, the workshop gradually built on format structure and new literacies before moving on to more complex texts and assignments.

The final project was for students to create their own graphic works. Although the study involved 14 students, only six participated in a case study to describe student comments and attitudes. Walker (2013) reported, “graphic novels can be appealing, interesting, and motivating to middle school students while assisting them in utilizing both traditional and new literacy skills” (p. i).

The students for this study were volunteers and therefore may have brought a favorable disposition toward graphic novels. While the study was limited in size and generalizability, Walker’s findings led her to conclude that graphic novels may offer a particularly useful resource for marginalized students.

Engaging students in the discussion of illustrated texts helps to increase understanding of factual information. As suggested by Pantaleo (2013), students need

explicit instruction to read critically and understand deeply. To accommodate this thinking, the authors suggest use of a picture walk and basic discussion before any reading begins. As the researcher of this study conducted the picture walk and basic discussion, students were encouraged to verbally dissect and talk through the illustrations with the hope of better understanding.

Graphic Novels and Reading Comprehension

In the area of reading comprehension, graphic novels have shown many positive effects. Hammond (2009) reported on how students make meaning of and respond to graphic novels. During a political science class, 23 twelfth-grade students read *American Born Chinese*. Using reader response theory, a qualitative method was employed to interpret the data collected from oral and written responses, reading questionnaires, interviews, field notes, and student created comics. Results concluded that reading a graphic novel was a new experience for most of the students, but they enjoyed the reading of the book. Hammond concluded that students could improve their multimodal literacy skills while using graphic novels as formats for teaching within the curriculum.

Lamanno (2007) explored the use of graphic novels in the classroom and their ability to increase student comprehension and motivation. The small group reading instruction study was conducted with students who had severe reading problems. Empirically supported techniques included the use of graphic organizers, self-questioning, and vocabulary instruction. Lamanno (2007) was seeking insight into the potential for graphic novels to be used as an intervention to improve students' reading comprehension, reading motivation, and reading fluency.

The results concluded that a significant increase in student's reading comprehension was not found, as measured by selected subtests from the WIAT-II (Wechsler Individual Achievement Test). Conversely, a slight improvement was shown in reading comprehension scores, as measured by correct responses on AIMSWeb maze probes, an assessment tool designed to identify struggling students and to monitor student acquisition of foundational academic skills (www.aimsweb.com). Furthermore, a decrease in oral reading fluency was also found for most of the students from pre-testing to post-testing. Finally, in order to produce measureable changes in high school students with severe reading problems, intervention efforts must be highly intensive. Hence, introducing graphic novels alone was not supported as an effective intervention. While neither student comprehension nor reading fluency increased, motivation was found to increase.

Dallacqua (2012) was also interested in the relationship between visual literacy and comprehension provided by graphic novels. Through work with four fifth-grade students, Dallacqua explored the ways students engaged with graphic novels. While reading and discussing in-depth *The Arrival* and *American Born Chinese*, students found literary devices in graphic novels to be not only textual but also visual. The ability of graphic novels to present literary devices can now be scaffolded and used to help students recognize literary devices in textual readings. Analysis of the study concluded that prior visual knowledge of graphic novels strengthened the teachers' lessons and advanced the students' understanding.

Graphic Novels as Nonfiction in Content Areas

Multiple studies have been conducted related to use of graphic novels to enhance content area curricula. Mathews (2011) examined pre-service teachers' potential to use graphic novels within the social studies curriculum. Twelve pre-service teachers, with similar backgrounds, participated in individual interviews and classroom discussions and wrote book reports upon reading the text and again upon completing student teaching.

Mathews (2011) discovered that interactions and personal beliefs impacted many of the findings. Findings indicate, "that the pre-service teachers support using graphic novels in order to provide an alternative perspective to traditional texts or to increase engagement amongst emerging or struggling readers" (p. 416). According to the results, pre-service teachers were not in favor of graphic novels that included controversial issues and events or violent content. Prior to the study, many of the participants were not familiar with graphic novels. After the study, many of the participants agreed that graphic novels could be useful in motivating students and fostering quality discussions.

The purpose of Mason, Tornatora, & Pluchino's (2013) research was to study fourth grade students' online processing of text and graphics using eye-tracking methodology while processing illustrated science text and graphics read online. Of particular interest were patterns of visual behavior, while taking into account individual differences in reading comprehension, prior knowledge, and spatial ability. Mason, et. al (2013) found,

Forty-nine 4th graders participated in a pretest, immediate, and delayed posttest design. Results of a cluster analysis using indices of first- and second-pass eye-fixation, as well as integrative saccades revealed three patterns of visual behavior varying for the level of integration of text and picture. (p. 95)

Further findings indicate patterns of eye movement did not reveal any differences for prior knowledge of the topic, reading comprehension ability, or spatial ability. Of note is the conclusion from the findings that for young readers, picture processing should not be assumed but rather should be encouraged, as eye movements in the study indicated that the best-scoring students displayed longer looks from text to picture and longer fixation on pictures.

Kendeou and Van Den Broek's (2007) study intended to investigate the comprehension of scientific texts and the effects of prior knowledge and text structure on cognitive processes. Processes were investigated online via two methodologies: think-aloud in Experiment 1 and reading time in Experiment 2.

Experiment 1 used think-aloud methodology to investigate cognitive processes. Experiment 1 included 86 undergraduate students and investigated the effects of prior knowledge and text structures online. "The results show that there was no significant difference between the reading span scores for the misconception and nonmisconception" (p. 1570).

Experiment 2 used reading time methodology, included 69 undergraduate students, and investigated the interaction between prior knowledge and text structure online. Participants, both with and without misconceptions, were asked to read a fake and a real scientific text on the computer, one sentence at a time. Sentences that were relevant to understanding were then investigated. "The analysis showed that there were no significant differences in reading span or in Need for Cognition score between misconception and nonmisconception groups" (p. 1572).

Results from both experiments indicated that readers adjust their processing as a function of the interaction between prior knowledge and text structure. The focus of this study was the readers' quality of knowledge. Similarly, one area of focus for the current study was the quality of statements recalled. Student statements were classified as facts, conclusions, or explanations. Readers comprehension is influenced by the text structure and visual images used to convey the information. Prior knowledge and text structure interact in their effects on readers' comprehension processes. There is evidence that the interaction between readers' prior knowledge and text characteristics influences comprehension.

Summary

Numerous studies have investigated the effectiveness of graphic novels as classroom teaching resources. Graphic novels are known to increase students' visual and textual understanding (Pantaleo, 2013; Thomas, 2010), increase motivation for all types of readers (Walker, 2013; Dallacqua, 2012), as well as engage students in the subject matter at hand (Mathews, 2011). With this understanding, graphic novels can lead to greater student comprehension and success in literacy and many additional content areas. The current study will examine the usefulness of graphic novels in the particular context of gaining information from nonfiction reading.

CHAPTER 3

METHODOLOGY

Students, parents, and teachers may have difficulty understanding ways graphic novels help students learn and the role the images play in overall comprehension. The purpose of this study was to further understand four fifth grade students' ability to comprehend science content information after reading graphic novels. These four students in this small midwestern school were also monitored for interest and enjoyment of the graphic novel format when reading about astronomy, Earth, and space.

Research Design

In order to determine the usefulness of graphic novels as information sources for nonfiction content area reading, the researcher conducted a qualitative descriptive study. To accomplish understanding the role graphic novels play in content area reading the researcher used a descriptive study format. Wildemuth (2009) explains the purpose of the descriptive method as a qualitative design with the purpose of understanding a phenomenon; something more complex than superficial observation. Wildemuth states that a researcher engages in descriptive studies to deepen understanding of a phenomenon or behavior. Descriptive research was an appropriate approach for this study because the researcher demonstrated a deeper understanding of graphic novels as information sources for nonfiction content area reading.

The researcher has been the teacher librarian at this school for three years. Thus these students are familiar with the researcher. The researcher acted in the role of participant observer to directly observe student information behaviors. According to Wildemuth (2009) the role of participant observer is to, "directly observe information

behaviors in the context in which they “naturally” occur” (p. 199). This role was selected for this study because the researcher sought information leading to a better understanding of students’ ability to comprehend graphic novels as sources of nonfiction content area learning. Wildemuth asserts that descriptive research questions arise when a particular behavior or phenomenon has not been researched. The questions at issue in this study have not previously appeared in the school library research literature.

Participants

A small group of four fifth grade students met with the teacher librarian four times for 45 minutes. A group size of four was chosen because that is the size of a typical small reading group. There were two male students and two female students. Participants were considered average functioning fifth graders, based on school test scores and teacher input. The project took place in a small school in a midwestern state. The students and their parents gave permission for data to be collected and used, which was approved by the overseeing university human subjects review board.

Procedure

The researcher began by selecting three graphic novels that focus on astronomy, space, and planet Earth. The graphic novels used in this study included:

Gilpin, D. (2010). *Planet Earth*. New York, NY: Kingfisher.

Green, D. (2009). *Astronomy*. New York, NY: Kingfisher.

Green, D. (2013). *Space Exploration*. New York, NR: Kingfisher.

Prior to reading any of the texts, students completed a pre assessment (see Appendix A). The pre assessment had three parts. First, it asked students to rate their interest in this topic (one meaning “least interesting” and five meaning “most

interesting”). Second, it asked them to individually record their current knowledge about the topics of astronomy, planet Earth, and space through responding to an open-ended question. Finally, the pre assessment had two comprehension questions for each of the three topics. These questions were adapted from the students’ fifth grade science textbook. At the time of this research, students had not studied the astronomy unit in the textbook. Questions from the textbook were used in the pre assessment in order to identify whether students already knew these concepts prior to this study in their regular science curriculum and prior to reading the graphic novels.

After students completed the pre assessment, the teacher librarian conducted a picture walk through the first book. A picture walk is previewing the pictures in a book to familiarize students before introducing the text. Subsequent meetings also began with a picture walk of each book, one per meeting. Students were encouraged to explore the content and verbally hypothesize about each book. During the sessions of the study, the students took turns reading all three books aloud, one per session. Students not currently reading aloud were following along in their own books.

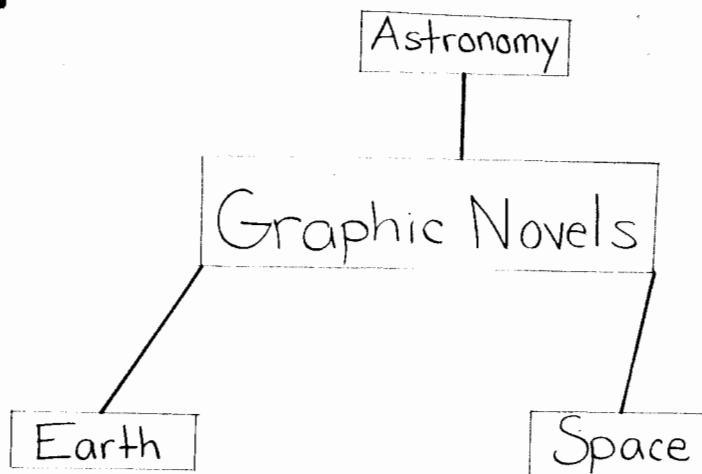
Upon finishing each book each student completed a post assessment (see Appendix A). The post assessment had three parts. In the first item of the post assessment, students completed an interest and enjoyment rating where they circled a number from one to five (one meaning “least enjoyable” and five meaning “most enjoyable”) to show their interest and enjoyment in the topic. Second, like in the pre assessment, each student was asked to individually write all they learned from the graphic novel. Finally, the post assessment had the same two comprehension questions from the

pre assessment for each graphic novel topic. Each student had unlimited time to complete the post assessment.

Upon finishing the post assessment the teacher librarian proctored a comprehensive group discussion. This group discussion was also captured in the researchers' notes. The researcher maintained a research diary of all observations (see Appendix B) throughout the study. Students contributed to topic discussions resulting in a large mind map (see Figure 1) representing each graphic novel. A mind map is a diagram used to visually organize information. The researcher created the mind map words and boxes in advance.

Figure 1

Beginning Mind Map

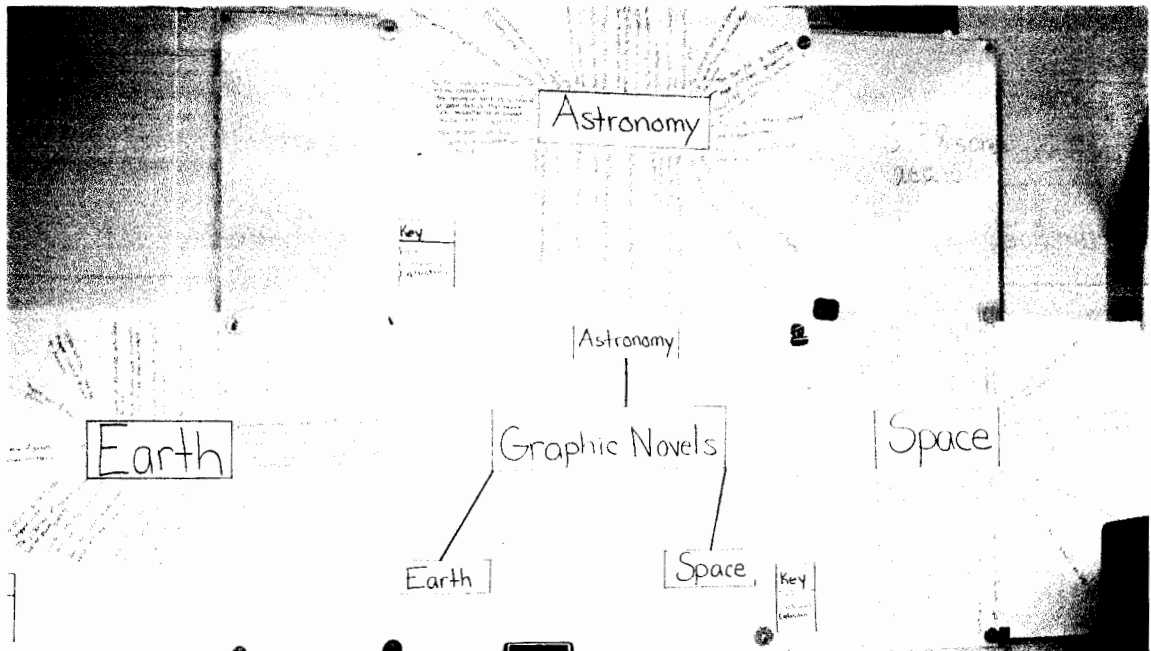


At the conclusion of reading each graphic novel and after completing the post assessment (see Appendix A) the students verbally read their new knowledge statements to the rest of the group and the researcher. The group of students then decided how to classify each

statement. The statements could be classified as fact, conclusion, or explanation. When students agreed upon the statement classification the researcher recorded the statement on the large mind map (see Figure 2). The mind map allowed students to visually see what types of statements they were making.

Figure 2

Completed Mind Map



Data Analysis

Data analysis used triangulation of three sources: student assessments, mind maps from group work, and the researchers' participant observation notes. Student pre and post assessment responses were compiled, evaluated for accuracy, and scored using a rubric (see Appendix C). The Facts, Explanations, Conclusions analyzing tool came from the Analyzing SLIM (Student Learning Through Inquiry Measure) Reflection Tasks by Kuhlthau, Maniotes, and Caspari (2012). This assessment tool is conducive to reflections while also assessing the learning progress. This assessment style encouraged

students to think through the learning process and allow the researcher to see student progress. The researcher counted the total accurate statements and categorized them as facts, explanations, or conclusion statements. Finally, the researcher assessed the interest and enjoyment ratings and assessed the accuracy of the comprehension statements. The researcher also analyzed the single mind map created after reading each graphic novel and after the post assessment. Lastly, the researcher analyzed the participant observer notes from each session. Participant observer notes were analyzed using “conventional qualitative content analysis” (Wildemuth, 2009, p. 309) for correlations between and amongst observations.

The students will start a formal Astronomy unit with their classroom teacher at the conclusion of this project with the teacher librarian. Therefore, student learning on this posttest assessment was attributed to their reading of the graphic novel texts.

CHAPTER 4

FINDINGS

The purpose of this study was to further understand students' ability to comprehend science content information through reading graphic novels. Students were also monitored for interest and enjoyment of the graphic novel format when reading about astronomy, Earth, and space.

The population of this study consisted of four fifth grade students of average functioning ability. There were two male students and two female students. The students all attended a small school in a midwestern state. The students met with the teacher librarian after school for a total of four times, for 45 minutes each time. The students were asked to complete a pre assessment, read from graphic novels, and complete a post assessment.

Student Learning Through Science Graphic Novels

The first research question this study aimed to answer was: What do students learn about science content while reading graphic novels about science topics?

Participants completed an initial beginning knowledge (see Appendix A) questionnaire on the pre assessment. The results are in Table 1.

Table 1

Beginning Knowledge

Student	Astronomy	Earth	Space
Student A	-It is about space or the solar system.	-A planet	-Study of planets
Student B	-Space -Solar System	-Absent	-Study of Earth -Information about Moons
Student C	-Satelite [<i>sic</i>] -Space study	-Planet we live on	-Asstroyds [<i>sic</i>] are there -We send rockets there
Student D	-Space	-The planet we live on -Third rock from the Sun -Has human life	-A place far away -Study of Earth -Has moons

In reviewing the beginning knowledge questionnaire, participants recorded the most statements about the topic of space. Overall, the beginning knowledge statements made by the participants were general and broad.

On the pre assessment students were asked two comprehension questions from their science textbook for each topic, with the scores out of two possible points. After reading and discussing each graphic novel, students were asked the same two comprehension questions. The scores are represented in Table 2.

Table 2

Pre and Post Assessment Comprehension Questions Results

	Astronomy			Earth			Space		
	Pre	Post	Difference	Pre	Post	Difference	Pre	Post	Difference
Student A	0	2	+2	0	2	+2	1	2	+1
Student B	0	1	+1	Absent	Absent		1	2	+1
Student C	0	2	+2	0	1	+1	2	2	0
Student D	1	1	0	1	2	+1	1	2	+1

Student A increased her knowledge of both astronomy and Earth by two, while increasing her knowledge of space by one. Student B increased his knowledge of both astronomy and space by one. Student C increased his knowledge of astronomy by two, Earth by one, and maintained a perfect score in space. Student D increased her knowledge of Earth and space by one and maintained the same score in astronomy.

The researcher maintained notes as a participant observer during reading and discussions, especially noting behaviors during reading and discussion time. Observations included attention to how students used the images to aid in comprehension and students' general responses to the content. The images helped to increase comprehension at times of confusion; for example one student stated, "The images help me to create a mental picture of what they are talking about." The participant observer witnessed students discussing the images, especially focusing on the images when the reading was unclear. While reading from the *Space Exploration* graphic novel, Student C guided the other students' attention to the image on page 13. Most specifically, Student C was intrigued by the red stripe on the space suit legs, which were color-coded to help

identify astronauts. Student A brought the group's attention to the image of the Earth's crust on page 14 of the *Planet Earth* graphic novel. Students then commented on the number of layers beneath the Earth's crust.

The students were comfortable reading the text, and it appeared to be understandable for these fifth graders. The images helped to confirm student comprehension statements. The text helped students to learn new knowledge. Students answered participant observer questions to extend the group discussion. The participant observer asked, "What do you think Infinity and Beyond looks like?" Student C answered, "Infinity and beyond must look bright." When asked why by the participant observer, student C answered, "Because the position of billions of stars are being mapped." The participant observer also asked, "If a black hole is a hole in the fabric of space, what happens when something falls into the hole?" Student A answered, "It gets spaghetti-fied!" When asked what that means, student A responded with, "Things are destroyed and shrunk to a tiny point." Students also contributed to group discussions with multiple statements. The student statements included: "So, astronomy is the study of everything in the universe, not just one specific thing?" "The sun and stars call the Milky Way home. I thought they lived in the Universe." All behaviors including these discussion statements indicated a connection between text, images, and student comprehension.

Student Comprehension Statements

The second research question sought to determine what changes were evident in students' science comprehension statements after reading graphic novels about science topics. The best results were reflected in the students' ability to use graphic novels to

convey facts about science topics (see Table 3). Examples of students' factual statements included: "Earth is 93,000,000 miles from the sun." "The year 1957 the first rocket reached space." "More than $\frac{2}{3}$ of the earth is covered in water." "On average [*sic*] a space suit weighs [*sic*] 276 pounds."

The results indicated that students struggled most with forming an explanation about science topics while reading graphic novels. The researcher was looking for any explanations of the relationship between any two of the concepts. The one explanation included: "The sun has a system that orbits [*sic*] around it."

Students were able to perform slightly better when forming conclusions. Examples of students' conclusions included: "The jostling of rocks caused earthquakes [*sic*]." "The solar system is a big happy family and is 500 years old." "Shifting plates make ocean water shift or disappear [*sic*]." "An orbit is a curved [*sic*] path that makes around planets moon or stars." A total of 11 conclusion statements were made.

Table 3

Student Comprehension Statement Results

Astronomy								
	Conclusions		Explanations		Fact		Total	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Student A	0	0	0	1	1	8	1	9
Student B	0	2	0	0	2	6	2	8
Student C	0	1	0	0	2	8	2	9
Student D	0	2	0	0	1	7	1	9

Planet Earth								
	Conclusions		Explanations		Fact		Total	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Student A	0	2	0	0	1	5	1	7
Student B	Absent	Absent	Absent	Absent	Absent	Absent	NA	NA
Student C	0	2	0	0	1	5	1	7
Student D	0	1	0	0	3	6	3	7

Space Exploration								
	Conclusions		Explanations		Fact		Total	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Student A	0	0	0	0	1	6	1	6
Student B	0	0	0	0	2	7	2	7
Student C	0	0	0	0	2	6	2	6
Student D	0	1	0	0	3	5	1	6

Together the students increased their number of factual statements about astronomy from six on the pre assessment to 29 on the post assessment. Students increased comprehension statements about astronomy from zero on the pre assessment to five on the post assessment. Only one student made an explanation statement on the post assessment. Similarly students increased their factual statements about Earth from five on the pre assessment to 16 on the post assessment. Students increased comprehension statements about Earth from zero on the pre assessment to five on the post assessment. Students were unable to make any explanation statements. In terms of space, students

increased their factual statements from eight on the pre assessment to 24 on the post assessment. Students increased comprehension statements about space from zero on the pre assessment to one on the post assessment. Students were unable to make any explanation statements about space exploration.

The completed mind map helped students to visualize any relationships and/or correlations between the three topics. Recording their statements after reading each graphic novel and after completing each post assessment allowed the researcher to further understand how the students gained comprehension of the science content through facts, explanations, and conclusions. When completing the mind map students were able to use and read directly from their post assessment. Each statement type was represented by a specific color for ease of identification. For example, facts were recorded in blue, conclusions were recorded in red, and explanations were recorded in green. The completed mind map was identical to Table 3.

The results in Table 3 conveyed that students learned basic facts, but struggled to form explanations and conclusions. One student stated, "These words make it easy for me to understand." The mind map results showed similarities with the results in Table 3. Students were able to readily supply facts about astronomy, Earth, and space. Providing conclusions seemed to be a little more difficult than providing facts, but students struggled the most to provide explanations about astronomy, Earth, and space.

Interest and Enjoyment of Visuals and Text in Graphic Novels

The third research question intended to demonstrate student's interest and enjoyment of the visuals and text when reading graphic novels about science topics. The results were compiled in Table 4 and Table 5. Table 4 showed all students being more

interested in each topic after reading from the graphic novel. Table 5 showed each student rated their enjoyment of reading graphic novels, about science topics, as either a four or a five on a scale of one to five.

Table 4

Interest in Topic Rating

	Interest in the topic of Astronomy		Interest in the topic of Earth		Interest in the topic of Space	
	Pre	Post	Pre	Post	Pre	Post
Student A	3	5	3	5	3	5
Student B	2	4	Absent	Absent	2	4
Student C	2	5	3	4	2	4
Student D	2	5	3	5	2	5

Note. 1 least interesting and 5 most interesting.

Table 5

Enjoyment of Specific Graphic Novel Rating

	Enjoyment of reading the graphic novel titled <i>Astronomy</i>	Enjoyment of reading the graphic novel titled <i>Planet Earth</i>	Enjoyment of reading the graphic novel titled <i>Space Exploration</i>
	Post	Post	Post
Student A	5	5	5
Student B	4	Absent	5
Student C	5	4	5
Student D	5	5	5

Note. 1 least enjoyable and 5 most enjoyable.

Summary

When reading graphic novels to learn about science content, three students increased their comprehension scores and one maintained her comprehension score for the topic of astronomy. Considering the topic of Earth all students who were present increased their comprehension score. With the topic of space, three students increased their scores and one student maintained his score. In response to the open-ended

question, students were able to readily supply facts learned from reading graphic novels about science topics. At the same time, students struggled to process those facts into meaningful explanations and/or conclusions. Overall, students became more interested in each of the three topics after reading the graphic novels. Each student also rated their enjoyment of science related graphic novels as above average, with each student rating each graphic novel with a four or five on a scale of one to five.

Participant observer notes corresponded with the results from Table 4 and Table 5. With their lack of graphic novel exposure students were quiet and hesitant at the beginning. As the students became more comfortable with the relationship between the text and images in a graphic novel their attitudes and behaviors began to change for the better. Students were making eye contact, listening intently to their peers, and asking appropriately challenging questions. Overall, the participant observer notes showed an increased interest among students in graphic novels from the start of the study to the conclusion of it.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

As students have accepted graphic novels as quality nonfiction, some teachers have shown resistance in doing the same (Ruppel, 2006). Some teacher's think there are few benefits to using graphic novels as quality sources of nonfiction or may be unsure how to incorporate graphic novels into their classroom. Due to the highly visual environment in which students live, the visual literacy component provided by graphic novels is appealing to students. The visually appealing format may provide comprehension strategies for students who would otherwise struggle to comprehend traditional, nonfiction text. The purpose of this study was to further understand students' ability to comprehend science content information after reading graphic novels. Students were also monitored for interest and enjoyment of the graphic novel format when reading about astronomy, Earth, and space.

Conclusions

A teacher at the school where this study was conducted was reluctant to use graphic novels in her upcoming science unit. The teacher was most concerned that students would not learn much factual knowledge from the graphic novels. It is my hope that this small descriptive study will help to convince teachers of the usefulness of graphic novels as quality sources of nonfiction.

Students were able to make factual statements because the format of the graphic novel was more conducive to fact learning and less conducive to conclusions and explanations. The straightforward wording of the graphic novel enabled students to

report facts, but students were unable to form conclusions or explanations. If the text had explicitly stated, the explanation is... or the conclusion is..., then I believe students would have been more successful. Without those explicit words coming from the text students struggled to make those connections. This leads me to believe that students may need additional information sources more complex than these graphic novels in order to help them better understand complex ideas.

Many students describe nonfiction reading as boring and uneventful. This study has helped to show graphic novels can improve the reading experience for nonfiction readers. The students in this study rated interest in the topic higher after reading the graphic novels and rated enjoyment of graphic novels above average after reading them. This demonstrated that students enjoy learning from the images of a text. The students in this study commented that the illustrations often helped them understand the confusing content. Students enjoyed the straightforward, easy to follow format of the graphic novels.

Graphic novels should not take the place of textbooks, but are useful for students to learn facts. Graphic novels are a great supplement to science curriculum and especially useful for students who are visual learners. While graphic novels do increase interest and enjoyment, the duty of advocating for the usefulness of graphic novels falls upon teacher librarians.

Recommendations

Graphic novels are a genre of literature that may last for years to come. Based on the research I have conducted, I feel it would be beneficial for teachers to use graphic novels within their curriculum and classroom. In my small group setting, students

increased their overall science content knowledge and comprehension scores after reading from graphic novels. The increase in comprehension may also be attributed to the small group setting. However, students' excitement about the topics also resulted from their interactions with the books. I would recommend future studies should determine whether the same results would be found with a larger number of participants.

Using graphic novels as nonfiction sources for learning facts is supported by this research. In my study, students made gains in the number of factual statements they could produce about the subjects, however, they were not able to produce consistent quality conclusions and explanations. I am left to wonder what would happen if this study had lasted longer. Future researchers might consider increasing its duration in order to determine whether more meaningful connections would have been made.

Students were asked to rate their interest and enjoyment of graphic novels. Each student rated graphic novels higher at the end of our sessions than they did at the beginning of our sessions. This finding supports the purchase of additional graphic novels to support student learning, particularly to motivate students' interest in topics related to the curriculum, perhaps as an introduction to a unit of study or to further student reading on a topic. Upon the conclusion of this study, the researcher will share the findings with classroom teachers in hopes that graphic novels will become an accepted nonfiction format for content area learning.

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APPENDIX A
PRE AND POST ASSESSMENT
ASTRONOMY GRAPHIC NOVEL

Rating Scale

Rate your interest in the topic of astronomy

1 least interesting - 5 most interesting

1 - 2 - 3 - 4 - 5

Beginning Knowledge

Record your current knowledge about astronomy.

Comprehension Questions

Answer the following two questions to the best of your ability.

Astronomy

1. Outer planets are known as _____ planets while inner planets are known as _____ planets.

- rocky, gaseous
- smooth, rocky
- gaseous, rocky
- rocky smooth

2. What is a meteorite?

- A bright streak of light that passes through Earth's atmosphere
- Large clouds of gas and dust in space that is the beginning or ending of a star
- A piece of a meteor that lands on earth after passing through the atmosphere
- A group of stars that appear to make a pattern

Astronomy Graphic Novel
Post Assessment

Rating Scale

Rate your interest in the topic of astronomy

1 least interesting - 5 most interesting

1 - 2 - 3 - 4 - 5

Rating Scale

Rate your enjoyment of reading the graphic novel titled *Astronomy*

1 least enjoyable - 5 most enjoyable

1 - 2 - 3 - 4 - 5

Learned Knowledge

Record your learned knowledge from the *Astronomy* graphic novel you just read.

Comprehension Questions

Answer the following two questions to the best of your ability.

Astronomy

1. Outer planets are known as _____ planets while inner planets are known as _____ planets.

rocky, gaseous

smooth, rocky

gaseous, rocky

rocky smooth

2. What is a meteorite?

A bright streak of light that passes through Earth's atmosphere

Large clouds of gas and dust in space that is the beginning or ending of a star

A piece of a meteor that lands on earth after passing through the atmosphere

A group of stars that appear to make a pattern

Earth Graphic Novel Pre Assessment

Rating Scale

Rate your interest in the topic of Earth

1 least interesting - 5 most interesting

1 - 2 - 3 - 4 - 5

Beginning Knowledge

Record your current knowledge about Earth.

Comprehension Questions

Answer the following two questions to the best of you ability.

Earth

1. The position of the sun, the Earth, and the moon determine:
 - seasons and moon phases
 - lunar and solar eclipse
 - high and low tide
 - all of the above
 - none of the above

2. One year on Earth lasts 365 days. Which of these definitions could be used for one year?
 - The time it takes for Earth to go around the sun once.
 - The time it takes for the moon to go around Earth 12 times.
 - The time for Earth to spin once on its axis.
 - The time for the moon to complete all of its phases.

Planet Earth Graphic Novel
Post Assessment

Rating Scale

Rate your interest in the topic of Earth

1 least interesting - 5 most interesting

1 - 2 - 3 - 4 - 5

Rating Scale

Rate your enjoyment of reading the graphic novel titled *Planet Earth*

1 least enjoyable - 5 most enjoyable

1 - 2 - 3 - 4 - 5

Learned Knowledge

Record your learned knowledge from the *Planet Earth* graphic novel you just read.

Comprehension Questions

Answer the following two questions to the best of your ability.

Earth

1. The position of the sun, the Earth, and the moon determine:
 - seasons and moon phases
 - lunar and solar eclipse
 - high and low tide
 - all of the above
 - none of the above

2. One year on Earth lasts 365 days. Which of these definitions could be used for one year?

The time it takes for Earth to go around the sun once.

The time it takes for the moon to go around Earth 12 times.

The time for Earth to spin once on its axis.

The time for the moon to complete all of its phases.

Space Graphic Novel Pre Assessment

Rating Scale

Rate your interest in the topic of space

1 least interesting - 5 most interesting

1 - 2 - 3 - 4 - 5

Beginning Knowledge

Record your current knowledge about space.

Comprehension Questions

Answer the following two questions to the best of your ability.

Space

1. Craters on the moon were caused by:
 - satellites
 - meteoroids
 - comets
 - equipment from human exploration of the moon

2. What does the word "astronaut" mean?
 - musician
 - teacher
 - star traveler
 - space catcher

Space Exploration Graphic Novel
Post Assessment

Rating Scale

Rate your interest in the topic of space

1 least interesting - 5 most interesting

1 - 2 - 3 - 4 - 5

Rating Scale

Rate your enjoyment of reading the graphic novel titled *Space Exploration*

1 least enjoyable - 5 most enjoyable

1 - 2 - 3 - 4 - 5

Learned Knowledge

Record your learned knowledge about space.

Comprehension Questions

Answer the following two questions to the best of your ability.

Space

1. Craters on the moon were caused by:

satellites

meteoroids

comets

equipment from human exploration of the moon

2. What does the word "astronaut" mean?

musician

teacher

star traveler

space catcher

APPENDIX B
PARTICIPANT OBSERVATION FORM

STUDENT: _____ TOPIC: _____ GENRE: _____ DATE: _____

What was said about the images? _____

What was said about the text? _____

How did images help students learn? _____

What did the text help students learn? _____

How can I tell the student learned? _____

How student interacted with text, responded in discussion. _____

Student contributed to. _____

APPENDIX C

PRE AND POST ASSESSMENT RUBRIC

Student: _____

Date: _____

	3 - Conclusions	2 - Explanations	1 - Facts
Astronomy Graphic Novel	Student is able to draw conclusions	Student is able to record explanations	Student is able to recall facts
Planet Earth Graphic Novel	Student is able to draw conclusions	Student is able to record explanations	Student is able to recall facts
Space Exploration Graphic Novel	Student is able to draw conclusions	Student is able to record explanations	Student is able to recall facts
Total Score			