AN INVESTIGATION OF THE EFFECTS OF GENRE ON STUDENT LEARNING FROM INFORMATIONAL TEXT

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The purpose of this study was to compare the effects of text genre on student learning from science text, using science-related traditional informational and poetic informational texts, with fifth-graders. Four texts were used: a traditional informational text about caves, a poetic informational text about caves, a traditional informational text about mountains, and a poetic informational text about mountains. One group of students worked with the traditional informational cave text and the poetic information mountain text, while a second group worked with the traditional informational mountains text and the poetic informational caves text. After reading each text, students completed comprehension questions and a sorting task involving the main concepts of each text. Results indicated that genre was not a factor in student comprehension of science text. Rather, it appears that student reading ability and student knowledge of the text topic may have influenced student comprehension. Study results might be interpreted as an indication that in a classroom, some students might learn better from poetic texts, and that a variety of text types may be useful.

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Chapter 1.0

INTRODUCTION

Current science standards emphasize inquiry, the manipulation and documentation of observable phenomenon, as the optimal learning context for students (NSTA, 2004). This emphasis on hands-on inquiry learning, however, does not mean that students are not engaged in learning from text. In fact, recent surveys reveal that science textbooks are an integral part of teaching science in many classrooms and that most elementary school teachers use science textbooks (Weiss, Banilower, McMahon, & Smith, 2001). According to Woodward and Elliot (1990), textbooks account for 75 to 90 percent of instruction in American classrooms. Weiss (1987) found that almost two-thirds of elementary students use science textbooks. St. John (2001) reported that textbooks are used as the main source of information during science lessons.

If textbooks are such an integral part of instruction in American schools, students must be able to learn from them. These textbooks must not only present correct information, but they must also be written in a manner that supports student comprehension. However, it appears that many of the textbooks being used by students are not meeting these criteria. Reviews of science textbooks have shown that the majority of these texts are ineffective in helping students succeed in science (AAAS, 2002).

Some of the ways in which science textbooks have been criticized for being ineffective include errors in information presented in these texts (Galley, 2001), text that is not written in a coherent and comprehensible manner (Beck, McKeown, Sinatra, & Loxterman, 1991), and the use of difficult vocabulary (Vacca & Vacca, 2002). Fang (2006) describes linguistic text features that can be troublesome for readers. She refers to these features as the *language of school science*, or LSS. Some LSS features include: technical vocabulary, ordinary words used in ways

not commonly used, and the use of complex sentences with restrictive and non-restrictive clauses. These linguistic challenges in science textbooks can impede student learning.

Are there ways in which student learning of science content from text can be improved? Some scholars suggest that science tradebooks be used for science instruction rather than traditional science textbooks. The use of tradebooks for instruction in content areas in the elementary classroom has grown (Rice, 2002). In some classrooms, science textbooks have been replaced by science tradebooks (Ross, 1994). Part of the appeal of tradebooks may simply be the way in which they are written. They are, for the most part, more interesting and less confusing for young readers than textbooks (Ross, 1994). Many tradebooks are written in narrative form with recognizable story grammars; that is, with a beginning, middle, and end. Because they present science concepts through a narrative, students can remember and understand concepts better than the writing in textbooks, which often presents lists of facts (Butzow & Butzow, 2000).

Other reasons for the growing popularity of tradebook use in the science classroom are more practical. Tradebooks are widely available from bookstores and catalogs (Kralina, 1993). In addition, tradebooks are often more current than science texts (Tyson & Woodward, 1989). Textbooks traditionally include a large number of topics (Tyson & Woodward), while tradebooks provide a more in-depth focus on fewer topics. (Ross, 1994).

Labbo (1999) offered some other reasons to explain why tradebooks might be an attractive alternative to textbooks. Specifically, she provided insights related to vocabulary used in the content areas. While vocabulary is very often defined formally in textbooks, tradebooks often present vocabulary in a contexualized manner. That is, "descriptions, rich examples, and

illustrations" (p. 1) of vocabulary can often be found in tradebooks. The use of tradebooks and their rich language could aid in teaching science in a manner that interests and engages students.

Research suggests that interest elicits and supports engagement (Krapp, Hidi, & Renninger, 1992). Research by Krapp et al. (1992) looked at the interestingness of text. They reported that there are two distinct types of interest: situational interest and individual interest. Situational interest is defined as interest created by particular conditions and/or objects (e.g., text), while individual interest is what a certain individual finds personally interesting. Both of these types of interest can influence learning. Krapp et al. (1992) reported that when students were interested in the text being read, they were motivated to read, which resulted in higher levels of learning. Interested readers are engaged readers. Engaged readers read more often, which leads to better comprehension of text and ultimately, higher reading achievement (Renninger, 2000; Guthrie, Wigfield, Metsala, & Cox, 1999; Cipielewske & Stanovich, 1992). Many students find tradebooks enjoyable to read (Kralina, 1993) and less intimidating than textbooks (Casteel & Isom, 1994). Many teachers also find tradebooks more interesting than textbooks. As a result, informational tradebooks are being used more often to teach science (Maria & Junge, 1993).

The present study was motivated by the idea that student comprehension of science text might be better supported when students use informational science tradebooks instead of traditional information texts. Why is it important to consider informational science tradebooks as key resources in science education? As mentioned earlier, tradebooks are often more interesting for students to read than textbooks. In addition, many tradebooks are written in a more comprehensible, coherent manner than textbooks and often do not contain the linguistic features

that can be troublesome for young readers. There appears to be both potential and promise for the use of informational tradebooks in the science classroom.

The purpose of this study was to investigate the possible effects on student learning from two specific kinds of science tradebooks: traditional informational texts, which are similar to science textbooks; and a genre of emerging prominence referred to as poetic informational texts. The study addressed the following questions: (1) How is genre related to student learning from science text? and (2) How are reader factors, including reading ability and perceptions of difficulty and interest of text, related to student learning from science text?

Chapter 2.0

REVIEW OF THE LITERATURE

The present investigation was concerned with reader-text interactions and how such interactions might be influenced by the genre of a text. Specifically, reader factors such as reading ability and reader interest of text and how these factors affect comprehension are discussed. In this chapter, theories of text-processing are presented that describe reader-text interactions and the impact of text features that support or challenge readers as they attempt to understand text information.

2.1 Models of Text Comprehension

Two primary models that explain the mental processes that occur during reading comprehension exist. These models are the Construction-Integration model (Kintsch, 1998) and the Landscape Model of reading (van den Broek, Young, Tzeng, & Linderholm, 1998). The section that follows describes these models.

The Construction-Integration Model, developed by Kintsch and Van Dijk (1978) and Kintsch (1988, 1998), offers insight into the mental processes that take place as a reader encounters text and attempts to comprehend it. Kintsch suggested that comprehension of text involves readers in creating a coherent mental representation of text information. This representation consists of two components: the textbase and the situation model. A reader constructs a textbase by capturing the gist of the information directly stated in a text but does not add anything to that information. According to Kintsch (1998), the result of constructing a textbase may be "an impoverished or even incoherent network" (p. 103). The network consists of nodes or propositions or idea units from the text, but these nodes are not necessarily connected in an organized way. Readers who construct a situation model of text information impose

coherence on the textbase, organizing the information by connecting nodes or propositions into an integrated network. The connections are created by making inferences, using prior knowledge, and finally integrating the representation into the reader's knowledge base in a way that makes the information accessible for use in other situations.

Kintsch (1998) emphasized that the process of constructing a coherent mental representation of text information depends on "the text—whether it is self-sufficient or not—but also on the readers, their goals, motivation, and resources available" (p. 107).

Before considering text features and their impact on comprehension, it is useful to describe another prominent model used to explain the processes readers use to construct a coherent mental representation of text information: the Landscape Model of Reading (van den Broek, Young, Tzeng, & Linderholm, 1998). The Landscape Model elaborates on Kintsch's reference to readers' goals, motivation, and resources. Like the Construction-Integration Model, the Landscape Model describes comprehension as the process of constructing a coherent mental representation by connecting text propositions or nodes into a network. Van den Broek and his colleagues (1998) refer to this process as taking place within "a landscape of fluctuating activation" (p. 73). Because readers can only attend to a limited number of concepts at a time, concepts represented in the text are activated in cycles. Each time a reader begins a new reading cycle, such as when reading a new sentence or proposition, four sources of concept activation come into play. These sources include: the text currently being read, information from the preceding reading cycle, concepts encountered during earlier reading cycles, and background knowledge.

Kintsch and van Dijk (1978) explained that as each new reading cycle occurs, activation of new concepts takes place. In addition, some old concepts are deleted from working memory

while other concepts are kept in the readers working memory. Van den Broek (1988) refers to these activations and deactivations during the reading cycle as peaks and valleys. Combined, these peaks and valleys create a landscape of concept activation that influences text comprehension.

Concept activation is influenced by a reader's standards of coherence. That is, how important it is to readers to understand what they are reading. Readers are motivated to achieve a certain level of understanding of the text they are reading. They will expend the effort necessary to construct a coherent mental representation if their standards of coherence are high. If their standards of coherence are low, they will be satisfied with a superficial or piecemeal understanding of text ideas.

Readers' standards of coherence influence the effort that they exert during reading to make connections between nodes of text information. With high standards of coherence, readers work to build connections through inferencing. Readers' motivation to exert the effort inferencing requires is one important aspect of constructing a coherent mental representation. Another is the prior knowledge readers have of the topic of the text. Connecting text information through inferencing is influenced by a reader's familiarity with the text topic (e.g., Beck, McKeown, Sinatra, & Loxterman, 1991).

The Construction-Integration Model and the Landscape Model of Reading emphasize the importance of readers' attentional resources, prior knowledge, inference generation, and standards of coherence, and their relationship to constructing a coherent mental representation of text information. Of equal importance are the properties of the text being read and how those properties can influence readers' interest and effort. Properties, or features, of text that address these issues are discussed in the next section.

2.2 Features of Text

Text features include both macro-level properties such as text structure and genre and micro-level properties such as transitions and referents. Both micro- and macro-level features influence a reader's perceived coherence of a text and their interactions with text information.

According to Beck and McKeown (1989), "Coherence refers to the extent to which the sequencing or ordering of ideas in a text makes sense and the extent to which the language used in discussing those ideas makes the nature of the ideas and their relationships apparent. A coherent text all fits together, seems of a whole, because a train of well-expressed ideas appears in a manner that discloses their connections" (p. 50).

2.2.1 Micro-Features

Several micro-features have been identified that are important factors in helping readers comprehend or construct a coherent mental representation of text information. They help in developing coherence relations, thus aiding in comprehension for the reader. These micro-features are described by Graesser, McNamara, and Louwerse (2003) as coherence relations and include: coreferents, conjunctive relations, chronology and verb tense, and given and new cues.

According to Graesser and his colleagues (2003), "Coreference occurs when two words (or verbal expressions) refer to the same person, thing, abstract concept, or idea." (p. 91). For example, when a pronoun such as *they*, *he*, or *she* is used to refer to an aforementioned character, confusion can occur for the reader. The reader must infer that the pronoun is representing the character. Failure to make such inferences can cause comprehension to break down. Graesser and his colleagues stressed the importance of having explicit coreferents in text to support readers' meaning making. Other coreferents include synonyms or alternative expressions that refer to a person, event, or object. Britton and Gulgoz (1991) offered the following example: In

a textbook about the Vietnam War, there were twelve different words or phrases used for bombing attacks. Some of these phrases were: *aerial extension, air war, strikes directly, campaign*, and *air raids*. When these researchers attempted to improve coherence for readers by revising the text, they attempted to use the same terms when referring to bombing attacks whenever it was possible.

Conjunctive relations are another type of coherence relation. Conjunctive relations link sentences or clauses. There are several subcategories of conjunctive relations. These subcategories include: additive (*and, also*), temporal (*then, before, during, after*), causal *(because, as a result*), and logical (*therefore, so*). When these conjunctions are used explicitly in text, readers are able to relate text ideas.

Chronology and verb tense are also important micro-features of text. As Graesser and his colleagues (2003) explained, story events happen in chronological order. In most texts, the order in which events occur matches up with the chronological order of the story. This matching up, or correspondence, is assumed by the reader. When this chronological order is not followed, or changes, readers can lose track of when events take place unless explicit cues are added by the author. For example, cues may be needed in the case of flashbacks or flashforwards in a story. According to Graesser et al. (2003),"a cooperative writer gives rich reorienting descriptions when there are major shifts in the time line, such as *last week at the Sunday dinner* or *later on in his career*" (p. 95). Again, when these cues are not explicit the need for inference generation by the reader is required for comprehension to occur. Verb tense can be an important cue to chronology for readers. Verb tense (past, present, future) helps the reader to make sense of the chronological order of events in a story.

Van den Broek and Kremer (2000) described another type of coherence relation: cues to causal/logical relations. Van den Broekand Kremer used the following example to explain causal/logical relations. Consider what a reader must know or infer in order to understand the following two sentences: "The presence of the moon exerts a strong gravitational pull on the earth. Thus it has contributed to the emergence of life on earth" (pp. 4-5). In order to make sense of these two statements, readers must know "that the moon's gravitational pull is instrumental in creating the earth's magnetic field, which in turn shields the earth's surface from lethal cosmic radiation" (p. 5). Most young readers would not have the prior knowledge to construct this meaning, and without it, they would have difficulty in understanding the causal/logical connection.

Another coherence relation that can contribute to text coherence are given-new cues (Graesser et al., 2003). The given-new principle posits that a reader's quest for coherence is made easier when a sentence begins with old information from the previous text (the given) first, and then presents new ideas (the new) in the second part of the sentence. Take for example the following two sentences: "Most rivers flow year-round. As it flows, a river wears away the land and cuts a channel into the ground" (p. 10) (Morris, 1998). The first sentence tells the reader a fact about rivers: that most of them flow all the time. In the next sentence, the concept of a flowing river is repeated (the "given" from the previous sentence), and then some new information about these flowing rivers is provided (they wear away land as they flow). The common argument in both of these sentences is the idea of flowing rivers. By repeating this fact in the second sentence, it is clear that the new concept introduced in the sentence (river erosion) is related to the flowing rivers discussed in the first sentence. If readers can make this

connection, then they can maintain coherence. This given-new principle, or argument overlap (Kintsch and van Dijk, 1978), allows readers to relate old and new ideas presented in the text.

2.2.2 Macro-Features

In addition to the micro-features of text that affect comprehension, there are also macro-features of text that are of significance when discussing the reading process. These relate to text organization and genre.

2.2.2.1 Text Organization. Under the area of text organization, there are several components that are key to helping readers comprehend text. These include: text headings, topic sentences, and signals of rhetorical structure (Graesser et al., 2003).

Text headings can provide readers with cues to upcoming text information. These headings cue readers about what to expect in a section that they will be reading. When the reader knows what to expect in the text, comprehension can more easily occur.

Graesser et al. (2003) wrote about the importance of topic sentences. Readers expect that the first sentence in a paragraph will introduce the main idea or content focus of a paragraph, and that the following sentences will provide information related to the topic sentence. When topic sentences are not provided, readers can have difficulty organizing the information in a paragraph.

Graesser et al. (2003) also explained the importance of signals of rhetorical structure. Signals of rhetorical structure are words or phrases that alert readers about how a text will be organized. Some examples of signals of rhetorical structure include: the words *first, second, third* or the letters *a, b, c* when lists or orderings are contained in text. Another example are phrases such as: *the first step is, the second step is* when procedures are listed. Phrases such as *on the one hand* or *whereas* cue readers to texts organized in comparison-contrast patterns. When

readers notice and use these signals of rhetorical structure, they are more likely to understand how text ideas relate to one another.

2.2.2.2 Genre. Grabe (2002) defined genre as "a central concept determining how discourse is organized and used for various purposes" (p. 250). In the cited work, Grabe focused on two specific genre families, or macro-genres, when discussing genre and the effect of genre on comprehension: expository and narrative.

Graesser, Golding, and Long (1996), defined narratives as "expressions of event-based experiences" (p. 174) and refer to narrative as having a "special status" (p. 171) when discussing theories of literacy and discourse processing. Graesser and his colleagues asserted that, when compared to other genres, narrative discourse is more familiar to readers. This familiarity is partly explained by the fact that narratives are written with a recognizable story structure, or story grammar. That is, narrative text has a beginning, middle and end. This "causal sequence" (Grabe, 2002) of events (beginning, middle, and end) helps the reader to construct a coherent representation of the text being read.

Another example of the familiarity of narrative is the fact that narrative describes events that readers have either experienced or have knowledge of others experiencing. Because readers often have prior knowledge of the ideas conveyed in narrative, they can use their background knowledge to construct meaning. Inferences that readers may need to make are easier because readers have knowledge to draw upon—experiences and also schema for narrative structure.

Expository text, on the other hand, does not contain the familiar components of narrative text and can be challenging for readers. As noted earlier, narrative text is organized within a story grammar which is familiar to readers. That is not the case for expository text. According to Grabe (2002), expository texts are organized in structures-- or multiple structures—which may

be unfamiliar to students. Some of these text structures include: cause-effect, classification, comparison-contrast, and problem-solution. As Grabe explained, comprehension difficulties "are often traceable, in part, to the inability of students to recognize (and then use) the text structuring generated by authors in organizing the information presented" (p. 259).

There are other ways in which expository text differs from narrative text. While narrative text is written in a familiar, story-like manner, expository text is written in a more straight-forward manner, like encyclopedia entries or textbooks with headings and subheadings. With these examples of the differences between expository and narrative texts in mind, is there some way in which the information found in traditional expository text could be offered to students in a more comprehensible form? The genre of informational tradebooks offers a promising answer to this question.

Pappas (2006) has analyzed expository texts in informational tradebooks for students and has developed a detailed categorization scheme to identify sub-genres and sub-genre features. Her work is of interest because she has studied the kinds of tradebooks, particularly science tradebooks, available to teachers and students. Such books offer alternatives to the traditional expository texts of science textbooks.

Pappas identified narrative informational texts as an important subgenre of expository science tradebooks. Narrative informational texts present important information within a narrative or story. One form of narrative informational text is the parallel hybrid text. These books include two story lines: one informational and one narrative. *Water's Way* (Peters, 1991) is an example. The book describes the water cycle and also provides a story about a young boy who investigates fog and steam and rain.

Another form of narrative informational text is the poetic informational text, which presents information in poetry often followed by a coda that provides more information. Diane Siebert (e.g., 2000) is well known for her poetic informational texts about caves, mountains, deserts, and rivers. In rhymed verse, she explains the formation of various landscapes as well as the plants and animals who live there. A significant feature of Siebert's books are the narrative point of view. In each case, the narrator is the physical feature of the landscape that relates information. That is, the cave, mountain, desert, and river use their own "voices" to explain their features. Such texts are examples of "I" poems (Kucan, 2007). This unique genre provides readers with the "inside" story, a subjective take, unlike traditional informational texts which are most often written in the third person and offer an objective description.

The work done by Pappas in categorizing and explaining the features of informational science tradebooks is extensive and may be useful for educators who are looking for resources to incorporate into units of instruction.

2.3 Reader- Text Interactions

The previous sections have described the mental processes involved when readers comprehend or construct a coherent mental representation of text information and how those processes are influenced by specific characteristics of readers and texts. In order for readers to construct meaning from text, they need to be actively engaged in interacting with text information. Actively engaged readers make text meaningful by grappling with text information and ideas. Beck, McKeown, and Worthy (1995) studied how reader engagement in text can be influenced by features of text.

In particular, Beck et al. (1995), considered the concept of *voice* in text. Text that is rich in *voice* helps readers connect to ideas and information by communicating this information in a

personal, interesting manner. According to Bakhtin (1981), engaging text should "speak" to the reader. Beck et al. (1995) suggested that textbooks contain little *voice,* limiting reader engagement with text. According to Beck and her colleagues, "the way current textbooks are written, there is little to help students energize the language." (p.224). In contrast, tradebooks that exhibit the qualities of *voice* can encourage readers to engage with text, thus improving comprehension.

Beck and her colleagues analyzed texts to determine features of voice. Their analysis pointed to three specific features: activity, orality, and connectivity. Activity includes using verbs to make text more immediate and relevant for the reader. Orality refers to the tone of the text; for example, formal or conversational. Connectivity relates to making connections between the reader and text, such as addressing the reader directly.

Beck et al. (1995) used these themes in their study to create voiced versions of text from a textbook. For this study, fourth-grade students read one of four versions of a passage. These versions included: the original text taken from a textbook, a revised version which had features of voice included, a revised version which was made more coherent, and a revised version which was both more coherent and contained features of voice. After reading one of these versions, students answered written questions about the text, and provided a written recall of what they had read. Two types of questions, informational and issue, were part of the written questions measure. Informational questions were questions that could be answered directly from text information, while issue questions required students to think at a deeper level.

An analysis of the results revealed no significant differences between student scores for the informational questions for any of the four texts. Students scored significantly higher on the issue questions when reading the text that contained both improved coherence and features of

voice. In addition, students who read the version with improved coherence scored significantly higher on the issue questions than those who read the textbook and voiced textbook passages. Beck et al. (1995) stated, "These findings suggest that coherence, as represented in the coherence passage, and particularly coherence in combination with voice qualities, as represented in the voiced coherent passage, does indeed help readers to develop understanding of the situation presented in the text, but these qualities do not seem to play a role in assisting the reader with the more readily accessible text information." (p. 229). Thus, improved coherence and *voice* in text seemed to have helped students answer questions which required a deeper level of thinking.

McNamara, Kintsch, Songer, and Kintsch (1996) investigated the influence of prior knowledge and coherent text on comprehension. In their study, students in grades 7 through 10 were assigned to one of four groups based on text they read. These texts were identified as: (a) maximally coherent, (b) minimally coherent, (c) coherent at a local level (information found in five or fewer clauses) but not a global level (information found in six or more clauses), and (d) coherent at a global level but not a local level. The texts dealt with the topic of the features and functions of the human heart.

The procedures for the study were as follows. A test of prior knowledge on the heart and its functions was administered to the students before the texts were read. The students then read the text, provided a written text recall, and answered posttest questions. This process was then repeated: reading of text, written text recall, and answering posttest questions. The questions on the posttest were one of four types: (a) text-based questions (questions that could be answered with information from a single sentence), (b) elaborative-inference questions (questions that could be answered by linking text information with information from outside knowledge), (c) bridging-inference questions (questions that could be answered by connecting information from

two or more sentences in the text), and (d) problem-solving questions (questions that required linking information from separate sentences and applying this information to a novel situation).

McNamara and her colleagues found that minimally and maximally coherent texts do influence comprehension. Specifically, the researchers found that "a text that requires gap-filling inferences is beneficial for learning, provided the learner has appropriate knowledge background" (p. 31). In addition, it was noted that participants with low knowledge benefited most from maximally coherent texts.

There are few studies that have looked at differences in reader interactions between narrative and expository text. One such study was conducted by Best, Ozuru, Floyd, and McNamara (2006). They conducted a study in which they had fourth graders read two narrative and two expository texts. These texts differed in several ways. The differences included argument overlap and cohesiveness of text. Each of the two texts in each genre included two versions, one containing low-cohesion text and the other containing high-cohesion text. The low-cohesion text was the original version of the text, while the high-cohesion text was changed in order to have greater cohesion. The students in the study read the texts and then answered twelve multiple-choice questions which were designed to assess text comprehension. These questions measured both local-level comprehension (information within five or fewer causes) and global understanding (information in six or more clauses).

The study findings were as follows: (a) student comprehension was better for narrative text than expository texts, (b) students with high levels of prior knowledge comprehended text better than those with low levels of prior knowledge, (c) students answered more global-level questions correctly for narrative texts than for expository texts, (d) there were no differences in answers for local-level questions, (e) participants comprehended high-cohesion texts better than

low-cohesion texts for both narrative and expository texts, and (f) students were more successful answering global-level questions for high-cohesion texts. This study explored student interactions with expository and narrative texts.

Ebbers (2002) conducted research in which she examined science tradebooks and classified these texts into seven genres. These genres, and a short description of each, follow: (a) reference: presents information in a "report" style, (b) explanation: describes purpose and shows causality, (c) field guides: label and classify, (d) how-to: show procedures, (e) narrative expository: present information in a narrative style, (f) biography: describes life of an individual, and (g) journal: describes an extended scientific study .

Ebbers (2002) encourages educators to provide examples of each of these genres for students when studying a science topic. These "text sets" (p. 41), according to Ebbers, encourage students to connect scientific inquiry with literacy. In addition, these text sets can present scientific information in an authentic manner.

While these studies indicate that there do appear to be differences in the ways in which students interact with, and comprehend, these different forms of text, several studies have provided evidence which suggests genre of text does not make a difference in student understanding of science text.

Maria and Junge (1993) compared comprehension of fifth-graders when working with both narrative text and traditional textbook text. Delayed posttest results found no differences in student written recalls for either text type. Although student recalls for the narrative text were longer, they did not contain more informational ideas than the written recalls of the traditional textbook text. Student recalls for both text types contained little informational ideas. In a similar study, Lamartino (1995) found no significant differences in student learning when interacting

with science text from different genre. In this study, students read similar science content from two sources; traditional textbook text and tradebooks.

Cervetti, Bravo, Hiebert, Pearson, and Jaynes (2009) conducted a study to measure the effects of genre as students read science text. Specifically, the researchers examined fluency, comprehension, and recall of student when reading two types of text: traditional informational text and fictional narrative text. Each text was developed by the researchers and contained the same information.

The fourth-grade students in this study were asked to read each kind of text. They read the text silently, except for the first or last 100 words of a text, which were read orally. After reading each text type, students were asked to complete oral retellings of the text, as well as orally answer nine comprehension questions. The researchers also compared student accuracy and rate of reading for each text type, as well as student preference for each text type.

The findings for this study were as follows: students recalled more important information and answered more comprehension questions correctly for the traditional informational text than for the narrative text; students did not prefer one text type over another; and student accuracy and rate of reading were not significantly different between the text types.

Although the previous studies investigated the potential effect of genre on student understanding, none considered poetry as a genre. The few research studies that have been completed regarding poetry and comprehension point to poetry as a promising genre for use in the classroom. For example, according to Kane and Rule (2004): “There is a convincing literature base showing that teachers in a variety of content areas at all levels have used poetry for many years to enrich their curricula and assist in the learning of concepts, procedures,

theories, and terms" (p.658). How have researchers looked at using poetry with students, and what does their research have to offer when considering using the genre of poetry with students?

Hanauer's (1998) research involving poetry and comprehension involved comparing student learning from poems versus typical encyclopedic information. The participants in this study were adults, ages 25 to 35, who had earned B.A. degrees. Study participant were given eight passages to read. Four of the passages were poems, while the other four passages were encyclopedia excerpts. After reading each passage, participants were asked to do the following tasks: rate their understanding of the text, complete a cloze version of the text using precise wording and without rereading the text, and complete a short summary of the text without rereading the text. After one week, and without rereading the text, the participants were again asked to complete the cloze version of the text with precise wording.

The results of the study were as follows: (a) Higher levels of surface information recall occurred for the poetry text versus the encyclopedic text, (b) The encyclopedic text was read more quickly than the poetry text, and (c) The poetry text was considered harder to understand than the encyclopedic text. After looking at these results, Hanauer's claim was "that the genre of a text will influence the way that text is read and accordingly, differences in measures of reading will be found for different genres."(p. 74). How did Hanauer explain these findings?

Hanauer used a method of analyzing poetry that was developed by Culler (1975) to frame his findings. This method makes use of four conventions used to interpret poetry. The first convention is that when reading poetry, readers must construct the referents for the pronouns and the situation taking place in the poem. In contrast, in encyclopedic texts, referents are more often clearly pointed out, and the pronouns and situation relate directly to the referent. The second convention deals with coherence. When reading encyclopedic text, readers expect the

information to be straightforward and at hand. In contrast, when reading poetry, readers expect to have to construct knowledge by thinking about the poem in-depth. The third convention involves the role of poetry as a social device. In other words, poetry is a genre in which important statements are made. Readers must consider the text in-depth in order to construct and understand these important statements. Encyclopedic text is not thought to have any meaning deeper than its surface meaning. The final convention involves the process of poetry reading. Poetry "should resist automatic understanding" (p. 67). The reader needs to work in order to form an understanding of poetry. In contrast, encyclopedic text is often more easily understood than poetry. The information is more direct than or "as transparent as possible" (p. 67).

2.4 Motivation for the Present Study

While some studies have selected genre as the variable of interest, studies in which the poetic informational genre was investigated do not exist. Thus, this genre was the focus in the present study which addressed the following research questions: (a) How is genre related to student learning from science text? and (b) How are reader factors, including reading ability and perceptions of difficulty and interest of text, related to student learning from science text?

Chapter 3.0

METHODS

The purpose of this study was to investigate the possible effects on student learning from two specific kinds of science tradebooks: traditional informational texts, which are similar to science textbooks, and a genre of emerging prominence referred to as poetic informational texts. Specifically, this study addressed the following research questions:

1. How is genre related to student learning from science text?
2. How are reader factors, including reading ability and perceptions of difficulty and interest of text, related to student learning from science text?

The following sections describe the study participants, materials, measures, scoring procedures, and data analysis.

3.1 Participants

The students who took part in the study attended a rural school in northwestern Pennsylvania. This elementary school enrolled children in grades three through six. The school population was primarily Caucasian from mainly middle- and lower-income families.

Two intact fifth grade classrooms participated in this study. Classroom A included 13 students and Classroom B had 15 students. Table 1 presents information regarding the Pennsylvania System of School Assessment (PSSA) reading scores of study participants. These scores were consulted to provide an indication of students' reading ability. Student performance on the PSSA is rated as: advanced, proficient, basic, and below basic. As the table shows, the number of students in each PSSA category was similar between both groups.

Table 1
Number of Students in Each PSSA Category for Reading

PSSA Score	Classroom A Number of Students	Classroom B Number of Students
Advanced	4	3
Proficient	4	5
Basic	3	5
Below Basic	2	2
Total	13	15

3.2 Texts

Four texts were selected for use in the present study: (a) traditional informational text about caves, (b) poetic informational text about caves, (c) traditional informational text about mountains, and (d) poetic informational text about mountains. The texts were excerpts from tradebooks edited for length and content in order to create comparable selections. Table 2 provides a summary of the various analyses of the texts. Appendices A, B, C, and D present the four text excerpts.

Table 2
Analysis of Text

	Cave Trad. Text	Cave Poetic Text	Mountain Trad. Text	Mountain Poetic Text
Flesch-Kincaid Readability Formula	6.72	4.95	4.7	3.18
Word Count	424	464	310	279
Number of Sentences	32	34	22	26
Average Number of Words Per Sentence	13.09	11.73	14.08	10.73
Number of Propositions	57	64	37	37
Percentage Overlap of Propositions in Texts	58		54	
Percentage of Unique Propositions in Texts	42		46	
Number of Propositions Requiring Inferencing by The Reader	1	19	10	13

The texts were analyzed in further detail in order to identify features that might support learning as well as features that might challenge learning. Using an approach employed by Beck, McKeown, Sinatra, and Loxterman (1991), each text was segmented into content units. These content units corresponded to a complete thought expressed in a phrase or sentence. For example, in the sentence "As plates push against each other, they buckle at the edges and push mountains up. (p. 8)" (Morris, 1996), there are several content units. The content units in this sentence include: plates push against each other, plates buckle, and plates push mountains up. The content unit analyses of the text sets can be found in Appendices E and F.

After analyzing the texts into content units, the content units were compared to see which included information that was common to both texts in a set (caves or mountains) as well as how many content units required inferencing on the part of the reader in order to comprehend the text. The results of this analysis are presented in Table 2. As the table shows, more than half of the content units in each text set referred to the same information, and the poetic informational texts require more inferencing on the part of the reader. These content units relate to three main ideas in each text set as presented in Table 3.

Table 3
Main Ideas in Text Sets

Main Ideas in Cave Texts	Main Ideas in Mountain Texts
1. How is a cave formed?	1. How are mountains formed?
2. How are stalactites and stalagmites made?	2. How are mountains changed?
3. How do cave animals adapt to their environment?	3. How do animals survive in a mountain environment?

In addition to the above analyses, the important characteristics of the traditional informational and poetic informational texts are summarized in Table 4.

Table 4
Important Characteristics of Texts

Poetic Informational Texts	Traditional Informational Texts
No Headings	Headings
First-person narrative point of view	Third-person narrative point of view
High inference demands	Low inference demands
Unfamiliar genre: "I" poem	Traditional genre
Rhyme	No Rhyme

Table 4 shows the main differences between the poetic informational text and the traditional informational text. The most important difference relates to the inference demands of the texts. The content unit analyses of the texts revealed that the poetic informational texts required readers to make more inferences than the traditional informational texts; that is, it is expected that readers of the poetic informational texts will be engaged in making connections among content units because such connections are not explicit.

Table 5 contains examples of high-inference and low-inference content units from the study texts.

Table 5

High- and Low-Inference Content Units From Study Texts

	High Inference Text	Low Inference Text	Content Unit In Common
1.	And through the eons I evolved	Some Caves may be up to 50 million years old.	Caves take many years to form.
	(From Poetic Cave Text)	(From Traditional Cave Text)	
2.	Of how this planet's faulted crust was shifted, lifted, tilted thrust. Toward the sky in waves of change, to form a newborn mountain range.	The earth's outer rocky layer is called its crust. It is made up of huge pieces called plates which fit together like a giant jigsaw puzzle. As plates pushagainst each other, they buckle at the edges and push mountains up.	Discussion of Earth's Crust and how mountains are formed
	(From Poetic Mountain Text)	(From Traditional Mount. Text)	

In the first example, the concept that caves take many years to form is presented. The traditional informational caves text explicitly tells the reader that caves are very old (50 million years). In contrast, the poetic informational caves text tells the reader that the cave "evolved" "through the eons." The idea of cave formation taking a long time is not presented in an explicit manner for the reader but rather must be inferred.

In the second example, the concept of Earth's crust is discussed and how this relates to the formation of mountains. The traditional informational mountain text defines the term *crust* explicitly. The poetic informational mountain text does not define the term *crust*. The reader must have knowledge of this term or be able to infer from the proceeding words "…shifted, lifted, tilted, thrust" that *crust* refers to the Earth's changing surface.

The traditional informational text then tells the reader that Earth's crust is made up of plates, and that these plates fit together like a puzzle. The imagery of a giant jigsaw puzzle is helpful for the reader. The reader is then explicitly told that as the aforementioned plates push together, they push mountain up. In contrast, the poetic informational text tells the reader that the crust was "shifted, lifted, tilted, thrust" up toward the sky "in waves of change." The reader must then infer that these changes "form[ed] a newborn mountain range."

3.3 Measures and Scoring

Five measures were used in the study: (a) Likert scales, (b) sorting task, (c), questions, and (d) delayed posttest.

3.3.1 Likert Scales

Students were asked to indicate their evaluation of the difficulty of each text after reading by marking a Likert scale. They were also asked to indicate the level of interest the text elicited using the same kind of scale. The Likert scales can be found at the end of each text excerpt in Appendices A, B, C, and D.

3.3.2 Sorting Task

The sorting task centered on the three main ideas of each text. The participants were given pieces of paper. Each piece contained one idea from the text. The students were asked to sort the pieces of paper into three groups. They were asked to put each group into an envelope and write a title on the envelope that describes the group. The sorting tasks for each text set can be found in Appendices G and H. One point was awarded for each item that was placed in an appropriate group. Two points were awarded for each title that described the group correctly.

3.3.3 Questions

Like the sorting task, the question measure involved students responding in writing to three questions related to the main ideas in each text set. Appendices I and J include the questions and ideal responses. Each student response was compared to the ideal response and awarded points for each content unit that matches the ideal response.

3.3.4 Delayed Posttest

Three weeks after students completed their reading and responded to their assigned texts, students were asked to answer the questions for both texts once again.

3.4 Procedures

Prior to the study, meetings with the principal and classroom teachers whose students participated in the study took place and permission forms were approved and secured.

Subsequently, the classroom teachers were interviewed regarding the content of their science curriculum in order to determine if students had studied caves or mountains. In addition, science textbooks used by the students were examined for the same purpose. By a coin toss, the fifth grade classrooms were assigned to read one of the following pairs of text: (a) poetic mountains/traditional caves or (b) traditional mountains/poetic caves. Table 6 presents the timeline of events for the study.

Table 6
Timeline

Week 1	Week 2	Week 5
Day 1: Students take pretest	**Day 1**: Students read and respond to: Classroom A: Expository Caves Classroom B: Poetic Caves **Day 4**: Students read and respond to: Classroom A: Poetic Mountains Classroom: Expository Mountains	**Day 1**: Students take delayed posttest

The types of text read were counterbalanced. That is, Classroom A read the traditional caves/poetic mountains texts, while Classroom B read the traditional mountains/poetic caves text. Appendices K and L present the scripts used when students read and completed the sorting task and answered the questions for each text.

3.5 Data Analysis

This section explains what data were used to answer each research question and how the data were analyzed. The two research questions which this study addressed were:

1. How is genre related to student learning from science text?
2. How are reader factors, including reading ability and perceptions of difficulty and interest of text, related to student learning from science text?

The first research question was answered by looking at the student scores on the two tasks each student completed after reading the text: the sorting task and the questions task. These data were analyzed by conducting *t*-tests to see if there were differences in scores received by the participants when reading the poetic and traditional texts.

The second research question was answered by examining student PSSA reading scores, and student ratings on the Likert scale measure. These data were compared to participant scores on the sorting and questions tasks using *t*-tests and analyses of variance to determine if any significant differences were present.

In addition to the quantitative analysis described above, a qualitative analysis was completed. Student responses to the questions task were analyzed to determine if there were any patterns in these responses.

Chapter 4.0

RESULTS

The purpose of this study was to investigate the possible effects on student learning from two specific kinds of science tradebooks: traditional informational texts, which are similar to science textbooks, and a genre of emerging prominence referred to as poetic informational texts. Specifically, this study addressed the following research questions: (a) How is genre related to student learning from science text? and (b) How are reader factors, including reading ability and perceptions of difficulty and interest of text, related to student learning from science text?

Research Question 1: How is genre related to student learning from science text?

4.1 Posttests

In order to answer the first research question, data from posttests and delayed posttests were used. Both posttests involved students in completing two tasks after reading. The first task engaged students in a sorting task. The sorting task centered on the three main ideas of each text, which were written on separate pieces of paper. Students were asked to sort the pieces of paper into three groups. They were asked to put each group into an envelope and write a title on the envelope that described the group. The sorting tasks and ideal responses for each text set can be found in Appendices G and H.

The second task completed by the students involved answering questions. The question measure involved students responding in writing to three questions related to the main ideas in each text set. Appendices I and J present the questions and ideal responses.

4.1.1 Scoring

For the sorting task, one point was awarded for each item that was placed in an appropriate group. Two points were awarded for each title that described the group correctly (15 total points possible). For the questions task, students were awarded points for each content unit

found in each of their answers. For the questions task, there were two possible points for each of three questions (6 total points possible).

4.1.2 Sorting Results

Tables 7 and 8 present results of the sorting and questions tasks for the posttests. As the tables show, student scores on the sorting task were similar. Students in both classrooms earned about two-thirds of the points (67%) out of the maximum of 15 possible points for both texts (Group A: 10.92, 10.38; Group B: 10.73, 10.2).

Student responses to the sorting task included common category names for each group. For example, students generated titles for the items about cave animal names such as "About How Animals Live in Caves," "Animals," or "Animals in Caves." Some common group names given to the items about cave formation included "Limestone and Water," "Underground Tunnels Carved by Water," and "Limestone and Caves." Students gave the following names for the group of items related to mountain formation: "It Tells How Mountains are Made" and "How Mountains are Formed." The items related to erosion of mountains evoked responses such as "The Weather on Mountains" and "How the Mountain Changes." In general, students in both classrooms did well on the sorting task for both texts. *T*-test results revealed no significant differences in student performance on the sorting task.

4.1.3 Questions Results

Tables 7 and 8 present the mean scores for student responses to the questions about each text. As the tables show, students were able to provide an average of 3 points out of the possible 6 for caves text and 4 points out of a possible 6 for the mountains text. *T*-test results revealed no significant differences between responses from students in the two classrooms.

Table 7

Mean Scores for Sorting and Questions Tasks for Cave Texts

Caves Poetic Informational	Caves Trad. Informational	Caves Poetic Informational	Caves Trad. Informational
Sorting Task M (SD)	Sorting Task M (SD)	Questions Task M (SD)	Questions Task M (SD)
10.73 (1.43)	10.92 (1.55)	3.13 (1.35)	2.84 (1.46)

Table 8

Mean Scores for Sorting and Questions Tasks for Mountain Texts

Mount. Poetic Informational	Mount. Trad. Informational	Mount. Poetic Informational	Mount. Trad. Informational
Sorting Task M (SD)	Sorting Task M (SD)	Questions Task M (SD)	Questions Task M (SD)
10.38 (2.39)	10.20 (1.89)	4.23 (1.78)	4.46 (1.30)

One question about the caves text was most often answered incorrectly by students who read both the traditional and the poetic caves text. This question was: "Do you think creatures like salamanders that live in caves would be able to survive if they were not left in their caves? Explain your answer. Give reasons." Several students responded to the question by stating that there are salamanders that do live outside caves. Thus, they simply wrote this fact and did not mention the specific challenges that cave-dwelling salamanders would face.

Another question that was incorrectly answered by many students in both classrooms was the question about the formation of stalactites in caves. The question was: "Would it surprise you to find out that stalactites only grow about an inch in a hundred years? Why or why not?" A common answer was that they would be surprised because an inch is not very long and they would expect the stalactites to grow faster than that. Thus, students did not understand the concept that dripping calcite takes many years to form stalactites.

Other examples of student responses to questions include the following. The question regarding cave formation elicited responses such as: "Limestone dissolves and creates holes that make caves." (2 points), "Water flows over rock and dissolves the rock." (2 points), "By rocks and water" (1 point), and "From a flood or a hurricane" (0 points). The question about stalactite formation garnered the following responses: "I would not be surprised because it is a slow, natural process." (2 points), "No because rock does not grow very fast." (1 point), and "It is surprising because wouldn't the stalactites break?" (0 points). The question about salamander adaptations included responses like these: "No (they wouldn't survive) because they are not used to other habitats except their cave. They are used to their cave temperatures." (2 points), "No (they wouldn't survive), because there are other hungry animals that could eat them." (1 point), and "I think they would (survive) because not all salamanders live in caves." (0 points).
The question about mountain formation evoked these responses: "The plates push up to make a mountain." (2 points), "By two plates colliding together" (2 points), "By the earth's crust moving into the mountain" (1 point), and "By force of air or wind or gravity on earth" (0 points).
Students offered these responses for the question regarding mountain changes over time: "Mountains change because of wind, snow, and water." (2 points), "Mountains change over time because water and other things make them change." (1 points), and "Mountains change because

they get older and weaker." (0 points). When attempting to answer the question about mountain animals and how they survive, some responses included: "A yak survives by having a heavy, thick, coat of fur." (2 points), and "Squirrels live there. They eat animals and insects." (1 point). There were no zero point responses to this question.

4.2 Qualitative Analysis

Tables 9, 10, 11, 12, 13, and 14 present student responses to each question from the questions measure. Each question is sorted by PSSA level. In addition, each response is coded ("P" for poetic informational text or "T" for traditional informational text) in order to identify which text type the student read before responding to the question. Each of the six questions was, as Beck et al. (1995) referred to the questions in their study, issue questions. That is, they required students to think at a deeper level and explain responses.

Student responses and scores for the first cave question, "How are caves created or formed?" were very similar for each PSSA level. Most students answered this question correctly, with many of the incorrect responses made by students at the below basic PSSA level. However, there was a difference in how students answered this question depending on text type read. Students who read the traditional informational text included the words limestone and acid in their descriptions of cave creation. These words were used in the traditional informational text. Students who read the poetic informational text most often wrote that caves are created by flowing water. This was surprising, as the traditional informational text contained information relating to caves being formed by running water, but the poetic text did not. Because this idea of running water was a consistent answer for these students, perhaps they had been exposed to this idea during a previous study of caves.

Most of the student responses to the second cave question, "Would it surprise you that stalactites only grow about an inch in a hundred years? Why or why not?" were incorrect, regardless of the text type read. The three students who answered the question most completely read the traditional informational text. These students grasped the idea of rock slowly building over time. Two of these students were at the advanced PSSA level, while one was at the proficient PSSA level. Most of the responses to the "Why or why not?" question included the idea that students thought the rock "would grow faster." The concept behind the question could have been difficult for students to grasp by only reading the text twice, with no other learning activities connected to it.

The final cave question asked: "Do you think creatures like salamanders that live in caves would be able to survive if they were not in their caves? Explain your answer. Give reasons." Student responses to this question did vary according to PSSA level. Students at the advanced and proficient PSSA levels wrote about the salamander needing to be in a cold and dark environment because of its pale skin and blindness, while many of the students at the basic PSSA level commented on the need for the salamander to have water. Students who read the traditional informational text tended to include the idea of temperature and cold in their responses, while students who read the poetic text focused more on blindness.

Student responses to the first mountain question, "How are mountains created?" were similar for both text types. However, there were differences in student responses when looking at PSSA level. Students at the advanced at proficient levels answered this question with an explanation of Earth's plates creating mountains. Most students at the basic and below basic PSSA levels did not include references to Earth's plates in their response. These students

mentioned weather phenomena such as ice, snow, wind, and rain. It appears that the process of mountain creation was difficult for students with lower PSSA scores to understand.

The second mountain question was: “How do mountains change over time and what makes them change?” Again, there were no differences in student responses when looking at type of text read. However, there were differences for students at different PSSA levels. Students at the advanced and proficient PSSA levels answered this question by discussing weather phenomena and erosion. Many students at the basic and below basic levels mentioned Earth’s plates when answering this question, even though they didn’t list this response when answering the first mountain question, where this answer would have been correct.

Student responses to the final mountain question: “Give an example of animals that live in the mountains and how they survive there.” were similar across PSSA levels. This question was answered correctly by most students. However, there were differences in how students responded depending on text type read. Students listed animals and survival tactics which were particular to each text. For example, students reading the poetic informational text referred to deer drinking cold, clear water. Students reading the traditional informational text responded by listing the yak and its coat of fur, the cougar, hare, and bear. This information was specific to the type of text read.

Table 9

Responses to Cave Question Number 1, Sorted by PSSA Level

PSSA Level	Type Text Traditional/P-Poetic	How are caves created or formed? Responses (score)
Advanced	T	By water seeping through limestone with a weak acid that dissolves the limestone to make a hollow area in the Earth's crust. (2)
	T	Caves are formed by trickling water and rain water nibbling on the limestone. (2)
	T	When limestone dissolves. (1)
	P	Limestone dissolves and creates holes that make a cave. (2)
	P	By water flowing through and dissolving the rock. (2)
	P	They are formed by stalactites and stalagmites. (0)
Proficient	T	The weak acid that makes big holes in rocks to form the rock to make caves. (2)
	T	Caves are formed by the Earth's crust and acid from limestone. (1)
	P	Water runs through them and chews the rock. (1)
	P	By rocks and water. (1)
	P	By water flowing by rock and dissolving the rock. (1)
	P	Man-made or an underground that was formed from a flood or hurricane. (0)
Basic	T	By limestone, water, and acid coming together. (1)
	T	Acid nibbles on the rock and dissolves it. (1)
	T	Limestone is dissolved by weak acid. (1)

	P	By limestone rocks and just earth. (0)

PSSA Level	Type Text Traditional/P-Poetic	How are caves created or formed? Responses (score)
	P	By running water. (1)
	P	Water runs through rock and forms the cave as it makes a tunnel. (1)
Below Basic	T	Caves can be formed by waterfalls. You can build them (caves) with your friends. (0)
	P	Water is what forms caves. (0)
	P	Stalagmites and Stalactites. (0)
		Point Total (20)

Table 10

Responses to Cave Question Number 2, Sorted by PSSA Level

PSSA Level	Text Type T-Traditional/P-Poetic	Would it surprise you that stalactites only grow about an inch in a hundred years? Why or why not? Responses (score)
Advanced	T	Yes, because limestone dissolves and I would think it would be like 5 inches in a hundred years. (0)
	T	Yes, I thought it would grow faster. (0)
	T	No, because I would think it would take a while for the rock to grow out to make stalactites. (2)
	P	No, because it is a slow, natural process. (2)
	P	Yes, I thought they would grow fast if they were by the opening of the cave. But if it were dark maybe they would grow really slow because of the darkness (0)
Proficient	T	Yes, that's a long time. (3 students said this) (0)

	T	Yes-I know a lot about rock and I didn't know that. (0)

PSSA Level	Text Type T-Traditional/P-Poetic	Would it surprise you that stalactites only grow about an inch in a hundred years? Why or why not? Responses (score)
	T	No, because many types of crystals grow for years and years. They take a very long time to grow. (2)
	P	No, because stalactites are rock. (1)
	P	No, because we just read about it. (1)
	P	Yes, because as water drips in the cave, chemicals get in the water and it gets hard. So, I would think a lot of water would get in there in a hundred years. (1)
Basic	T	Yes, that is so slow and I move faster than that. (0)
	T	Yes, I would think it would grow faster. (0)
	T	Yes, because a hundred years is a lot. (0)
	P	No, because rock does not grow fast. (1)
	P	No, because there might not be any water to make them grow. (0)
	P	Yes, I would think it would grow more inches in a year. (0)
Below Basic	T	No, I never knew things could last that long. (0)
	T	I think it would be interesting. (0)
	P	It sounds like they grow a lot. (0)
	P	Yes, because I thought they grew every day. (0) Point Total (10)

Table 11

Responses to Cave Question Number 3, Sorted by PSSA Level

PSSA Level	Text Type T-Trad./P-Poetic	Do you think creatures like salamanders that live in caves would be able to survive if they were not in their caves? Explain your answer. Give Reasons. Responses (score)
Advanced	T	No, they are born there and their eyelids grow together and they would not be able to see. And caves are very cold and outside it may be warm. (2)
	T	No, they would be used to living in the dark and cold. If they came out they would over heat. They wouldn't know where to find food. (2)
	T	No, they are not used to other habitats. They are used to the cave temperatures. Other creatures could kill them. (2)
	P	No, their eyes and skin would burn up. (2)
	P	It would be too hot and sunny-they would die. (2)
	P	No, they are blind and are not used to the outside. (2)
Proficient	T	No, because s.m. need shelter in order to survive because of the cold, harsh winters. (2)
	T	No, because when they turn pink I think that means that they are albino and that means it is hard to live under the sun. (2)
	T	No, other animals would eat them. (2)
	T	No, because they might get too hot or too cold outside of their cave, but they are used to their homes in caves. (2)

		P	No, another animal would eat it. (2)
		P	No, they are blind from the cave. (2)
PSSA Level	Text Type T-Trad./P-Poetic	Do you think creatures like salamanders that live in caves would be able to survive if they were not in their caves? Explain your answer. Give Reasons. Responses (score)	
		P	No, they have pale white skin making it easier to be caught and they can't see from being in the dark so long. (2)
		P	Yes, they would still have hear, smell, touch, taste. They can still survive-they would need to use their other senses to catch and eat food, touch for their water to drink, and to hear if a predator is near. (1)
Basic		T	Yes, they could depend on their other senses. (1)
		T	No, they are blind, imagine them in the bright sun. (2)
		T	No, they need water to survive. (0)
		P	No, because they can also live in water like a lake or stream. (0)
		P	No, they might eat certain bugs that only live in a cave. (1)
		P	No, there is no water to make them grow. (0)
		P	No, they are blind, they are used to the dark. (2)
Below Basic		T	If they are out of cages they can live. (0)
		T	No, there might not be enough food. (1)
		P	Yes, not all salamanders live in caves. (0)
		P	Maybe, they would have a good chance to get more food outside of a cave. They would be safe in the cave from birds, cats, ants, mice, and more. (1)
			Point Total (35)

Table 12

Responses to Mountain Question Number 1, Sorted by PSSA Level

PSSA Level	Text Type T-Trad.P-Poetic	How are mountains created? Responses (score)
Advanced	T	When the Earth's plates collide and they force one to go up it makes a mountain. (2)
	T	Plates are pressed together. (2)
	T	Plates of Earth move and press together. (2)
	P	Earth's plates collide and shift. (2)
	P	Plates shift and make a fold or fault. (2)
Proficient	T	From plates getting pushed together. (2)
	T	By wind changing, and water. (0)
	P	Plates of earth freeze or get cold. (0)
	P	By two plates (Earth's plates) colliding together. (2)
Basic	T	By ice and things changing. (0)
	T	Earth's plates get crusted together and from a mountain. (2)
	P	By force of air or wind or gravity. (0)
Below Basic	T	Because they have the ice and the snow melting and it has all those trees that are behind them. (0)
	P	Rocks and snow and rain combine to make mountains. (0)
	P	Mountains are created by the earth. (0)
		Point Total (16)

Table 13

Responses to Mountain Question Number 2, Sorted by PSSA Level

PSSA Level	Text Type T-Trad./P-Poetic	How do mountains change over time and what makes them change? Responses (score)
Advanced	T	Mountains change because of wind, snow, and water. (2)
	T	They get smaller after a long, long time and it gets worn down by rain. (2)
	T	They get smaller because of erosion. (2)
	P	Weather makes is change by water wearing it down. (2)
	P	By water rubbing against rock on the mountain, and the wind blowing from both sides. (2)
	P	The harsh weather and erosion makes the mountain get smaller over the years. (2)
Proficient	T	Rain, wind, and snow make it change over time. (2)
	P	Water, rain, rivers, and the plates maybe or the crusts. (2)
	P	The weather takes some stuff from it and the ocean rubs it. (2)
Basic	T	Ice, rivers, and hail make mountains change by making new rocks or combining the two. (0)
	T	Earth's plates make them change. (0)
	P	Water makes mountains change. (1)
	P	By plates colliding. (0)
Below Basic	T	They get older and weaker. (0)
	T	The Earth's crust breaks. (0)

	P	In the fall the leaves change colors. (0)
	P	Plates move the Earth's crust. (0)
		Point Total (19)

Table 14

Responses to Mountain Question Number 3, Sorted by PSSA Level

PSSA Level	Text Type T-Trad./P-Poetic	Give an example of animals that live in the mountains and how they survive there. Responses (score)
Advanced	P	A squirrel lives there. They survive by tree plants like acorns. (2)
	P	Deer drink cold and clear water. (2)
	T	The yak has a long coat of hair. (2)
	T	Yaks, cougars, and bear-they survive in the big cave cave-like spot and in the trees. (2)
Proficient	T	Yak, bear, deer, mountain lions-the bear live in a cave how they eat is the rivers and they catch their prey with the claw. (2)
	T	Mountain lions survive there by preying on anything from hare to deer. (2)
	P	An eagle eats rodents. (1)
	P	Deer drink the cold clear water and eat grass. (2)
	P	It's like the food chain. The prey eat the plants and The predator eats the prey-it goes on and on like that. (2)
Basic	T	Rabbits and deer live on mountains and survive by finding caves and food. (2)
	T	The Yak stays warm by its' warm layer of hair and fur. (2)
	T	Bear, mountain lion, hares, and deer by eating each other and finding shelter. (2)

	T	Bear have fur and in winter sleep in caves. (2)
	P	The animals eat whatever they can find. (1)
	P	Deer drink cold water. (2)

PSSA Level	Text Type T-Trad./P-Poetic	Give an example of animals that live in the mountains and how they survive there. Responses (score)
	P	Bugs and rodents live in the mountains. They survive by the shelter the mountains provide. (1)
Below Basic	T	Bear and deer live in the mountains. They can survive because they are winter animals. (1)
	P	Wolves hunt for prey. (1)
	T	Cougars, they get the prey like hare or deer. (2)
		Point Total (33)

4.3 Delayed Posttests

Delayed posttests were administered three weeks after the initial posttests. Only the questions task was used for the delayed posttest. The sorting task was not used because students scored high on the posttest sorting task. The relatively high student scores on the posttest sorting task were attributed in part to the design of the task. Thus, it was believed that including the sorting task for the delayed posttest measure would not produce insightful data. The delayed posttests were administered in one day. Students were given the cave questions first, and then the mountain questions.

4.3.1 Results

Table 15 presents results of the posttest/delayed posttest comparison. In general, student scores on the delayed posttest were lower than on the initial posttest. *T*-test results revealed significant differences between the initial questions task scores and the post-test scores for both the mountain poetic informational text (p = .0008) and the mountain traditional informational text (p = .0006). Students in both groups scored significantly lower on the delayed posttest than on the initial posttest. There were no significant differences found for the cave questions.

Some examples of student responses on the initial posttest and delayed posttest measures follow. To the question, How are mountains created? A student responded on the initial posttest: "Plates of earth moved and are pressed together." His delayed posttest response was "Do not remember." Another student answered this question in virtually the same way on both tests. His first response was "When the earth's plates collide and they force one to go up and eventually makes a mountain." The delayed posttest response was "Mountains are formed by plates of the earth crashing together." When responding to the question about the salamander, a student answered "No (they wouldn't be able to survive) because they are used to cold and coming to the surface they will be fried from the sun." on the initial posttest. On the delayed posttest the response was "No, (they wouldn't be able to survive) because they are used to dark. You bring them to light, they die. Like the blind beetle. It will fry them like French fries."

Table 15

Mean Scores for Initial Posttest, Delayed Posttest, and Difference

	Initial Posttest M (SD)	Delayed Posttest M (SD)	Difference M (SD)
Cave Poetic	3.13 (1.35)	2.60 (1.05)	-0.53 (1.50)
Cave Trad.	2.66 (1.44)	1.73 (1.53)	0.92 (4.75)
Mountain Poetic	4.06 (1.75)	2.40 (2.02)	-1.93 (1.75)
Mountain Trad.	4.46 (1.30)	2.53 (1.68)	-1.61 (1.26)

Research Question 2: How are reader factors, including reading ability and perceptions of difficulty and interest of text, related to student learning from science text?

4.4 Reading Ability

Tables 16, 17 and 18 present information related to the reading ability of students and student scores on the sorting and questions tasks. As noted previously, reading ability was measured using student scores on the PSSA. Table 16 presents the mean scores on sorting and questions tasks for students at each PSSA level. Table 17 presents ANOVA results. There were significant differences for two tasks, as shown by the ANOVA results. For both the mountain sorting task and the mountain questions task, there were significant differences between students in the Advanced and Below Basic levels, as well as students in the Proficient and Below Basic

Levels. Not surprisingly, the Below Basic students scored significantly lower than the Advanced and Proficient students. Table 18 presents information related to correlations between PSSA level and scores on the sorting and questions tasks. There was a positive correlation between PSSA level and scores on both questions tasks and for the mountain sorting task, as shown by Pearson Correlation Coefficients. That is, the higher the PSSA level of the student, the higher they scored on those three tasks. There was not a correlation between PSSA level and student scores on the caves sorting task.

Student scores on these tasks may have been influenced by the familiarity of the text topic by students. That is, students with prior knowledge of a particular topic may have performed better on study measures than students with little or no prior knowledge of the text topic.

Table 16

Mean Scores on All Tasks for Each PSSA Level

	Sorting Task		Questions Task	
	Caves M (SD)	Mountains M (SD)	Caves M (SD)	Mountains M (SD)
Below Basic	10.5 (1.73)	8.75 (2.98)	2.00 (2.44)	2.75 (1.25)
Basic	10.5 (1.60)	10 (1.69)	2.50 (0.92)	3.87 (1.80)
Proficient	11.22 (1.56)	10.33 (1.87)	3.33 (0.86)	5.00 (0.86)
Advanced	10.85 (1.21)	11.42 (2.07)	3.71 (1.38)	5.00 (1.29)

Table 17

ANOVA Results for PSSA Level and Scores on Sorting and Questions Tasks

Source of Variation	df	MS	F	p
Cave Sorting	3	1.056	0.49	0.689
Mountain Sorting	3*	14.08	2.85	0.057
Cave Questions	3	2.941	1.60	0.214
Mountain Questions	3*	22.916	4.42	0.012

*Significant for both Bonferroni and Least Squared Deviation (LSD) Tests

Table 18

Correlation Between PSSA Level and Scores on Sorting and Questions Tasks

	Cave Sorting	Mount. Sorting	Cave Questions	Mount. Questions
PSSA Scores	.399	.010*	.043*	.003*

4.5 Difficulty and Interest

Tables 19 and 20 present information relating to student rating of interest in text topic and text difficulty. As described previously, students rated their interest and sense of text difficulty on Likert scales: 1 (not very interesting) to 5 (very interesting), and 1 (the text was easy to read) to 5 (the text was very difficult to read).

4.5.1 Results

T-test results revealed no significant differences were found for the Likert scale ratings for interest or difficulty. That is, on average, students rated all texts as easy to read (< 2) and above the mid-point (> 3) for interestingness.

Table 19
Mean Scores for Likert Scale Responses to Cave Texts

Cave Poetic Interestingness M (SD)	Cave Traditional Interestingness M (SD)	Cave Poetic Difficulty M (SD)	Cave Traditional Difficulty M (SD)
3.80 (1.20)	3.46 (1.12)	1.53 (0.63)	1.38 (0.76)

Table 20
Mean Scores for Likert Scale Responses to Mountain Texts

Mount. Poetic Interestingness M (SD)	Mount. Traditional Interestingness M (SD)	Mount. Poetic Difficulty M (SD)	Mount. Traditional Difficulty M (SD)
3.30 (1.43)	3.66 (0.89)	1.30 (0.63)	1.33 (0.48)

In summary, quantitative study results indicate that genre was not a factor in student comprehension of science text. Students scored about the same on both the sorting task and the questions task, regardless of the type of text read. Students did score higher on the mountain questions task than on the cave questions task, for both text types. Results also show there was a

positive correlation between PSSA level and student scores on both questions tasks and the mountain sorting task. Students rated all texts as easy to read and average for interestingness.

The qualitative analysis indicates that students at the advanced and proficient PSSA levels answered more questions correctly and completely than students at the basic and below basic PSSA levels, regardless of text type. Implications of these findings, including hypotheses to explain these results, will be discussed in Chapter 5.

Chapter 5.0

DISCUSSION

The present study was an attempt to address the lack of research available regarding differences in student interactions with traditional informational text and poetic informational text. The fifth-grade students participating in this study were asked to read each type of text and complete both comprehension questions and a sorting task that attempted to measure student understanding of the texts read.

5.1 Limitations

A major limitation in this study was the number of participants: Classroom A contained 13 students, while Classroom B had 15 students. If a larger number of students had participated, there may have been greater differences between groups. Originally, there were about 24 student participants in each classroom. However, because of absences, music lessons, and pull-out instruction, that number was decreased.

The type of interactions with students that this study provided could be an additional limitation for this study. The investigator was a visitor who came to each classroom four times. It is possible that students were not convinced of the importance of the study since the activities associated with the study were separate from the everyday activities of these students.

Another possible limitation for the present study involves the study measures themselves. In particular, the questions measure could have been more robust. A greater number of questions, as well as questions at different levels, may have influenced findings. For example, in their study, McNamara et al. (1996) incorporated comprehension questions as part of their measures which required different amounts of thinking and processing on the part of study participants. Using different types of questions may have generated different types of data.

Despite these limitations, this study suggests that students can interact with both traditional informational text and poetic informational text in productive ways.

5.2 Implications

There are several major implications that can be derived from this study. They relate to: effects of genre and topic on student learning from science text, and judgments of both interestingness and difficulty of traditional and poetic science texts, as represented in the literature and as revealed by students.

Study results provide inconclusive evidence related to the potential impact of genre on student learning from science text. That is, genre did not influence student scores on study measures. These results might be interpreted as an indication that in a classroom, some students might learn from poetic texts and/or traditional texts, and that a variety of text types might be useful.

Research by Pappas (2006) and Ebbers (2002) has shown the importance of including tradebooks in the elementary school science curriculum. In addition, McClure and Zitlow (1991) urge teachers to use poetry in science instruction. Thus, educators may increase student learning by incorporating genres such as poetic informational text by authors such as Siebert (2000) into their instruction.

Recent research by Cervetti et al. (2009) as well as research by Maria and Junge (1993) and Lamartino (1995), suggests that students may comprehend science material presented in the form of traditional informational text more completely than material presented in the form of fictional narrative text. Cervetti et al. (2009) also found no differences in accuracy and fluency by students when reading informational and fictional narrative texts. With this in mind, it seems that educators may want to include traditional informational text when teaching science.

As with the quantitative results of the study, the qualitative analysis suggests that genre was not a factor in student performance on the study measures. Rather, it appears that student reading ability, as determined by PSSA levels, was the greatest factor in influencing student responses to the questions task. Students at the advanced and proficient PSSA levels had more correct and complete responses than students at the basic and below basic PSSA levels. One explanation for this difference could be a lack of knowledge by students at the basic and below basic PSSA levels. This lack of knowledge, according to Snow (2002) affects student ability to process content of text, thus affecting comprehension. Best et al. (2006) found that children with higher knowledge levels comprehended text better.

The findings of Snow (2002) and Best et al. (2006) raise another question involving the present study: how does topic relate to the findings regarding genre? In other words, did students with more topic knowledge perform better on study measures due to this knowledge, or did genre have an effect on study measures? Perhaps a combination of topic knowledge and genre affected scores. In the current study, text topic, rather than genre, seemed to influence study results on study measures. Students scored higher on the questions task when reading the mountain texts than on the cave texts, regardless of genre. Study results did show a correlation between PSSA level of students and scores on the study measures. In general, the higher a student's PSSA level, the better they performed on the study measures (sorting and questions tasks).

Study results of student performance on the delayed posttest measure show that students scored much lower on the delayed posttest than on the initial posttest. There were significant differences between student scores on both the mountain tasks (sorting and questions). One explanation for this may be that students did not retain the information in long-term memory after reading the texts three weeks prior to the delayed posttest. Thus, they may have lacked the

background knowledge to answer the questions. If students had the opportunity to read the text again before the delayed posttest measure, they may have been able to activate concepts as new reading cycles occurred (Kintsch & van Dijk, 1978). This concept activation may have led to increased comprehension and different findings for the delayed posttest measure.

Study findings also challenge the idea that one genre may be easier to comprehend than another (Grabe, 2002). There was inconclusive evidence that one text type was easier or more difficult for students to comprehend. That is, text that might be perceived as being more challenging (poetic informational text) for students did not appear to be more, or less, difficult than text that might be perceived as less challenging (traditional informational text). When texts were read aloud in their study, Cervetti et al. (2009) found that most students preferred text which, according to comprehension and fluency results, was more challenging. Students in the present study may have read certain study texts with more thought and care than others, resulting in inconclusive evidence regarding genre and comprehension.

Study results relating to interestingness showed that students did not find one genre more interesting than another. Likert scale scores were at the midpoint for both types of texts. In their study, Cervetti et al. (2009) found that one group of students preferred reading traditional informational text while another group choose fictional narrative text. It is not clear why students in the present study showed no preference for one text type over another. It may be that students were not fully engaged in the study, or they truly may have not preferred one text over another.

The current study attempted to measure student learning from traditional informational text and poetic informational text. Unlike the studies by Lamartino (1993), Maria and Junge(1993) and Cervetti, et al.(2009), study participants did not perform better on measures for one text type over another text type. The results of this study indicate that student learning took

place as students interacted with both traditional informational text and poetic informational text. The results of this study suggest further research in this area. Using more text sets with a variety of topics is one potential direction for such research.

Appendix A

TRADITIONAL INFORMATIONAL SCIENCE TEXT

Caves

What Is a Cave?

A cave is a hollow in the ground. This hollow, which we sometimes call a cavern, is really a hole in the earth's crust. Some caves are just below the surface, while others extend deep down into the crust.

Caves can have very long underground passages, with lakes, rivers, and waterfalls. Some caves may be up to 50 million years old. Most developed as water trickled through them, finding paths between layers of rock, filling tunnels, and carving out new passages.

Limestone and Water

The world's biggest caves are found in limestone areas. Limestone is a soft rock that dissolves in weak acid. Rainwater contains the acid that eats away at limestone. Over thousands of years, the weak acid nibbles away until thin cracks in the rock grow into bigger holes and then become wide tunnels.

Cave Formations

Constantly dripping water creates fantastic shapes and patterns inside caves, where it is damp, dark, and cold. Amazing sights usually await explorers when they first enter a cave.

When water seeps through limestone, it carries a dissolved mineral called calcite. Over time, this mineral is deposited and creates formations called speleothems.

The best-known speleothems are stalactites, which hang downwards, and stalagmites, which grow upwards. To remember which is which, think "c" for ceiling in stalactite, and "g" for ground in stalagmite.

A gradual buildup of calcite makes strange shapes. Water drips down from stalactites to make stalagmites. Stalactites and stalagmites can grow together to form a column.

Animals

Inside caves it is dark, damp, and usually very cold, yet some creatures spend their whole lives deep inside caves. Because there is little sunlight, many of these animals have white, pale, pink or transparent skins. Although some are blind, they can rely on sharp senses of hearing, touch, and smell.

Cave-dwelling salamanders can see at birth, but since they never leave their dark cave home, their eyelids grow together and their bodies turn pale.

Other animals leave their caves to feed. Many sea caves, for example, are teeming with life. Crayfish, sponges, sea worms, and even sharks live in underwater caverns.

Many animals use caves simply for shelter. When autumn comes, black bears and grizzlies look for a cave in which to sleep through the long winter. Some snakes spend the winter in caves, too.

Colonies of bats often live inside caves. They hang from the roof during the day and leave at night to catch food. They find their way in the dark by sending out high-pitched sounds, which echo back from objects in their path.

How easy was it to read “Caves”?

1 2 3 4 5

Very easy Very difficult

How interesting was it to read “Caves”?

1 2 3 4 5

Not very interesting Very interesting

Appendix B

POETIC INFORMATIONAL TEXT

I Am the Cave

I am the cave,

So cool and dark,

Where time, unending, leaves its mark

As natural forces build and hone

A crystal world from weeping stone.

And through the eons I evolved,

My limestone, bit by bit, dissolved

By Nature's forces intertwined

In endless tears that left behind

The hollows that grew long and wide—

A cave within the mountainside.

My ceilings cry their endless tears

That fall throughout the endless years,

Each droplet leaving just a trace

Of sparkling crystal in its place.

And as these tiny crystals build,

My surfaces are frocked and frilled

With finite, fragile works of art

That set this lovely world apart—

An unlit world, a world concealed,

Where cracked and dripping ceilings yield

Stalactites growing layer by layer

With spearlike tips that pierce the air;

Stalagmites form, round-topped and tall,

Arising from my floors to stand

Like castles in a wonderland;

These decorations slowly grow

Til those above meet those below,

And as these counterparts unite

Great columns form to span my height

And bridge the gaps of time and space

That fill the darkness I embrace.

I am the cave,

Dark, damp, and chill,

Where forms of life evolved to fill

This niche, whose mazes reaching back,

Progress from bright to blackest black.

Inside, where light fades into gloom,

A twilight place--an anteroom--

Greets trogloxenes who feed outside

But venture in to rest, to hide:

The snakes, the porcupines, the rats,

The skunks, the mice, and ah! The bats…

But unlike guests who come and go,

Some creatures choose to stay below,

For darkness, cool and damp, beguiles

These cavern-loving troglophiles:

The crickets without wings and voice,

And salamanders who, by choice,

Remain within where they can shun

All hint of day, all trace of sun.

And in those depths untouched by light,

In places darker than the night,

All hues are lost, eyes cannot see,

And troglobites have come to be:

These creatures, pale and blind,

have found

No need for sight beneath the ground,

And sightless, they can never leave,

But with their other gifts perceive

The unseen world in which they dwell—

A world of hearing, touch, and smell.

I know these little troglobites:

White beetles, millipedes, and mites;

White crayfish whose antennae guide

Them through my stream, where blindfish glide;

White spiders that so lightly crawl

From rock to rock, from wall to wall.

How easy was it to read “I Am the Cave”?

1 2 3 4 5

Very easy Very difficult

How interesting was it to read “I Am the Cave”?

1 2 3 4 5

Not very Very interesting

interesting

Appendix C

TRADITIONAL INFORMATIONAL SCIENCE TEXT

Mountains

How Do Mountains Form?

There are various kinds of mountains. They are created in different ways. All, however, are formed by the movement of rocks in the earth's surface.

The earth's rocky outer layer is called its crust. It is made up of huge pieces called plates, which fit together like a giant jigsaw puzzle. As plates push against each other, they buckle at the edges and push mountains up. If the crust cracks, it has the same effect.

Folds and Faults

The earth's plates are made up of layers of rock, called strata. As the plates move, the strata are pushed and bent into folds. The movement is very slight, but it exerts great force over millions of years.

When the strata are pushed and folded so much that they cannot bend any more, they break and form a crack called a fault. The world's mountains are made of folds and faults.

Wearing Away

Very old mountain ranges, such as the Appalachians, in the eastern United States, and the Urals, in Russia, were pushed up more than 250 million years ago. Their peaks are now much lower than they once were because they have been worn down by erosion.

As soon as a mountain forms, it is attacked by wind, rain, and ice, as well as changes in temperature. Most erosion is caused by streams and rivers, which scrape away at the rock.

Animals

Mountain animals have adapted to life in a harsh, rugged environment. Some, such as the yak, have thick coats to keep them warm. Other animals like to sleep through the winter months. Bears that live in forests on the lower slopes use a cave for their winter sleep.

Mountain lions, also called pumas or cougars, live in a variety of habitats-even high mountain areas. They will eat almost any prey, from hares to deer.

How easy was it to read “Mountains”?

1	2	3	4	5
Very easy				Very difficult

How interesting was it to read “Mountains”?

1	2	3	4	5
Not very interesting				Very interesting

Appendix D

POETIC INFORMATIONAL TEXT

I Am the Mountain

I am the mountain.

Come and know

Of how, ten million years ago,

Great forces, moving plates of earth,

Brought, to an ancient land, rebirth:

Of how this planet's faulted crust

Was shifted, lifted, tilted, thrust

Toward the sky in waves of change

To form a newborn mountain range.

I am the mountain,

Young, yet old.

I've stood, and watching time unfold,

Have known the age of ice and snow

And felt the glaciers come and go.

They moved with every melt and freeze;

I am the mountain.

From the sea

Come constant winds to conquer me-

Pacific winds that touch my face
And bring the storms whose clouds embrace
My rugged shoulders, strong and wide;
And in their path, I cannot hide.
And though I have the strength of youth,
I sense each change and know the truth:
By wind and weather, day by day,
I will, in time, be worn away;
For mountains live, and mountains die.
As ages pass, so, too, will I.

I am the mountain.
In each breath
I feel the pull of life and death
As untamed birds and beasts obey
The laws of predator and prey.
On me, the hunted ones reside,
Sustained by foods my plants provide:
I shelter rodents. In my trees
Live pinecone-loving chickarees,
While tunnels, crevices, and holes
Hold marmots, ground squirrels,
chipmunks, voles.
I cradle herds of graceful deer
That drink from waters cold and clear;

I know each buck with antlers spread

Above his proud, uplifted head.

I know these creatures, every one.

They, to survive, must hide or run;

As food for those that stalk and chase,

Within life's chain, they have a place.

How easy was it to read "I Am the Mountain"?

1 2 3 4 5

Very easy Very difficult

How interesting was it to read "I Am the Mountain"?

1 2 3 4 5

Not very interesting Very interesting

Appendix E

TEXT ANALYSIS-CAVES TEXTS

A. Content units related to idea of cave formation

Traditional Informational Text	**Poetic Informational Text**
What Is A Cave? Heading provides focus for reader. (I1) *A cave is a hollow in the ground.* The topic of the piece, caves, is introduced. Also, a definition of a cave (a hollow in the ground) is provided. The term "hollow" could be an issue, but it is defined for the reader in the next sentence. (I2) *This hollow, which we sometimes call a cavern, is really a hole in the earth's* crust. The term *hollow*, used in the first sentence, is now defined for the reader. In addition, a synonym for the word hollow is offered with the word *cavern*. The reader must possess prior knowledge of the term "crust" in order to comprehend this	(P1) *I am the cave,* The topic of the text, caves, is introduced in first person. The cave is the narrator. (P2) *So cool and dark,* The idea that a cave is cool and dark is explicitly made. (P3) *Where time, unending leaves its mark* The idea that time goes on forever and creates change in the cave is stated. (P4) *As natural forces build and hone* The text tells that nature is building something(s) in the cave. The word *hone* is difficult vocabulary . (P5*) A crystal world from weeping stone.* We now know what is being built (a crystal

sentence. **Traditional Informational Text** (I3) *Some caves are just below the surface, while others extend deep down into the crust.* This sentence attempts to tell the reader where caves are located. The reader is told that caves are just below the surface, but are not told what surface is being discussed (the surface of the earth). Likewise, as in the previous sentence, the word "crust" is used but not defined. (I4) *Caves can have very long underground passages, with lakes, rivers, and waterfalls.* This sentence introduces the idea that caves have hollow areas (passages) which contain bodies of water. This information is made explicit for the reader.	world). Also, the crystals are created from stone which has water running from it (we **Poetic Informational Text** are told it is "weeping"). This must be inferenced by the reader. (P13) *And through the eons I evolved,* The cave is telling the reader that it was created over many years. The vocabulary "eons" may be troublesome for some. (P14) *My limestone, bit by bit, dissolved* The cave tells us it was formed by the dissolving limestone. Understanding this concept will require deep thinking and inferencing on the part of the reader. (P15) *By Nature's forces intertwined* This line makes reference to rainwater (nature's forces) mixing with and eroding the limestone. Again, great inferencing will be needed by the reader in order to generate this idea.(P16) *In endless tears that left behind*The running water is referred to

Traditional Informational Text (I5) *Some caves may be up to 50 million years old.* This sentence explicitly conveys the fact that some caves are very old. (I6) *Most developed as water trickled through them, finding paths between layers of rock, filling tunnels, and carving out new passages.* This sentence says that "most" developed, but does not restate that the topic is caves. This coreference could be confusing. This sentence also explains the role of water in cave formation. It would help the reader if the sentence further explained that as the water was "carving out new passages", new caves were formed. The reader must infer this.	metaphorically as "endless tears" that **Poetic Informational Text** create…(go to next line) (P17) *The hollows that grew long and wide* The hollows of the cave are created by the aforementioned endless tears. With deep thinking, this idea should be comprehensible for the reader. (P18) *A cave within the mountainside.* A cave is created in the mountain.

Traditional Informational Text **Limestone And Water** Heading provides focus for reader. (I7) *The world's biggest caves are found in limestone areas.* This sentence is introducing the main idea of the third paragraph which is the importance of limestone in the formation of caves. (I8)*Limestone is a soft rock that dissolves in weak acid.* This sentence is setting-up the main idea for sentence I9. (I9)*Rainwater contains the acid that eats away at limestone.* In this sentence, argument overlap is used when the term "acid" is used again in reference to the "weak acid" in sentence I8. Now the reader knows where the acid	

comes from (rainwater). **Traditional Informational Text** (I10) *Over thousand of years, the weak acid nibbles away until thin cracks in the rock grow into bigger holes and then become wide tunnels.* This sentence clearly explains how small cracks form bigger holes and, ultimately, "wide tunnels". This sentence could be clearer if a link to the previous sentence was made by referencing the word *rainwater*.	

B. Content units related to idea of stalactite/stalagmite creation

Traditional Informational Text	**Poetic Informational Text**
Cave Formations Heading provides focus for reader (I11) *Constantly dripping water creates fantastic shapes and patterns inside caves, where it is damp, dark and cold.* This sentence contains two main ideas: shapes are created by dripping water, and caves are damp, dark, and cold. It would be helpful for the reader if these "fantastic shapes" were named in this sentence. (I12) *Amazing sights usually await explorers when they first enter a cave.* This sentence is preparing the reader for the "amazing sights" that will be discussed in the following paragraph.	(P19) *My ceilings cry their endless tears* The cave "cries" as the metaphorical "tears" drip from above, from the cave ceiling. This should be comprehensible for most readers. (P20) *That fall throughout the endless years,* "That" is a coreference for tears.The water drips "forever". (P21) *Each droplet leaving just a trace* *Of sparkling crystal in its place.* "Droplet" is a coreference for tears.The cave tells the reader that from each drop of water, a little crystal is left behind.

Traditional Informational Text	**Poetic Informational Text**
(I13) *When water seeps through limestone, it carries a dissolved mineral called calcite.* This sentence is used to set-up the main idea for the next sentence. It explains how calcite is created by water filtering through the aforementioned limestone. Calcite is referred to as a "mineral". This vocabulary could be troublesome. (I14) *Over time, this mineral is deposited and creates formations called speleothems.* Argument overlap is used as reference is made to "this mineral". The reader is then told that "speleothems" are made from these minerals. "Speleothems" is a tier three word, and may be difficult for the reader.	(P22) *And as these tiny crystals build* The crystals, we are told, build. Some readers may take the word build literally, and picture the crystals actually building something. (P23) *My surfaces are frocked and frilled* The vocabulary "frocked and frilled" will be troublesome for many readers. Some readers may think of "filled" when they see "frilled". This may help. (P24) *With finite, fragile works of art* It will take deep inferencing to connect the idea that these "works of art" are created from the aforementioned crystals. (P25) *That set this lovely world apart-* The crystals create a unique, beautiful place.

Traditional Informational Text	**Poetic Informational Text**
(I15) *The best-known speleothems are stalactites, which hang downwards, and stalagmites, which grow upwards.* The reader is given concrete examples of what sepeleothems are as this term is overlapped from the previous sentence. The terms stalactite and stalagmite are introduced. In addition, their location in a cave is discussed. (I16) *To remember which is which, think "c" for ceiling in stalactite, and "g" for ground in stalagmite.* Here, the author offers a helpful hint for remembering where stalactites and stalagmites are found in a cave. (I17) *A gradual buildup of calcite makes strange shapes.* This idea has already been discussed in (I11). This overlap happens many	(P26)*An unlit world, a world concealed,* The word "world" creates argument overlap. The reader is told the world is dark and hidden. The term "concealed" may be difficult for some readers. (P27) *Where cracked and dripping ceilings yield* The idea of the wet, dripping ceilings from "(P19) is referenced but the gap in overlap may be troublesome. (P28) *Stalactites growing layer by layer* The word *stalactite* is introduced. The reader needs prior knowledge of what stalactites are. Also, the concept that the drips create the stalactites "layer by layer" is discussed.

Traditional Informational Text	**Poetic Informational Text**
sentences later. This could cause confusion. (I18) *Water drips down from stalactites to make stalagmites.* An explanation of how stalagmites are created from dripping stalactites is explicitly made. (I19) *Stalactites and stalagmites can grow together to form a column.* Column formation by intersecting stalactites and stalagmites is explicitly discussed.	(P29) *With spearlike tips that pierce the air;* A description of the physical appearance of a stalactite is provided. The reader can envision a spear-shaped form. This requires inferencing by the reader. (P30) *Stalagmites form, round-topped and tall,* The term "stalagmite" is introduced. A physical description is provided. Again, prior knowledge of stalagmites is needed. (P31) *Arising from my floors to stand* These stalagmites can now be pictured rising from the cave floor. Inferencing by the reader is needed here.

	Poetic Informational Text (P32) *Like castles in a wonderland;* This simile comparing stalagmites and castles is helpful. (P33) *These decorations slowly grow* The concept of slow crystal growth is again described and applied to the stalactites and stalagmites. (P34) *Til those above meet those below,* This is a description of the stalactites and stalagmites meeting as they grow. Readers should be able to picture this imagery with the previous descriptions given by the author. (P35) *And as these counterparts unite* Readers have to be able to imply that stalactites and stalagmites are the "counterparts" in this line. The vocabulary "counterparts" and "unite" could be troublesome.

	Poetic Informational Text (P36)*Great columns form to span my height* The image of column-like formations created by the meeting of these formations is created for the reader. (P37) *And bridge the gaps of time and space* This line would be difficult for young readers to comprehend. The idea of the aforementioned columns "bridging gaps of time and space" is a very high-level concept. (P38) *That fill the darkness I embrace.* The reader can picture these great columns filling the cave, which enjoys being in his dark home.

C. **Content units related to animals surviving in a cave habitat**

Traditional Informational Text	**Poetic Informational Text**
Animals Heading provides focus for reader. (I20) *Inside caves it is dark, damp, and usually very cold, yet some creatures spend their whole lives deep inside caves.* This sentence is the topic sentence for the next section of text, which is about animals that live in caves, and how they adapt to caves. The reader is also reminded of the dark conditions inside caves. This information is very explicit for the reader. (I21) *Because there is little sunlight, many of these animals have white, pale, pink, or transparent skins.* The idea of dark caves is revisited when the reader is reminded of the "little sunlight" in caves. The reader is then explicitly given a cause and effect statement regarding little	(P39) *I am the cave,* The narrator, the cave, is reminding the reader what the poem topic is. (P40) *Dark, damp, and chill,* The cave is telling the reader what it is physically like inside itself. (P41) *Where forms of life evolved to fill* There are types of life that have changed over time. The "forms of life" reference should be comprehensible for the reader. However, the vocabulary "evolved" may be difficult for some. (P42) *This niche, whose mazes reaching back,* The vocabulary "niche" will be troublesome for many readers. The imagery of mazes reaching back is

Traditional Informational Text	**Poetic Informational Text**
sunlight and the effect this has on the appearance of animals in caves. (I22) *Although some are blind, they can rely on sharp senses of hearing, touch and smell.* This sentence gives us another adaptation that animals in caves many have (blindness). The reader is also introduced to the idea of other senses being used by these animals in place of sight. The coreference "some" could be confusing for the reader. The words "some animals" would make this clearer for the reader. (I23*) Cave-dwelling salamanders can see at birth, but since they never leave their dark cave home, their eyelids grow together and their bodies turn pale.* This sentence gives the reader a concrete example of the ideas that were discussed in the previous three sentences.	powerful but will require inferencing by the reader. (P43) *Progress from bright to blackest black* Readers, with much inferencing, will be able to imagine the light in the cave being bright at first, then becoming very, very dark. (P44) *Inside, where light fades into gloom,* This is explicit. (P45) *A twilight place—an anteroom-* This line requires knowledge of the terms "twilight" and "anteroom". Many readers may possess knowledge of "twilight", but "anteroom" is a high tier word. (P46) *Greets trogloxenes who feed outside* The term "trogloxenes" is a third tier

Traditional Informational Text	**Poetic Informational Text**
(I24) *Other animals leave their caves to feed.* This sentence contains an argument overlap from the previous sentence regarding the idea of animals staying in caves. While the previous sentence tells the reader the salamander never leaves the cave home, this sentence is a topic sentence that tells the reader that some animals live in caves but do go back and forth to the outside world. (I25) *Many sea caves, for example, are teeming with life.* This sentence is confusing, given the previous topic sentence. The reader is told that sea caves are "teeming with life". This does not give us an example of animals "leaving their caves to feed" (from the previous sentence). Instead, the reader is introduced to the term "sea caves" which is	word. Readers may be able to come to some understanding of the word when used in context with the words "feed outside". Readers may be able to reason "trogloxenes" has something to do with animals. (P47) *But venture in to rest, to hide:* This line may further aide the reader in understanding that "trogloxenes" are some type of animal. (P48) *The snakes, the porcupines, the rats,* *The skunks, the mice, and ah! The bats…* This line gives the reader examples of the kinds of animals that are "trogloxenes". It will take great inferencing on the part of the reader to make this connection.

Traditional Informational Text	**Poetic Informational Text**
not explained. In addition, the vocabulary "teeming" could be confusing. *(I26) Crayfish, sponges, sea worms, and even sharks live in underwater caverns.* This sentence gives the reader examples of animals one might find in sea caves. These sea caves are now referred to as "underwater caverns". This term would have been helpful for the reader as an explanation of what sea caves are in the previous sentence. The reader is never specifically told that these animals leave the cave to feed, and then return. *(I27) Many animals use caves simply for shelter.* This is the topic sentence for this paragraph. (I28) *When autumn comes, black bears and grizzlies look for a cave in which to sleep*	(P49) *But unlike guests who come and go* *Some creatures choose to stay below,* This line is telling the reader that the prior creatures, the trogloxenes, leave and come back to the cave. Other animals never leave the cave. Again, it will take great inferencing abilities by the reader to make the connection that the trogloxenes come and go from the cave. (P50) *For darkness, cool and damp, beguiles* Some creatures enjoy the cave environment, and don't want to leave. The vocabulary "beguiles" may pose difficulties for many readers. (P51) *These cavern-loving troglophiles:* *Troglophile* will be difficult for most readers. Using the context of the prior lines, some readers will be able to infer

Traditional Informational Text	**Poetic Informational Text**
through the long winter. This sentence explicitly gives the reader examples of these animals using caves for shelter. (I29) *Some snakes spend the winter in caves, too.* Another explicit example is given of animals that use caves simply for shelter. (I30) *Colonies of bats often live inside caves.* This is the topic sentence for the final paragraph. This is an animal that most, if not all, readers are familiar with. Prior knowledge of bats and their existence in caves are helpful for the reader. (I31) *They hang from the roof during the day and leave at night to catch food.* The coreference "they" is used for bats. Examples are given of the life of a bat as it	that this word is a reference to animals. (P52) *The crickets without wings and voice,* An example of these troglophiles is given. It is also explained that the crickets in these caves have no wings, nor do they make sound. Much inferencing will be needed to make this connection. (P53) *And salamanders, who, by choice,* Another example of troglophiles is given to the reader. More inferencing on the reader's part is needed here. (P54) *Remain within where they can shun* *All hint of day, all trace of sun.* The idea that these animals stay in the cave, their dark sanctuary, is repeated for the reader.

Traditional Informational Text	**Poetic Informational Text**
relates to living in a cave. (I32) *They find their way in the dark by sending out high-pitched sounds, which echo back from objects in their path.* The coreferent "they" is used once again. The reader is given an example of bats using senses other than sight to navigate through a cave. However, the reader is not reminded that the bats can't use sight in the dark cave. The repetition of this idea from the previous paragraph regarding cave adaptations would be useful.	(P55) *And in those depths untouched by light,* The idea that the cave is a dark place, where no light can be found, is repeated for the reader. (P56) *In places darker than the night,* The cave is a very, very dark place- explicitly stated. (P57) *All hues are lost, eyes cannot see,* It is so dark in the cave that one can not see. The vocabulary "hues" may be troublesome for some readers. (P58) *And troglobites have come to be:* At this point, after the introduction of the other two technical terms, the reader should have the knowledge that the term "troglobites" refers to animals.

	Poetic Informational Text (P59) *These creatures, pale and blind, have found* *No need for sight beneath the ground,* These troglobites are "creatures" that live deep in the cave "beneath the ground". They are pale and blind because they live deep in the ground. (P60) *And sightless, they can never leave,* These creatures are blind, and will stay in the cave forever. (P61) *But with their other gifts perceive* This line will be confusing until the next two lines are read with it. The vocabulary "perceive" should not be too difficult for most readers. This line leads the reader to wonder what these "gifts" are.

	Poetic Informational Text (P62) *The unseen world in which they dwell-* Reference is made to the dark environment, this "unseen world", in which these creatures live. (P63) *A world of hearing, touch, and smell.* The reader can now go back two lines (P61) and use the information in the current line to understand what these "gifts" of perception are. (P64) *I know these little troglobites:* The term troglobite is referenced for the reader again. With much inferencing, the reader should know these animals live in the dark cave, and have physical adaptations because of the dark environment they live in.

	Poetic Informational Text (P65) *White beetles, millipedes, and mites;* Examples of these troglobites are listed for the reader. (P66) *White crayfish whose antennae guide* Another example of a troglobite is given. The reader must infer that the crayfish is white because of the dark environment, and this crayfish has antennae to help "guide" him through this dark cave. (P67) *Them through my stream, where blindfish glide;* The antennae from the previous line is used to guide the crayfish through the cave's stream, which also contains blindfish. Again, the reader must infer that this fish is blind because of the cave environment.

	Poetic Informational Text (P68) *White spiders that so lightly crawl* Another example of a troglobite is offered to the reader. The spider is white, due to the dark cave environment. These ideas require more reader inference. (P69) *From rock to rock, from wall to wall* The path of the white spider is explicitly described.

Appendix F

TEXT ANALYSIS-MOUNTAIN TEXTS

A. **Content units related to idea of how mountains are formed.**

Traditional Informational Text	**Poetic Informational Text**
How Do Mountains Form?	(P1) *I am the mountain.*
Heading provides focus for reader.	The topic, mountains, is introduced. The narrator is the mountain itself.
(I1)*There are various kinds of mountains*.	(P2) *Come and know.*
The topic, mountains, is introduced.	The reader is invited to read on and learn.
(I2) *They are created in different ways*.	(P3) *Of how, ten million years ago,*
The reader must infer that *They* is a coreferent for *mountains*. The concept that mountains are created in different ways is introduced.	A long time span is described.
(I3) *All, however, are formed by the movement of rocks in the earth's surface.*	(P4) *Great forces, moving plates of earth,*
The reader must infer that *All* is a coreferent for *mountain*s. The main way in which mountains are formed, by rock	The term *great forces* is not explained so the reader must infer what those might be. The reader must also know what the term *plates* means when used in reference to the earth.

movement, is introduced. **Traditional Informational Text** (I4) *The earth's rocky outer layer is called its crust.* The reader must infer that *the earth's surface* and *the earth's rocky outer layer* are coreferents. (I5) *It is made up of huge pieces called plates, which fit together like a giant jigsaw puzzle.* The reader must infer that *it* is refers to *the crust*. The term *plates* is introduced as the reader is told that the earth's crust is made up of plates. The reader is not told what the *huge pieces* are, but must infer that plates are made of huge pieces of rock. The jigsaw puzzle analogy could be helpful to readers in picturing the plates.	**Poetic Informational Text** (P5*) Brought, to an ancient land, rebirth:* The reader must infer that the "great forces" have changed the earth ("rebirth").The reader must also infer that this "rebirth" happened long ago ("an ancient land"). (P6) *Of how this planet's faulted crust* No explanation is provided for the terms *faulted* and *crust*. (P7)*Was shifted, lifted, tilted, thrust* The "great forces" introduced in (P4) are now vividly described with these verbs. (P8) *Toward the sky in waves of change* The reader must infer that the movement described as "waves of change" refers to the movement of the "plates of earth P4.

Traditional Informational Text	**Poetic Informational Text**
(I6) *As plates push against each other, they buckle at the edges and push mountains up.* The term *plates* is repeated. The reader may be confused by the term *buckle*.	(P9) *To form a newborn mountain range*. Because of the actions described in P 6, P7, and P8 mountains have been created. The reader must connect information from across propositions to construct an understanding.
(I7) *If the crust cracks, it has the same effect.* This sentence is confusing. The reader must infer that *the same effect* refers to the action of mountains being pushed up, which is stated in the previous sentence.	
Folds and Faults The heading provides focus for the following text.	
(I9) *The earth's plates are made up of layers of rock, called strata.* The term *strata* is introduced and defined.	

This sentence would have been helpful at **Traditional Informational Text** the beginning of the second paragraph when the term *plates* was introduced. (I10) *As the plates move, the strata are pushed and bent into folds.* The reader may be confused by wondering how rock can bend. (I11) *The movement is very slight, but it exerts great force over millions of years*. The movement referred to in the previous sentence is reinstated. The idea that the folding process takes millions of years is stated directly. (I13) *When the strata are pushed and folded so much that they cannot bend any more, they break and form a crack called a fault.* The term *fault* is introduced and defined. The term *strata* is used again but the	

readers has not seen the term for two long **Traditional Informational Text** sentences. (I14) *The world's mountains are made of folds and faults.* This sentence summarizes this section of the text.	

B. Content units related to idea of erosion acting on mountains

Traditional Informational Text	**Poetic Informational Text**
Wearing Away	
Heading provides focus for the reader	(P10) *I am the mountain,*
(I15) *Very old mountain ranges, such as the Appalachians, in the eastern United States, and the Urals, in Russia, were pushed up more than 250 million years ago.*	The reader is reminded of the topic.
	(P11) *Young, yet old*
The topic idea of mountains is overlapped with the previous sentence by using the words "mountain ranges". The concept of mountain creation, described in the last section, is overlapped with the words "pushed up more than 250 million years ago". The reader must infer that this phrase is describing mountain creation.	The reader must infer much here. They must understand that mountains are very old in human years, but young compared to the beginning of time.
	(P12) *I've stood, and watching time unfold*
	The mountains are given the human quality of standing and watching as time passes. The reader must have prior knowledge of the concept of "time unfold(ing)".
(I16) *Their peaks are now much lower than they once were because they have been worn down by erosion.*	(P13) *Have known the age of ice and snow*
	The reader must have prior knowledge of the ice age when reading "the age of ice and snow"

Traditional Informational Text	**Poetic Informational Text**
The reader must infer that the coreferent *their* is referring to the mountains ranges. The concept of erosion is explicitly introduced. The term *erosion* is explained as the reader is told the peaks are lower because they have been "worn down". (I17) *As soon as a mountain forms, it is attacked by wind, rain, and ice, as well as changes in temperature.* The concept of erosion is overlapped as examples of erosion are listed for the reader. The reader must infer that these are examples of erosion. It is not explicitly explained. (I18) *Most erosion is caused by streams and rivers, which scrape away at the rock.* Another example of erosion is explicitly stated. The reader must imply that the "rock" refers to the rocks of a mountain.	(P14) *And felt the glaciers come and go.* The term "glaciers" is introduced, but not defined. The reader must have prior knowledge of this concept. (P15) *They moved with every melt and freeze;* The reader must know that "they" is a coreferent for glaciers. The actions of the glaciers is explicitly described. Again, prior knowledge regarding the melting and freezing of glaciers during the ice age is needed by the reader. (P23) *I am the mountain* The topic is restated. (P24) *From the sea* This line becomes clear once the reader reads the next line. This may be confusing for some readers.

	Poetic Informational Text (P25) *Come constant winds to conquer me-* The reader must have prior knowledge of winds bringing weather patterns into an area, and that the weather that accompanies these weather patterns causes erosion. (P26) *Pacific winds that touch my face* The reader must infer that the winds are coming from the Pacific Ocean, onto land, and across the country. The reader would have to have prior knowledge of this weather pattern (P27) *And bring the storms whose clouds embrace* Once this line is read, the reader could put it together with (P25) and (P26) and construct a mental representation of what is happening here.

	Poetic Informational Text (P28) *My rugged shoulders, strong and wide;* The mountain is personified as having big, strong shoulders is used. The reader must infer that the clouds in (P27) are now "embracing (P27)" the shoulders in (P28). (P29)*And in their path, I cannot hide* The word *their* is used as a coreferent for the storm clouds. This connection takes much inferring. (P30) *And though I have the strength of youth,* The reader it told that the mountain is young. (P31) *I sense each change and know the truth:* The mountain is given the human characteristic of being able to observe and understand that changes are occurring to it

	Poetic Informational Text because of the weather. (P32)*By wind and weather, day by day,* Wind and weather are now explicitly listed for the reader and, in the next line…. (P33) *I will, in time, be worn away;* The reader is told what the wind and weather will do to the mountain. (P34) *For mountains live, and mountains die;* Mountains are given the quality of living things to live and die. The reader must infer that erosion causes the death of the mountain. (P35) *As ages pass, so, too, will I.* The reader must infer that the word "pass" means that the mountain will one day be gone as time "pass(es)".

C. Content units related to animals surviving in a mountain habitat

Traditional Informational Text	**Poetic Informational Text**
Animals	(P36) *I am the mountain.*
Heading provides focus for reader.	The topic of the text is mentioned.
(I21) *Mountain animals have adapted to life in a harsh, rugged environment.*	(P37) *In each breath*
The topic of the last section is introduced. The reader must know what *adapted* means.	The mountain is given the human characteristic of breathing.
(I22) *Some, such as the yak, have thick coats to keep them warm.*	(P38) *I feel the pull of life and death*
The coreferent "some" is used for animals. An example of animal adaptations is given. The reader must infer that this is an adaptation to living in mountains.	The reader is given a clue as to what the next section will be about, life and death.
(I24) *Other animals like to sleep through the winter months.*	(P39) *As untamed birds and beasts obey*
Another animal adaptation is listed. The reader must think back to the first sentence in the paragraph.	The reader is told about "untamed birds and beasts", that is, wild animals.
	(P40) *The laws of predator and prey.*
	The reader must have prior knowledge of the concept of predator and prey.
	(P41) *On me, the hunted ones reside,*
	The reader must comprehend that "me"

Traditional Informational Text	**Poetic Informational Text**
(I25) *Bears that live in forests on the lower slopes use a cave for their winter sleep.* An example of "animals sleep(ing) through the winter(I24)" is given. (I26) *Mountain lions, also called pumas or cougars, live in a variety of habitats-even in high mountain areas.* An example of another mountain animal is given. (I27) *They eat almost any prey, from hares to deer.* "They" is used as a coreference for mountain lions. The reader must infer that they have adapted by eating various prey. The term "hares" may be new to some readers.	refers to the mountain. They must also infer that the "hunted ones" refers to animals that are prey. The term "reside" may be new for some readers. (P42) *Sustained by foods my plants provide:* The vocabulary "sustained" could be troublesome for some readers. (P43) *I keep the pikas, small and shy,* Readers may not know the term "pikas". They should be able to infer that it is an animal of some sort. (P44) *That spread their gathered grass to dry.* "Their" is used as a coreference for pikas. (P42) *Sustained by foods my plants provide.* The reader must infer that the pikas use

	Poetic Informational Text the food provided by the plants. The vocabulary "sustained" may be difficult. (P45) *I shelter rodents. In my trees* The reader is explicitly told that rodents live on the mountain. Some readers may also be confused by the full sentence in the first half of this line, and then a new idea begins, unrelated to the first sentence. (P46) *Live pinecone-loving chickarees,* Readers may not know what "chickarees' are, but should be able to infer they are an animal. (P47) *While tunnels, crevices, and holes* This line tells the reader that these places on the mountain… (P48) *Hold marmots, ground squirrels,* Provide shelter for these animals and… (P49)*Chipmunks, voles.*

	Poetic Informational Text These animals. Readers may not know what marmots and/or voles are, but they should be able to infer that they are animals. (P50) *I cradle herds of graceful deer* An example of another type of mountain dweller is given. (P51) *That drink from waters cold and clear;* This sentence is very explicit for the reader. (P52)*I know each buck with antlers spread* Another explicit sentence is provided… (P53) *Above his proud, uplifted head.* As is the case in this line. (P56) *I know these creatures, every one.* The mountain tells the reader he knows all

	Poetic Informational Text of the animals living on him. (P57) *They, to survive, must hide or run;* "They" is used as a coreference for all of the animals just discussed. The topic of survival is introduced explicitly. (P58) *As food for those that stalk and chase,* The reader is told that these animals are food for predators. They must infer that "those that stalk and chase" are animals that hunt these creatures. (P59*) Within life's chain, they have a place.* The concept of the food chain, or web of life, is introduced. "They" is used as a coreference for the prey.

Appendix G

CAVES SORTING ACTIVITY

Sort all of the pieces of paper into three groups. Place the pieces that belong together in an envelope. Write a title on each envelope that describes all the pieces of paper. Make the title explain what the group is.

How Caves are Formed	**Animals in Caves**	**All about Stalactites and Stalagmites**
Limestone dissolved by water	Pale animals	Stalagmites build up from cave floors
Most caves found in limestone areas	Animals depend on hearing, touch, and smell	Stalactites and stalagmites grow and change shape
Underground tunnels carved by water	Animals become blind	Crystals build up layer by layer

Appendix H

MOUNTAINS SORTING ACTIVITY

Sort all of the pieces of paper into three groups. Place the pieces that belong together in an envelope. Write a title on each envelope that describes all the pieces of paper. Make the title explain what the group is.

How Mountains are Formed	How Mountains Change	How Animals Live on Mountains
Plates move	Mountains are worn down	Creatures find shelter
Changes in temperature and melting/freezing have an effect	Forces are at work which change the surface of the earth	Plant-eaters and meat-eaters can find food
Crust is pushed up	Wind, rain, and ice create changes	Predators search for prey

Appendix I

QUESTIONS AND IDEAL RESPONSES FOR CAVE TEXTS

1. **How are caves created or formed?**

   Caves are formed by rainwater dissolving limestone over a long period of time. As the limestone wears away, thin cracks form. As these cracks become bigger, they become holes, and then wide tunnels.

2. **Would is surprise you to find out that stalactites only grow about an inch in a hundred years? Why or why not?**

   This would not surprise me because stalactites are formed by calcite crystals which come from limestone. As water drips over the limestone, calcite is formed. It takes a very long time for all of those little drips of water over the limestone to create a stalactite.

3. **Do you think creatures like salamanders that live in caves would be able to survive if they left their caves? Explain your answer. Give reasons.**

   No, I don't think they would survive. They have adapted to living in caves over many, many years. If they left their caves, their adaptations for living in caves would make it hard to live out of caves. For example, they are blind and have pale or white skin because they live in a cave. If they didn't live in a cave, their blindness and pale skin would make them easy prey for predators. On the other hand, their specially developed senses, such as touch, hearing, and smell, could help them survive outside of a cave. These senses could help them find food and escape predators.

Appendix J

QUESTIONS AND IDEAL RESPONSES FOR MOUNTAIN TEXTS

1. **How are mountains created or formed?**

   Mountains are formed when rocks move under earth's surface. The Earth's crust is made up of a rocky layer. The crust is made up of huge pieces of rock called plates. When the plates push against each other, they buckle and mountains are pushed up. Volcanoes are formed when molten rock comes through the earth's surface.

2. **How do mountains change over time and what makes them change?**

   Erosion makes mountains change over time. Things such as wind, rain, ice and changes in temperature cause erosion. Much erosion is caused by streams and rivers running over mountains. They have rocks and grit in them, and these things rub against the mountains, wearing them down. Glaciers also caused erosion long ago.

3. **Give an example of animals that live in the mountains and how they survive there.**

Yak-thick coat to keep warm

Bears-Sleep through the winter

Mountain Lions-eat almost anything

Pikas-spread grass to dry for food/shelter

Chickarees-use pinecones

Marmots/squirrels/chipmunks/voles-live in holes and crevices in mountains

Deer-drink water

Some animals must hide or run to escape enemies.

Appendix K

SCRIPT AND PROCEDURES FOR READING THE POETIC TEXTS

Caves and Mountains

Today we are ready to read. We're going to read about caves (mountains).

Show picture of cave with stalactites and stalagmites(a mountain).

This picture shows the interior of a cave(a mountain). Today we will be reading about caves(mountains).

I will distribute a copy of the text to each student at this time.

This text is written as a poem. It's a special kind of poem. It provides a lot of information about caves (mountains). Also, in the poem, the cave (mountain) is the narrator, or the one who explains and describes.

First, I'll read the text and I'm asking you to follow along as I read.

Next, I'll ask you to take part in the reading.

Then, I will ask you to complete some activities.

I will read the text aloud to the students, as they follow along.

Now we are going to read the text again. This time, you are going to read aloud with me. Are you ready?

We will then read the text again. This time, students will read along with me.

After reading the text the second time, I will direct the students to the Likert scale questions attached to the text.

There are two questions at the end of the text that we are going to look at together. The first question asks "How easy was it to read (title of text)?" After that question, there are five numbers. Under number one, you see the works "Very Easy". Under number five, you see the words "Very difficult". I would like you to tell me how easy this text was for you to read. If it was very easy, you would circle number 1. If it was very difficult, you would circle number 5. If it was a pretty easy for you to read, but not very easy, you would circle number 2. If it was sort of hard to read, but not really hard to read, you would circle number 4. If you feel like the text was not too hard to read or too easy, you would circle number 3.

I will then talk the students through the second Likert scale question using the same explanation format for the first Likert scale question.

After the Likert scales have been completed, I will collect the text from the students.

Now, I am going to give you an activity to complete and some questions to answer that will help me understand what you think about the information that we just read.

To begin, I'm going to have you complete a sorting activity relating to the text we have just read. So, you're going to get 3 envelopes and 9 pieces of paper with different statements written on each. What I would like you to do is read each piece of paper and sort them into three groups.

Then, place each group of slips of paper into a separate envelope and write a title on the envelope that explains what each group is about.

I will distribute the sorting activity materials to students.

I will be timing the class to see how long this activity takes them to complete. When they are finished, I will collect their envelopes.

Thank you for completing the sorting activity. Now, I have one more thing for you to work on. I am going to read some questions to you about the text you just read. When you are finished with your question, please look up at me.

I will distribute the question sheets to students.

I will read a question, wait for everyone to look up at me, and then move on to the next question. I will be timing the class to see how long it takes them to answer the questions. I will thank them for all of their help today.

Appendix L

SCRIPT AND PROCEDURES FOR READING THE NARRATIVE TEXT

Mountains and Caves

Today we are ready to read. We're going to read about caves(mountains).

Show picture of cave with stalactites and stalagmites(a mountain).

This picture shows the interior of a cave(a mountain). Today we will be reading about caves(mountains).

I will distribute a copy of the text to each student at this time.

This text is written like something you would find in your science textbook.

First, I'll read the text and I'm asking you to follow along as I read.

Next, I'll ask you to take part in the reading.

Finally, I'll ask you to complete some activities.

I will read the text aloud to the students, as they follow along.

Now we are going to read the text again. This time, you are going to read aloud with me. Are you ready?

We will then read the text again. This time, students will read along with me.

After reading the text the second time, I will direct the students to the Likert scale questions attached to the text.

There are two questions at the end of the text that we are going to look at together. The first question asks "How easy was it to read (title of text)?" After that question, there are five numbers. Under number one, you see the works "Very Easy". Under number five, you see the words "Very difficult". I would like you to tell me how easy this text was for you to read. If it was very easy, you would circle number 1. If it was very difficult, you would circle number 5. If it was a pretty easy for you to read, but not very easy, you would circle number 2. If it was sort of hard to read, but not really hard to read, you would circle number 4. If you feel like the text was not too hard to read or too easy, you would circle number 3.

I will then talk the students through the second Likert scale question using the same explanation format for the first Likert scale question.

After the Likert scales have been completed, I will collect the text from the students.

Now, I am going to give you an activity to complete and some questions to answer that will help me understand what you think about the information that we just read.

To begin, I'm going to have you complete a sorting activity relating to the text we have just read. You will be getting slips of paper with different statements written on each.

You will also be getting three envelopes. What you need to do is read each slip of paper and sort the slips of paper into three groups.

Then, place each group of slips of paper into a separate envelope and write a title on the envelope that explains what each group is about.

I will distribute the sorting activity materials to students.

I will be timing the class to see how long this activity takes them to complete. When they are finished, I will collect their envelopes.

Thank you for completing the sorting activity. Now, I have one more thing for you to work on. I am going to read some questions to you about the text you just read. When you are finished with your question, please look up at me.

I will distribute the question sheets to students.

I will read a question, wait for everyone to look up at me, and then move on to the next question. I will be timing the class to see how long it takes them to answer the questions. I will thank them for all of their help today.

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