

THE EFFECTS OF INSTRUCTION ON EXPOSITORY TEXT STRUCTURE AND  
USE OF GRAPHIC ORGANIZERS ON COMPREHENSION FOR YOUNG  
ADOLESCENTS WITH LEARNING DISABILITIES

by

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(Under the direction of JAMES BAUMANN)

ABSTRACT

This dissertation investigated the effectiveness of instruction of text structure combined with the use of graphic organizers on the reading comprehension of science material for young adolescents with learning disabilities. Using single-subject research methodology, specifically a multiple-probe across students design, the author collected both intervention and interview data from four, eighth-grade participants. Results indicated that the intervention was effective in increasing comprehension scores for all four participants. However, performance across students did not maintain as had been anticipated. Participants responded favorably to the intervention. Instructional and research implications are provided.

INDEX WORDS: Expository text, Text structure, Learning disabilities, Adolescents, Graphic Organizers, Single-subject methodology, Dissertation

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A Dissertation Submitted to the Graduate Faculty of The University of Georgia in Partial  
Fulfillment of the Requirements for the Degree

DOCTOR OF EDUCATION

ATHENS, GEORGIA

2003

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August 2003

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## CHAPTER 1

### INTRODUCTION

The purpose of this chapter is to provide an overview and rationale of this dissertation. First, I define expository text and its characteristics. Second, I provide an overview of the difficulties that students with learning disabilities have with comprehension of expository text. Third, strategies to foster comprehension of expository text are identified. Fourth, a rationale for the application of single-subject methodology in this study is provided. The chapter concludes with the study's significance, research question, and overview.

#### Expository Text

As students progress through the elementary and middle grades, they are faced with the task of reading and responding to content area material. This material, presented in classes such as science and social studies, is expository in nature and qualitatively different from narrative texts. Students often experience difficulty with the transition from “learning to read” to “reading to learn” (Chall, 1983; Moustafa, 1999). Such challenges span age and grade levels and reading ability and apply to students both with and without learning disabilities. This present study explored an intervention designed to improve the comprehension of expository text for young adolescents with learning disabilities.

*Expository text* is defined as writing intended to present to a reader information about theories, predictions, persons, facts, dates, specifications, generalizations, limitations, and conclusions (Slater & Graves, 1989). Characteristics of expository text include (a) its *structure*, the way in which ideas of a text are interrelated to convey a

message to a reader (Meyer & Rice, 1984; Meyer & Freedle, 1984), and (b) its *patterns*, the possible organizational styles of a text. Calfee and Curley (1984) identified five major expository text patterns: description, illustration, sequence, persuasion, and functional. Other scholars (Englert & Thomas, 1987; Singler & Donlan, 1989) have identified similar patterns, although names vary in the literature.

The characteristics of expository text play a critical role in what is referred to as *awareness* of text structure. Similar terms are *familiarity* (Weaver & Kintsch, 1991), *sensitivity* (Seidenberg, 1989), and *knowledge* (Englert & Thomas, 1987; Pearson & Fielding, 1991). Regardless of the terminology, *awareness* refers to a student's ability to identify and use an author's structural pattern to comprehend and compose expository text. Armbruster, Anderson, and Ostertag (1987) suggested that students may struggle with expository text because they are unable to infer text patterns. Adolescents may lack prior knowledge and schemas for expository text due to the heavy reliance on narrative text in the elementary grades. As a result, research has revealed that adolescents often have difficulty learning from expository text (Armbruster, Anderson, & Ostertag, 1989; Moustafa, 1999; Spiro & Taylor, 1980). These difficulties can manifest themselves in both reading comprehension and composition.

Being able to comprehend and respond to expository text is critical for adolescent students. The National Assessment of Educational Progress (NAEP), a periodic assessment administered to students nationally to assess growth in reading achievement, provides benchmarks for judging performance of students across grade levels (McKenna & Stahl, 2002). For eighth-grade students to be considered proficient in reading, they must "be able to show an overall understanding of the text, including inferential as well as literal information. . . . Proficient eighth-graders should be able to identify some of the devices authors use in composing text" (McKenna & Stahl, 2002, p.32). The presence of such standards suggests the need for research on effective interventions designed to improve comprehension.

### Students with Learning Disabilities and Expository Text

Comprehending expository text, while challenging for many students, poses a particular challenge to students with learning disabilities (Seidenberg, 1989). The federal definition of a *learning disability* is a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or to do mathematical calculations. The term includes such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. The term does not include children who have learning problems which are primarily the result of visual, hearing, or motor handicaps; of mental retardation; of emotional disturbance; or of environmental, cultural, or economic disadvantage (Hallahan & Kauffman, 1995).

According to Swanson (1996), students with learning disabilities often have weaknesses in the executive function of memory. This higher-order function determines the manner in which mental activities or routines will be performed. Swanson suggests that learning disabilities may be the result of breakdowns in higher-order activities such as executive functioning, rather than simply a specific type of processing weakness isolated to a particular academic domain. As it relates to reading, this conception may explain why students with learning disabilities may possess accurate decoding skills but struggle to comprehend challenging material (Samuels, 1987). Many adolescents with learning disabilities, therefore, experience difficulty comprehending expository text despite adequate word recognition skills and may need explicit instruction on how to manage expository text more than their nondisabled peers.

Englert, Raphael, Anderson, Gregg, and Anthony (1989) examined the relationship between knowledge about expository texts and reading and writing performance for students with and without learning disabilities. Englert et. al. reported that text recalls for students with learning disabilities were significantly less organized and contained fewer ideas than those of both low-achieving and high-achieving

nondisabled students. Students were also interviewed about their knowledge of expository text. Students with learning disabilities possessed less knowledge and awareness about the processes involved in monitoring, organizing, and revising text based on its structure compared to nondisabled participants. Similarly, Wong and Wilson (1984) explored sensitivity to passage organization in students both with and without learning disabilities and found that students with learning disabilities were less aware of passage organization than the students without learning disabilities.

The difficulty students with learning disabilities experience while reading expository text has been attributed to their characteristics as learners. They have been described by Torgesen (1977) as inactive learners, that is, students who approach a learning task in a passive and disorganized manner. Torgesen suggested that children with learning disabilities do not adapt efficiently to tasks that require strategic processing. Smith and Friend (1986) concluded that students with learning disabilities experiencing difficulties on reading tasks may possess the innate capacity to succeed on academic tasks, but they may be unable to activate and execute appropriate strategies. Weisberg (1988) concluded in her review that students with learning disabilities need explicit instruction on how to identify when and how to use appropriate procedures and strategies and how to monitor their effectiveness.

### Strategies

A number of strategies have proven to be effective in improving expository prose comprehension of students with learning disabilities. One of these strategies is direct instruction of expository text structure and its patterns (Raphael, Kirschner, & Englert, 1988; Bakken, Mastropieri, & Scruggs, 1997). Smith and Friend (1986) examined the effect of direct instruction of text patterns on high school students' recall of expository text. Fifty-four participants with learning disabilities were assigned to either a text structure strategy group or a control group. The results indicated that training in text

structure significantly improved both recognition of text structure and recall, and that this effect remained stable over at least a week.

A second strategy demonstrated to enhance students' comprehension of expository text is the use of graphic organizers (Alvermann, 1982; Troyer, 1994; Horton, 1990). *Graphic organizers*, defined by Doyle (1999) as "any type of visual representation of concepts which helps organize information in a manner that makes the information easier to learn" (p.12), have been used to facilitate both comprehension and composition. Research on graphic organizers with students with learning disabilities is limited, however. Darche and Carnine (1986) evaluated the effectiveness of visual displays for sixth-grade students with learning disabilities using science and social studies material. They reported that students who received instruction in graphic organizers while reading expository text outperformed students in a control group. Similar results have been found with secondary students (Crank, 1995; Doyle, 1999).

The research on instruction of expository text structure combined with graphic organizers is limited for student with learning disabilities. Most of the research in this area employed group designs, used materials especially written for the experiments, and was conducted outside the classroom. Talbott, Lloyd, and Tankersley (1994) contended that many interventions prove beneficial in highly controlled conditions but do not transfer to classroom settings, highlighting the need for more teacher-conducted research. Talbot et. al. also pointed out that much research "fails to consider the role of teachers as they test approaches to shaping comprehension" (p.223).

Other researchers have recognized the need for more research on expository text comprehension with adolescent students with learning disabilities. Bakken et.al. (1997) reported that, of all the comprehension studies for students with learning disabilities conducted, fewer than 25% involved adolescents. They also noted that most of the comprehension research involved narrative rather than expository text. Addressing this limitation, they conducted a study that compared text structure training to traditional

instruction for adolescents with learning disabilities. However, they did not use graphic organizers. Griffin and Tulbert (1995) called for more research on the use of graphic organizers for students with learning disabilities: “If the next two decades are to be fruitful for the use of the graphic organizer, researchers must design studies that are methodologically sound and are sensitive to the needs of students who are poor comprehenders and their teachers” (p.86).

#### Rationale for Application of Single-Subject Methodology

Although the empirical and theoretical research in the area of expository text is extensive, there is an absence of applied research that employs single-subject research methodology to investigate comprehension of expository material of adolescents with learning disabilities. There are several reasons why single-subject methodology is appropriate for investigating comprehension processes for students with learning disabilities. First, single-subject research is appropriate for intensely studying small populations such as grade-level groups of students with learning disabilities. As McCormick (1995) states, “The personalized evaluation inherent in single-subject studies presents good possibilities for furnishing insights to refine our perceptions about delayed readers” (p.29). The same can be said of readers with learning disabilities.

Second, single-subject methodology is well suited for teacher research because it can be conducted with students in a classroom setting during normally occurring class times, enhancing the external or ecological validity (Brofenbrenner, 1976) of a study. Due to the personalized nature of the data, teacher-researchers are able to evaluate instruction on an ongoing basis during data collection. Students with learning disabilities vary widely in their individual learning styles and needs, yet variability among students is rarely studied. Single-subject methodology enables a researcher to examine the effectiveness of an intervention on each student, identify exceptions to the intervention, and adapt instruction accordingly.

Third, single-subject research is appropriate when a research participant pool is small. Small sample sizes lead to limitations in group-design research. However, using methodologically sound procedures in single-subject research can result in systematic replication, which, in turn, enhances external validity. In addition, employing the rigorous standards for single-subject research put forth by Tawney and Gast (1984) control for possible threats to internal validity.

Neuman and McCormick (1995) report that single-subject methodology has been used in several areas of literacy research. The most widely used design is the multiple-baseline across-subjects design due to the irreversibility of most reading instruction. Multiple-baseline studies in literacy described by Neuman and McCormick have investigated reading behaviors such as word recognition (Lenz & Hughes, 1990), self-questioning (Knapczyk, 1991), concept learning (Bulgren, Schumaker, & Deschler, 1988), and aspects of comprehension such as recall of story events and details (Gurney, Gersten, Dimino, & Carnine, 1990). However, to date, there has been no study that investigates the effectiveness of instruction on awareness of text patterns with corresponding graphic organizers on the comprehension of expository material of eighth-grade students with learning disabilities employing a multiple-baseline across students design.

### Significance of Study

The current study addressed the void found in the area of instruction of text pattern awareness using graphic organizers on adolescents with learning disabilities. It also contributed to the field of literacy by employing single-subject methodology. Thus, the significance of the study was two-pronged: (a) it advanced our understanding of how to improve reading comprehension for adolescents with learning disabilities; and (b) it contributed to the research base on single-subject methodology. Conducting research within a classroom using curriculum materials enhances the ecological validity and practicality of findings. Discovery and exploration of performance variability revealed by

single-subject research can lead to instruction designed to incorporate individual learning needs while remaining pragmatic for teachers.

### Purpose and Research Question

The purpose of this study was to determine whether instruction on awareness of text patterns of a science textbook and corresponding use of graphic organizers enhances expository text comprehension for eighth-grade students with learning disabilities. This study employed single-subject methodology. The study addressed the following specific research question: Will instruction on awareness of text patterns of a science textbook and corresponding use of graphic organizers increase the percentage correct of reading comprehension questions for eighth-grade students with learning disabilities?

### Overview of the Study

The research setting was a public middle school in a Southeastern state. There were four participants, all of whom were in the eighth grade. All four had Individual Educational Plans (IEPs) and were receiving instruction in a special education program for a learning disability. Additionally, all participants had reading scores in the average range for their grade level but had difficulty comprehending science text as noted by failing grades in content areas and teacher reports. The researcher was also the participants' special education teacher who served them daily. Data were collected during scheduled class time. Materials included the adopted science textbook for the eighth grade and author-generated materials including a text pattern identification guide and graphic organizers. It was anticipated by the author that instruction on using these materials would increase percentage correct of comprehension questions on the science passages.

## CHAPTER 2

### REVIEW OF THE LITERATURE

The purpose of this chapter is to provide a review of the literature relevant to the topic of this dissertation. Research in the area of comprehension of expository text is quite extensive. Similarly, research on students with learning disabilities in the area of reading comprehension is also extensive. Given the purpose of this study, the review of the literature focuses on the following areas: (a) defining and describing expository text, (b) identifying characteristics of students with learning disabilities as they relate to the comprehension of expository text, (c) reviewing the effects of text structure on comprehension of expository text for students both with and without learning disabilities, (d) describing interventions designed to improve reading comprehension of expository text for students with learning disabilities, and (e) providing an extended discussion of graphic organizers as a strategy to foster comprehension of expository prose.

#### Expository Text and Text Structure

In the primary grades, children are taught the preliminaries of reading, traditionally by means of carefully constructed and controlled texts (Calfee & Curley, 1984). Materials at this early level are intended to foster word recognition and fluency and are often of high interest to hold a young reader's attention. However, by the time students enter the middle grades, they are increasingly exposed to informational rather than narrative texts. Referred to as *exposition*, this type of writing is intended to present to a reader information about theories, predictions, persons, facts, dates, specifications, generalizations, limitations, and conclusions (Slater & Graves, 1989). Comprehension and composition of expository text are crucial for success not only in the area of

academics but also for functioning in a society that relies on the deliberate and pervasive distribution of the written word.

According to Weaver and Kintsch (1991), research on expository text is both long and short in history. The history is long in that academic reading and writing have been around for centuries. However, the authors contend that formal research in this area began just 30 years ago. One notable exception is Frederick Bartlett's 1932 book *Remembering* in which he discussed the notion of story structures and how they affect the recall of a passage. Bartlett contended that readers unfamiliar with a particular story structure rely on their preexisting story structures, or schemas, to interpret a passage and thus create meaning. Bartlett's insights were later incorporated into cognitive theories such as Minsky's (1975) frames and Anderson's (1984) schema-theoretic view of reading. Research in the area of the structure of both written and spoken language, while grounded in Chomsky's (1957) work, accelerated in the 1970s. Text analysis systems were being developed by researchers such as Kintsch and van Dijk (1978), Meyer (1975), Graesser (1981), and Frederickson (1985). Out of this research arose the notion of text structure.

*Text structure*, referred to by some as *text organization* (Singer & Donlan, 1989), refers to (a) the way in which ideas of a text are interrelated to convey a message to the reader (Meyer & Rice, 1984; Meyer & Freedle, 1984); (b) the order of sentences, paragraphs, and the passage as a whole (Dymcock, 1999); and (c) the logical connections among ideas in text and subordination of some ideas to others (Dickson, Simmons, & Kameenui, 1995). Examples of text structures extend beyond expository text to include narratives and story grammars. However, expository and narrative forms of writing have critical differences in terms of their organizations, patterns of coherence relations, and voice (Cox, Shanahan, & Tinzmann, 1991). Graesser, Golding, and Long (1991) provide a comprehensive discussion of these differences that are beyond the scope this review.

Research on the structural characteristics of expository text (Meyer, 1975; Armbruster, 1984; Pearson & Camperell, 1981; Weaver & Kintsch, 1991) suggests that there are three levels at which a text can be analyzed. The first level, the microproposition (microstructure) level, focuses on the structure of sentences and how they relate to one another. It is the smallest unit of text analysis. The second level, the macroproposition (macrostructure) level, is concerned with the main idea of a text and examines a text at the paragraph level. The third level is the top-level structure and refers to the overall organization, or “gist” of a text. A reader forms a mental representation of a text by combining the author’s intended micro- and macrostructure of the text and their own knowledge and beliefs (Kinstch, 1998).

An additional characteristic of expository text is text patterns. Using a classification system that reviewed textbooks, newspapers, and magazines, Calfee and Curley (1984) identified five major categories for expository text patterns: description, illustration, sequence, persuasion, and functional. Other researchers and writers (Englert & Thomas, 1987; Singler & Donlan, 1989) have identified similar patterns, although category names vary. For example, Hayes (1989) identified the most commonly seen text patterns in middle school texts as time order, cause-effect, and enumeration. In a study exploring expository discourse and college students, Hiebert, Englert, and Brennan (1983) examined undergraduate, content area textbooks and found four patterns: description, sequence, enumeration, and comparison-contrast. The various labels to denote text patterns can be attributed to the differing purposes and audiences of the authors. Patterns, although characteristic of all expository text, vary depending on age level and content of the text (McGee & Richgels, 1985).

The characteristics of expository text play a critical role in students’ *awareness* of text structure. Awareness refers to a student’s ability to identify and use an author’s structural pattern. Armbruster, et. al. (1987) suggested that students may struggle with expository text because they are often unable to do this. Students entering the middle

grades often lack prior knowledge and schemas for expository text due to the heavy reliance on narrative text in the elementary grades. As a result, researchers have emphasized the importance of the transition from “learning to read” to “reading to learn” (Chall, 1983; Moustafa, 1999). Young readers who develop sensitivity to text structure and are able to recognize an author’s text structure generally perform better on both comprehension and composition tasks (Smith & Friend, 1986; Winograd, 1984).

When exploring the interaction between expository text and readers, it is important to consider the text itself. Slater and Graves (1989) present four attributes of good expository text, recognizing that not all texts incorporate them. These attributes include texts that are clearly informational, provide meaningful explanations, use explicit contextual cues, and incorporate narrative attributes. Other researchers have suggested that text structure indicators such as semantic cues (Meyer, Brandt, & Bluth, 1980), signal words (Seidenberg, 1989), and textual cues (Seidenberg, 1989) are important to use in writing expository prose. These indicators have been found to enhance text comprehension. A text classified as good exposition includes organization at all three levels with clear patterns and interesting details.

One would hope that good expository text is included in textbooks for all students. Textbooks are the predominant tool of instruction in America and are used increasingly with each advancing grade (Kinder & Bursuck, 1991). However, there has been considerable criticism of textbooks. Textbooks have been described as “inconsiderate” of their readers by Armbruster (1984) when they do not include the attributes of good expository text. Others have claimed that textbooks used in the middle grades are poorly organized and that students receive little to no instruction on how to read them effectively (Raphael, Englert, & Kirshner, 1988). As early as fifth grade, textbooks have been found to assume too much prior knowledge on the student’s part (Beck & McKeown, 1991). Dense vocabulary, rapid presentation of information, little opportunity for in-depth practice of concepts, and inconsistent presentation of main ideas

are other textbook characteristics cited as troublesome for readers (Jarrett, 1999; Scruggs & Mastropieri, 1993; Seidenberg, 1986).

Research has examined how to improve textbooks and assist students in reading them. Some authors have focused on writing good textbooks for learning (Chambliss & Calfee, 1998); others have made suggestions for student preparation and use of the books (Wood, 1995); still others have examined how to adapt textbooks for individual students (Jarrett, 1999). Cousin (1989) offered research-based suggestions to publishers on how to improve textbooks in the areas of readability, clarifications, graphics, and text organization. Research on the attributions of good expository text, such as cohesion and explicit main idea statements, has been conducted and directed to the attention of textbook writers for children of all ages (Pearson & Camperell, 1981).

#### Characteristics of Students with Learning Disabilities

This discussion focuses on the characteristics of students with learning disabilities that relate to expository text features and content area reading. It is important to consider such characteristics in order to gain insight into the challenges and difficulties these students experience when confronted with comprehending and composing expository text. This section begins with a definition of learning disability and then addresses research related to students' with learning disabilities (a) awareness of text structure, (b) use of text structure in comprehending expository text, (c) inactive learning, and (d) metacognitive characteristics.

#### Definition

The federal definition of a learning disability is a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or to do mathematical calculations. The term includes such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. The term does not include children who have learning problems

which are primarily the result of visual, hearing, or motor handicaps, of mental retardation, of emotional disturbance, or of environmental, cultural, or economic disadvantage (Hallahan & Kauffman, 1995).

#### Awareness of Text Structure

Research demonstrates that students' awareness of text structure is related to reading ability (McGee, 1982; Taylor & Samuels, 1983). Students categorized as good readers generally recognize text structure and use it to aid in comprehension, while poor readers are often unable to identify an author's organizational patterns (Meyer, et. al., 1980). For example, in their investigation of whether poor readers can be taught to become sensitive to textual cues, Weisberg and Balajthy (1990) found significant posttest improvements on both text comprehension and composition following direct instruction of the text's organization. Weisberg (1988) suggested that such findings may be a result of building a reader's schema for expository text. While most of the research on a reader's schema has focused on the content of a passage, schemas for format of a text are also important for comprehension and composition of expository text (Gold & Fleisher, 1986).

In a study using Kintsch and van Dijk's (1978) conceptual model, Winograd (1984) examined the possibility that eighth-grade students' difficulty with reading comprehension may be linked to their lack of awareness of important elements in the text. The essential components of Kintsch and van Dijk's (1978) text-analysis system are the microstructure and macrostructure of the text and the macro-rules that readers apply while reading a text. Winograd (1984) reported that good and poor readers in the eighth grade differed on their sensitivity to important elements of a text, with good readers reporting better awareness, comprehension, and producing better written summaries. Similarly, Elliot (1980) reported that sixth-grade students' awareness of top-level structures contributed to significantly greater recall of expository passages. These results

suggested that when students are experiencing difficulty in comprehension, their awareness of text elements and strategic skills should be assessed.

### *Use of Text Structure*

Recognition and use of text structures and textual cues appear to be a skills used more often by good readers than by poor readers (Winograd, 1984). However, research suggests that it is also a skill used more by children without learning disabilities than by children with learning disabilities (Englert & Thomas, 1987; Seidenberg, 1989). Wong and Wilson (1984) explored sensitivity to passage organization in students both with and without learning disabilities and found that students without learning disabilities were more aware of passage organization than the students with learning disabilities. Others have also found that students with learning disabilities are less sensitive to organizational structures in both comprehending and composing text (Englert, Raphael, Anderson, Anthony, Fear, & Gregg, 1988). Additionally, research suggests that many students with learning disabilities have substantial difficulty in both recognizing and reorganizing a disorganized passage (Wong & Wilson, 1984; Seidenberg, 1989).

Seidenberg (1986) suggested that a learner's ability to recognize and use the organizational structure of texts is important for both reading and writing tasks and that many students with learning disabilities lack the strategies to do so. Because they lack these strategies, their ability to recall information is impaired. Similarly, their inadequate writing skills reflect deficits in a solid understanding of text organization, patterns, and cues. The ability to make predictions, discriminate between relevant and irrelevant information, and summarize are also hindered as a result of insensitivity to text structures (Dickson, et. al., 1995). Fortunately, research suggests that students with learning disabilities can be taught successfully how to recognize text structures and use them to aid in their reading comprehension and composition of expository text (Smith & Friend, 1986).

Consistent with the findings that students with learning disabilities are less sensitive to text structure, research suggests that they also have difficulties using text

structure to comprehend and compose expository prose. Gold and Fleisher (1986) investigated main idea recall of expository passages for both average readers and students with learning disabilities and found that average readers approached the passages in a more systematic way, using text structure as an aid. Additionally, the researchers found that the students with disabilities were more rigid in their approach, relying almost exclusively on the first sentence of each passage for the main idea regardless of passage type (inductive or deductive). Snider (1989) reported similar results in her investigation of the effects of passage type on recall, finding that students with learning disabilities were better able to recall textually explicit passages.

In her review of the relevant literature, Seidenberg (1989) suggested that teaching students with learning disabilities awareness of the different text structures is only the first step. Students also need subsequent instruction on how to apply them to writing tasks or when identifying main ideas. She emphasized the importance of explicit instruction for students with learning disabilities to activate and use appropriate strategies during reading and writing. Her recommendations were similar to other descriptions of the learning needs of students with learning disabilities (Torgesen, 1977) and to the literature on poor readers and their inability to activate and use appropriate strategies during reading and writing tasks of expository text (Anderson & Roit, 1993; Griffin & Tulbert, 1995; Maria & McGintie, 1981; Swanson & Da La Paz, 1998).

#### *Inactive Learners*

Students with learning disabilities have been described as inactive learners (Torgesen, 1982) who frequently are passive and disorganized. Torgesen suggested that children with learning disabilities do not adapt efficiently to tasks that require strategic processing activities. The educational implications are to provide direct instruction in the use of cognitive strategies, such as recognizing the need for planning a strategy when attempting a learning task, self-monitoring performance, and searching for alternatives. Hresko, Parmar, and Bridges (1996) described learning as an active process in which learners activate and process information necessary to complete a given task. Hresko et.

al. (1996) suggested that a significant number of students with learning disabilities do not spontaneously activate strategies. These students may be deficient in both strategy selection, in which a student ideally chooses an appropriate strategy, and strategy execution, in which a student must successfully implement and monitor its use. Weisberg (1988) concluded from her literature review that disabled readers need explicit instruction on how to identify when and how to use appropriate procedures and strategies and how to monitor their effectiveness.

Torgesen (1977) also described learning as an active process requiring such emotional and cognitive “meta” variables as attention, motivation, and perception. He suggested that the poor performance of children with learning disabilities indicates that they may have deficits in one or more of these variables, resulting in an inability to actively identify and use appropriate strategies. Similarly, Smith and Friend (1986) offered that students with learning disabilities possess the “innate capacity” (p. 38) to succeed on academic tasks but are often unable to activate and execute appropriate strategies.

### *Metacognition and Text Structure*

The ability to monitor one’s comprehension is referred to as *metacognition*. The term metacognition was introduced by developmental psychologists interested in children’s knowledge and control of their own learning (Brown, 1978; Flavell, 1985). Metacognition involves both the awareness of what skills and strategies are appropriate to perform a task and the ability to monitor the use and effectiveness of those skills and strategies. Self-regulatory behaviors such as monitoring, evaluating, checking, revising, and remediating performance all fall under the domain of metacognition (Baker & Brown, 1984). Additionally, it includes a learner’s knowledge of his or her own capabilities (Brown, 1984). If students are unaware of their limitations, they can’t be expected to anticipate or prevent problems in performance.

Cognitive monitoring is essential for both text comprehension and composition. Effective readers and writers demonstrate metaocognition (Brown, 1984) such as

clarifying the purpose of the task, identifying important aspects of the message, focusing attention on the main points, and engaging in self-questioning to determine if the task demands are being met. Swanson and De La Paz (1998) suggested that proficient readers typically use one or more of these metacognitive behaviors tacitly as they read. Proficient readers use appropriate strategies because these strategies have proven to be effective over time. Similarly, Applebee (1981) stated that good writers are often unaware of their own strategies but can identify which ones are effective.

Researchers have demonstrated that poor readers and writers do not monitor their own performance as well as good readers and writers. Raphael and Pearson (1985) found that poor readers often seem unaware of task requirements and use inappropriate strategies to complete them. Even when students are able to decode words correctly, poor readers often do not attend to the meaning of the passage or monitor their own comprehension (Bos & Vaughn, 1994). Winograd (1984) assessed the summarization ability of both good and poor readers in eighth grade and found that although both groups were aware of the task, the groups differed in their ability to identify important information: Poor readers identified and included ideas in their summaries that were personally interesting rather than pertinent to the main idea of the passage. Weisberg and Balajthy (1990) successfully taught high school students experiencing these difficulties to identify and use a passage's main ideas to write summaries.

Similar to poor readers and writers, students with learning disabilities often fail to monitor their selection and use of strategies and their own performance (Swanson & Cooney, 1996). Metacognitive knowledge seems to distinguish children with and without learning disabilities. For example, Wong (1982) found that when compared to normally achieving and gifted children, children with learning disabilities lacked self-checking skills and were less aware of efficient strategies related to recall of prose. Wong and Jones (1982) trained middle school students both with and without learning disabilities in a five-step self-questioning procedure designed to improve comprehension. Results

indicated that the metacognitive training substantially increased awareness of important textual units for the students with learning disabilities but not for the normally achieving students. Wong and Jones suggested that normally achieving students already monitor their own comprehension, lessening the effects of metacognitive training. The authors also suggested that differential effects of training on the two groups underscore the inactive nature of a student with learning disabilities.

Becker and McCormick (1991) cite similar studies that demonstrate the metacognitive differences between students with learning disabilities and their nondisabled peers (e.g. Chan, Cole, & Barfett, 1987; Schumaker, Deschler, Alley, Warner, & Denton, 1982). These studies suggest that students with learning disabilities, while differing from normally achieving students, can be taught to use strategies designed to increase awareness of cognitive behaviors. Seidenberg (1986) suggested that comprehension of expository text requires metacognitive strategies because comprehension is student-directed and self-monitored. Many students with learning disabilities do not appear to possess or use such strategies but benefit from instruction on how to do so.

It has also been reported that students with learning disabilities often do not monitor their writing of expository text. Englert, Raphael, Anderson, Anthony, Fear and Gregg (1988) suggested that students with learning disabilities demonstrate dependence on adults and teachers to monitor the quality and quantity of their compositions. They designed the Cognitive Strategy Instruction in Writing program to improve expository writing of students with learning disabilities by emphasizing control of thinking and organizational strategies. Walmsley (1983) noted that writing ability, and therefore disability, may be an extension of other language skills. If a child possesses deficits in metacognition in reading, it follows that these deficits will manifest themselves in their composition of expository prose.

In summary, students with learning disabilities face particular challenges when encountering expository text. They appear to be less aware and less sensitive to expository text structures while both reading and writing. They often do not employ these structures when attempting to comprehend or compose expository text. Students with learning disabilities are often described as inactive learners who do not spontaneously activate strategies when necessary. Their metacognitive skills appear to be deficient when compared to normally achieving students, although metacognitive training has shown to be effective. Given these characteristics, it is not surprising that students with learning disabilities often struggle in the area of expository text comprehension.

#### Effects of Text Structure on Comprehension of Expository Text

This review now turns to the effects of text structure on students' reading of expository text. While emphasis is placed on students with learning disabilities, it is important to provide a reference to normally achieving students. By doing so, one is able to relate the performance of students with learning disabilities to a larger population and recognize the unique learning needs of these students. The effects of text structure on reading comprehension is discussed first, beginning with normally achieving students ranging from elementary to high school, followed by the effects of text structure on the comprehension of students with learning disabilities.

#### *Text Structure and Reading Comprehension for Normally Achieving Students*

Research with normally achieving students consistently demonstrates that structure is an important variable in the comprehension of expository text (Slater & Graves, 1989). Students in elementary school (McGee, 1982; Taylor & Samuels, 1983), middle school (Taylor & Beach, 1984), high school (Meyer, et. al., 1980), and college (Bacon & Carpenter, 1989) use text structure to comprehend text, and their reliance increases with age. This appears to be a late developing skill possibly linked to overall reading ability.

McGee (1982) compared the oral recall of expository passages of good and poor readers in third and fifth grade. Recalls were analyzed to determine how closely the students' retellings reflected the author's structure. The results indicated that fifth-grade good readers were more aware of text structure and had better recall of the passage than both fifth-grade poor readers and third-grade good readers. The good readers in the third grade, while not displaying any awareness of text structures, outperformed poor readers in the same grade. McGee suggested that these findings support the notion that text structure awareness and use in comprehension is developmental and correlated to overall reading ability.

In a similar study, Englert and Hiebert (1984) conducted an investigation of four major types of expository text on the comprehension of children in both third and sixth grade and on three different reading ability levels. The major focus of the study was how knowledge of expository text patterns develops over the school years. Children were given topical information on four passages, each adhering to different text patterns (sequence, compare/contrast, descriptive, and enumeration), and were asked to rate how well both target and distracter statements corresponded to the original stimuli sentences. Developmental differences were noted, with sixth grade students being more capable of detecting mismatches between stimuli sentences and incoming statements. At both grade levels, students in the high-ability groups were more aware of text structures than the two lower-ability groups. Description was found to be the most difficult of all text patterns for all students; however, the findings suggested that students made the greatest gains in comprehending description. Englert and Hiebert (1984) concluded that the ability to effectively use text structure in comprehension increases with age and ability level.

If, in fact, the use of text structure is developmental, elementary students are at a disadvantage. Taylor and Samuels (1983) investigated whether recall of expository text could be attributed to the use of text structure as a retrieval cue for elementary students. Students were asked to read both normal and scrambled passages. Half of the students

received training in text structure awareness, and half did not. The students aware of text structures recalled significantly more of the normal than the scrambled passages, whereas for students who were unaware of text structure, there was no difference in recall between normal and scrambled passages. The results indicated that many elementary students have not yet learned how to use text structure as a retrieval aid but benefit from such instruction. These findings support the developmental nature of the use of text structure while highlighting the need for early instruction on its use.

Zabucky and Ratner (1992) conducted a study on the differences between good and poor readers in middle school. The authors used an error detection paradigm to assess the effects of passage type (consistent and inconsistent) on comprehension monitoring and recall of both narrative and expository passages. Look-backs were counted during reading, and recall of the passages was assessed verbally. The authors found that good readers were better able to detect inconsistencies in the passages, with more inconsistencies being identified in narrative rather than expository passages. Good readers also had significantly more look-backs than poor readers, with a higher frequency in the expository texts for both groups. The authors suggested that comprehension monitoring may be correlated to overall reading ability with more breakdowns in comprehension occurring with expository text.

An important component of comprehension of expository text is understanding the overall gist, or the top-level structure, of a text. Top-level structures of a text tie all the micro- and macropropositions of a text together to form an overall organization (Meyer, 1984). Elliot (1980) conducted a study to investigate what middle school students know about organizational features of expository text and whether the use of top-level structures facilitated written recall. He found that only 44% of the students used the author's top-level structure to organize their recall protocols. These findings were consistent with others who suggested that the use of top-level structures in recall is developmental but important in the overall comprehension of a text. Similarly, in his

study summarization skills of eighth-grade students, Winograd (1984) found that sensitivity to the overall gist of a passage was correlated to reading ability. This sensitivity was evident in written summaries designed to reflect top-level structures.

Weisberg and Balajthy (1990) conducted three studies investigating whether poor readers could be trained to become more sensitive to important information in a text by using its cues, apply this awareness to new text passages, write summaries of the passages, and improve their reading comprehension. Results indicated that students who received training in text structure and text cues could identify main ideas significantly better than those who received no training, included more idea units in their summaries, and demonstrated improvement in their comprehension of new passages. The authors suggested that these findings are encouraging for poor readers and could be applied to children with learning disabilities.

It is evident from the research reviewed that awareness and use of text structure plays an important role in comprehension of expository text for students of all ages without learning disabilities. The ability to effectively use text structure as a retrieval cue appears to be developmental and related to text patterns and types. It is also correlated to reading ability, with poor readers being less aware of and less likely to use text structure in comprehension. Students with learning disabilities demonstrate similar behaviors. Due to the learning characteristics previously described, these students face challenges when confronted with expository text.

#### *Text Structure and Reading Comprehension for Students with Learning Disabilities*

Researchers have reported significant differences between students with and without learning disabilities in their ability to use text structure in reading comprehension. Englert and Thomas (1987) examined this difference in students' ability to recognize and produce related details consistent with a given text structure. Their participants were third- and seventh-graders with and without learning disabilities. Students were assessed on both reading and writing measures. Results indicated that

students with learning disabilities at both grade levels lacked sensitivity to text structure, which, in turn, impaired their performance on both comprehension and composition of expository prose.

Wong and Wilson (1984) explored the differences in sensitivity to passage organization for students with and without learning disabilities. Participants were randomly selected from Grades 5 to 7. The authors presented each child with both an organized passage and a disorganized passage (scrambled by the authors) individually and asked the student to recall as much as possible. Next, each child was asked to identify any differences between the two passages. Finally, each participant was asked to reorganize the disorganized passage. Results indicated that the students with learning disabilities had poorer recall for both passage types, more frequently failed to detect the disorganized passage despite explicit probes by the researcher, and were generally unable to reorganize the disorganized passages. In a follow-up intervention study, Wong and Wilson (1989) successfully increased text organization awareness of the participants with learning disabilities.

In another investigation into the differences between disabled and non-disabled students, Penning (1985) found similar results. Penning assessed the relationship between text structure, discourse type, and disability to free and probed recall of a passage. The recall performance of 30 normally achieving, sixth-grade students was compared to 30 sixth-grade students with learning disabilities. There were significantly higher mean scores on the structured passages for both groups; however, the participants with learning disabilities scored significantly lower than the normally achieving students on recall of important ideas. Recall of narrative discourse as opposed to expository was higher for both groups.

Penning and Raphael (1992) reported similar results in their investigation of the characteristics of poor comprehenders and their relationship to text variables. The purpose of their study was to examine differences between normally achieving students

and their peers with learning disabilities, with both groups having specific problems in reading comprehension. Penning and Raphael (1992) found that students with learning disabilities were less able to effectively use sentence and text structures on various language measures. Additionally, discourse type impacted recall for all students, with well-structured expository and narrative text being recalled more frequently and accurately than poorly structured text of both discourse types.

Research and theory have addresses characteristics and needs of students with learning disabilities in the area of comprehension of expository text. In their review of literature on reading instruction and students with learning disabilities, Becker and McCormick (1991) acknowledge the increased demand of comprehension ability beginning around the fourth grade. At this time, students are presented with increasingly complex, expository text patterns coupled with greater demands on their prior knowledge and abstract reasoning. In addition to studies that investigated the role of prior knowledge and metacognition, Becker and McCormick reviewed research that examined text variables and their influence on comprehension. Relevant to the present review is their discussion of research by Beregrud, Lovitt, and Horton (1988) who found using a graphic representation of a science textbook's structure improved retention for secondary students with learning disabilities, suggesting that students may reach high school and continue to have deficits in the area of text structure awareness.

Seidenberg (1989) reviewed research relating text processing to reading and writing instruction for students with learning disabilities. Seidenberg concluded that students with learning disabilities lack the prerequisite knowledge of text organization used in the comprehension of expository text (Wong & Jones, 1982; Wong & Wilson, 1984). Seidenberg proposed that the research consistently demonstrated that the identification of main ideas is facilitated when readers are aware of text patterns that exemplify superordinate/subordinate relationships among ideas (Meyer, et. al., 1980; Pearson & Johnson, 1978). Because many students with learning disabilities are unaware

of such text patterns, Seidenberg pointed out that these students have difficulty distinguishing main ideas from details. This difficulty will impact comprehension, summary, and composition of expository text for these students.

Gold and Fleisher (1986) reported that students with learning disabilities could not identify main ideas in inductively organized passages and lacked strategic behavior while reading or answering comprehension questions. Weisberg and Balajthy (1986) reported that, while students with learning disabilities were initially unaware of compare/contrast text patterns, providing training in the use of graphic organizers significantly improved their comprehension of this type of passage.

Englert, Raphael, Anderson, Gregg, and Anthony (1989) examined the potential relationship between knowledge about expository texts of students with learning disabilities and their reading and writing performance. One hundred and eighty fourth- and fifth-graders were equally divided among three groups (learning disabled, low-achieving, high-achieving). Students were asked to read expository passages and recall as much as they could and they were interviewed about their knowledge of the organization of expository texts. Results revealed that recalls of students with learning disabilities were significantly less organized and contained fewer ideas than those of both the low-achieving and high-achieving students. An analysis of metacognitively based interview data revealed that students with learning disabilities possessed less knowledge and awareness about the processes involved in utilizing text structure. The authors reported that students with learning disabilities focused on the details rather than the groups of ideas when planning their recall.

In summary, the literature on the effects of expository text structure on reading comprehension suggests that students with learning disabilities are less aware of text structure and are less likely to use text structure to aid in comprehension than their non-disabled peers. This appears true for both recall and summarization tasks for students ranging in Grades from 4 to 12 and beyond (Bellows, 1994). There have many

interventions designed to improve comprehension of expository text for students both with and without learning disabilities. I now review the most prominent interventions with an emphasis on the use of direct instruction of text structures and graphic organizers.

### Interventions Designed to Improve Comprehension of Expository Text

There is strong empirical support for the benefits of text structure instruction to enhance reading comprehension. The notion of using text structure to improve reading comprehension is relatively new (Fitzgerald, 1990) with most of the work on text structure instruction following the advent of text analysis models by authors such as Kinstch and van Dijk (1978) and Meyer (1975). Durkin (1979) observed that less than 1% of total time devoted to reading comprehension was spent explicitly teaching students how to comprehend text, resulting in much research activity on comprehension instruction. The research on text structure instruction has its foundations in two early, consistent findings. The first was that students who are knowledgeable of an author's structure recall more information from a text than those students who are not (Meyer, et. al., 1980). Second, good readers are more likely to use an authors' text structure in their recalls than are poor readers (Taylor & Beach, 1984).

Many researchers have emphasized the importance of text structure instruction. Englert and Thomas (1987) stated, "Unfortunately, since students gain knowledge via expository prose, teachers who do not direct attention to the text structures that underlie expository discourse may be depriving students of important opportunities to develop self-sufficiency in communication skills essential to their independence as adults" (p.103). Thirteen years after this statement, the National Reading Panel (2000, Chapter 4) endorsed text structure instruction to improve reading comprehension.

In a significant study, Meyer, Brandt, and Bluth (1980) investigated the differences between good and poor readers and their use of strategies while reading

expository text. They hypothesized that good readers would use a text's superordinate relational structure and focus on the text's message. Poor readers, on the other hand, were hypothesized to follow a default/list strategy, which describes the passage in a list-like way with no apparent organization. Meyer et. al. divided 102 ninth-grade students into good, average, and poor reader categories based on standardized test scores and teacher rating scales. All students were asked to read two passages written by the authors and to write down everything they could recall without looking back. One passage had a top-level structure that was explicitly stated (coded as "with-signaling"), while the other did not (coded as "without-signaling").

Results indicated that the good readers recalled significantly more idea units than the average readers, and the average readers more than the poor readers. Furthermore, students identified as good readers used the authors' top-level structure for organizing their recall protocols while poor readers did not. The students who used the text structure in their recalls wrote significantly more information. The authors concluded that the ability to use a text's top-level structure is an important strategy for remembering information in the text, and that good and average readers appear to possess this ability while poor readers do not.

Taylor and Beach (1984) assessed the effects of teaching expository text structure. One hundred and fourteen seventh-grade students were randomly assigned to one of three groups: experimental, conventional, or control. Students in the experimental group received instruction on how to produce a hierarchial summary of social studies texts. The students were provided instruction for four weeks. The students in the conventional group read the same passages but received traditional reading instruction focusing on main idea recall rather than the text's structure. Students in the control group did not receive any instruction.

Taylor and Beach (1984) assessed the effectiveness of the hierarchial summary instruction on both reading and writing measures. On the reading measure, they found

that students in the experimental group recalled significantly more than both the conventional and the control groups. Students in the experimental group also made the most significant comprehension gains from pretest to posttest on both passages used in the study. The researchers suggested that students who used the hierarchical summary strategy focused more on the text's structure and therefore had better recall of unfamiliar material. It was unclear whether the strategy itself was responsible for the improvement or whether simply drawing students' attention to text structure enhanced their understanding. Regardless, the authors were encouraged with the results and made a case for further research.

Armbruster et. al. (1989) explored the effects of direct instruction in problem/solution text structure on fifth-grade students' learning of social studies material. The authors randomly assigned 82 students to either a structure-training group or a traditional instruction group. Students in the structure-training group received direct instruction over nine days on problem /solution text structure, how to use a visual frame to represent the problem and possible solutions, and how to write a summary of problem/solution passages according to a set of rules. The authors created workbooks that included sample problem/solution passages for the structure-training group. Students in the traditional-instruction group worked from workbooks that contained sample problem/solution passages with accompanying questions. They were asked to read the passages silently and answer questions about what they had read. As for the structure-training group, the traditional group also wrote summaries of their passages. All students were tested on their comprehension and summary abilities for problem/solution passages following nine days of instruction.

Results supported the hypotheses posed by Armbruster et. al. (1989). The first hypothesis, that structure training of a particular text pattern would facilitate recall of more information on an essay test, was supported in that students in the structure-training group recalled 50% more of the macrostructure ideas on posttests. The results also

supported the second hypothesis: Training aided in recall but did not affect performance on a short-answer test. The final hypothesis, that students in the structure-training group would write summaries that included more passage main ideas and fewer less important details, was supported. The authors concluded that direct instruction of a conventional text structure facilitates use of the macrostructure and comprehension.

Building on these findings and others related to main ideas (Baumann, 1986), Miller and George (1992) developed a series of Expository Passage Organizers (EPOs) that were designed to help students focus on critical components of exposition. To determine their effectiveness, 35 sixth graders of average ability were randomly assigned to an EPO group or a control group. Following five weeks of training administered daily for 40 minutes, the EPO group scored significantly higher on both reading and writing measures than the control group. The authors recommended the use of EPOs for middle grade students of all ability levels.

Richgels, McGee, and Slaton (1989) described a seven-step method they developed that incorporated well-structured passages taken from textbooks, graphic organizers, and signal words. They defined and illustrated five common text patterns and provided a step-by-step outline of their method. Their method is practical for teachers in that they instruct the reader to select a passage from students' textbooks, making it relevant for both teacher and student. The authors referred to this as "real life expository passages" (p.183). A sample lesson is provided to assist in a reader's execution of the method. Richgels et. al., however, provided no empirical support for the effectiveness of their 7-step method.

Slater and Graves (1989) suggested four strategies for teaching reading comprehension of expository text to normally achieving students of different ages. The authors point out that the use of text structure is developmental and varies with ability. As a result, a child's age and ability level should be taken into consideration when using their methods. The authors recommended that these strategies be introduced in the

following order: (a) use structural organizers that visually represent a given text's structure, (b) outline poorly organized passages, (c) summarize a passage main ideas and important details, and (d) ask questions to identify important content. The authors purported that taken together, these strategies will enhance a students' expository text comprehension. Moustafa (1999) made similar suggestions without providing supporting data, reporting that teaching students to monitor their own comprehension, generate questions while reading about structure and content, and summarize material is effective in improving comprehension of expository material.

Teaching text structure has also been found to improve reading comprehension for adults reading a scientific journal (Samuels, Tennyson, Sax, & Mulcahy, 1988) and for English language learners (Talbot, 1997). It warrants mentioning that there is research to support teaching narrative text structure as story grammars as an aid in reading comprehension (e.g., Fitzgerald, 1989; Short & Ryan, 1984). It appears that teaching text structures is beneficial for a variety of genres and for readers of all ages. There are many resources available to assist with teaching strategies and methods to address expository comprehension (e.g., Alvermann & Phelps, 1998). However, others have cautioned that too much emphasis on strategies may deter attention from content and that a balance needs to be struck when teaching any strategy (Anderson & Riot, 1993).

In their review of instructional approaches used to teach expository text, Pearson and Fielding (1991) conclude that there is "incredibly positive support" (p. 832) for just about any approach to teaching expository text structure. The authors expressed the need, however, for more research employing authentic texts, that is, texts children and adults would encounter both in and out of school. They suggested that it appears that most systematic attention to an author's text organization facilitates comprehension of expository text for normally achieving students. Similar findings have been demonstrated for students with learning disabilities. This review now turns to the literature that

explores the effects on teaching text structure to facilitate reading comprehension of students with learning disabilities.

*Teaching Text Structure to Students with Learning Disabilities*

Studying and comprehending expository material requires that readers monitor their acquisition and recall of the material (Seidenberg, 1986). Students with learning disabilities often fail to apply these metacognitive processes when reading. Torgesen's (1977, 1982) "inactive learner" concept suggests the need for instruction that incorporates both content and metacognitive strategies. Deschler, Schumaker, Lenz, and Ellis (1984) supported Torgesen's recommendations for adolescents with learning disabilities.

Other writers have provided instructional principles for improving reading comprehension for students with learning disabilities. Becker and McCormick (1991) identified cognitive strategies as one type of intervention for improving reading comprehension of expository text for students with learning disabilities. Swanson and De La Paz (1998) focused on metacognitive strategies that increase self-regulation of comprehension for students with learning disabilities, emphasizing the importance of identifying and describing a strategy to the student before introducing it. Dickson, Simmons, and Kameenui (1995a) called this teaching "conspicuously" (p. 10), arguing that strategy use must be clear and explicit for students with learning disabilities. Given that Talbott, Lloyd, and Tankersly (1994) reported that cognitive interventions were the most widely investigated and applied, the recommendation to make these interventions explicit is an important one.

Wong and Jones (1982) attempted to increase metacomprehension in students with learning disabilities by training them to self-question their understanding of important textual units while reading expository passages. One hundred twenty eighth- and ninth-grade students were randomly assigned to either a training group or a control group. Half of the students had learning disabilities and the other half were identified as normally achieving. Students in the training group were told of the purpose of the

training and a five-step procedure for developing questions was explained to them. Students were taught how to underline the main idea of a passage and turn it into a question. The authors then modeled writing questions in the margins as they read a five-paragraph passage. Students were then given a prompt card with the five steps on it and asked to read and generate questions on their own. They received corrective feedback as they did this.

Students were assessed on their ability to predict important ideas as they read, generate good questions, and answer comprehension questions about passage content. Results demonstrated that the self-questioning training was effective on all measures for the students with learning disabilities, but not for the normally achieving students. The authors attributed this finding to the inactive nature of a child with a learning disability, suggesting that perhaps normally achieving students engage in this technique automatically and therefore showed no gains as the result of metacognitive training.

In another study conducted to assess the effects of self-questioning on comprehension of expository material, Alexander (1985) trained three students to use a study skills program designed to increase recall. Using a multiple-baseline across students with reversal design, Alexander trained students to preview a passage, generate questions about what might be important, read the passage, generate questions about what they read, and then review the passage. Visual analysis of the data revealed that mean retelling percentages increased for all three students following introduction of the study skills training conditions. Performance declined for all three students during the return to baseline and increased again following the reintroduction of the study skills training condition. High levels of performance were maintained during maintenance and follow-up conditions. These results further support the benefits of using questioning as a strategy for improving comprehension for students with learning disabilities.

Weisberg (1988) recognized self-questioning as a strategy that has empirical evidence of its effectiveness to increase comprehension of expository material. Her

conclusion is supported by other research (e.g., Wong, Wong, Perry, & Sawatsky, 1986; Clark, Deshler, Schumaker, Alley, & Warner, 1984). These studies demonstrated that training students with learning disabilities to self-question while reading and answering comprehension questions increased their performance on comprehension measures. The authors of both studies noted several limitations, however, such as extensive training time and poor transfer.

Williams (2000) outlined a questioning strategy that involves multiple steps and questions. Originally introduced by Schumaker, Deshler, Alley, Warner, and Denton (1984), the “Multipass” strategy asks students to pass through an expository text three times. On the first pass, students attempt to identify the text’s main ideas. On the second pass, students attempt to answer comprehension questions from the text. On the final pass students check their performance on the questions and generate questions related to unclear information. By requiring multiple exposures to the text, it was suggested that students would become more sensitive to not only the content but also to the author’s structures and patterns. This article is descriptive only, however, and does not provide any empirical support for the effectiveness of the Multipass strategy.

Visual imagery is an additional metacognitive strategy shown to foster comprehension of expository material for students with learning disabilities. Visual imagery involves asking students to create a picture in their heads or on paper that would represent a concept. Becker and McCormick (1991) identified keyword visual imagery as a mnemonic technique shown to foster acquisition and comprehension of low-frequency vocabulary, such as those found in textbooks. Gambrell and Koskinen (1982) conducted a study in which students identified as poor readers in the sixth grade were trained to use generic visual imagery while reading an expository passage. Recall of the text improved when visual imagery was used while reading the text, but not as a post-reading-only strategy. Their results suggest that using visual imagery during reading can enhance comprehension for poor readers.

Other strategies place more emphasis on the text rather than the learner. Smith and Friend (1986) evaluated the effect of direct instruction of text patterns on high school students' recall of expository text. Fifty-four participants with learning disabilities were assigned to either a text structure strategy group or a control group. Smith and Friend explicitly informed students in the experimental group of the purpose of the strategy and the difference between content and structure. Students in this group were provided definitions of common text patterns identified by Meyer and Freedle (1984), shown examples of each with signal words, and provided guided practice in identifying each pattern using author-generated workbooks. Students in the experimental group learned a seven-step strategy for using text structure while reading and reviewing material. Control-group students received what the authors referred to as a typical approach to strategy instruction. Controls received no instruction on text structure, although high-interest passages were selected to control for motivation and interest.

All participants were administered a pretest, a posttest, and a delayed posttest on reading comprehension of expository passages, each requiring students to identify the author's text structure and generate a free recall. The results indicated that training in a text structure strategy significantly improved both recognition of text structure and recall, and that this effect remained stable over at least a week. Smith and Friend (1986) noted that while these findings may not be surprising, they were encouraged to find that students with learning disabilities who typically experience severe difficulty in comprehension can be taught to use strategies to improve their comprehension of expository material.

Bakken, Mastropieri, and Scruggs (1997) conducted a similar study using a text-structure-based strategy. Their intention was to assess the feasibility of teaching adolescents with learning disabilities to identify three types of text structure and apply structure-based strategies to enhance comprehension of science material. The researchers randomly assigned 54 eighth-grade students with learning disabilities to one of three

conditions: (a) text-structure-based training, (b) paragraph restatement strategy, or (c) traditional instruction. The students in the text-structure-based strategy group received direct instruction on text structure types. Students were also taught how to identify the main idea and details in each type of structure. Corrective feedback during independent practice was provided. Students in the paragraph restatement condition received training on how to paraphrase an expository passage, while students in the traditional instruction group received no additional training. Both immediate and delayed measures were administered to all students.

Bakken et. al. (1997) reported several major findings. First, the text-structure-based strategy resulted in statistically significant differences in the total number of idea units recalled on both the immediate and delayed recall measures when compared to the traditional instruction group, and on the delayed measure when compared to the paragraph restatement group. Second, results also indicated positive effects for the paragraph restatement instruction, suggesting that students with learning disabilities benefit from instruction that includes text-based strategies. The authors emphasized that maintenance of skills acquired during training is critical for success, and they were encouraged by the delayed recall results for the students in the text-structure-based strategy group.

Weisberg and Balajthy (1990) conducted a series of studies that explored effects of instruction on how to identify important details and use summarization rules on students' expository text comprehension. The participants were fifth- and sixth-graders described as disabled readers, although there was no mention of specific learning disability. Students assigned to an experimental group were taught how to identify main ideas and important details in a passage. They were also taught to use macrorules to summarize exposition and to identify main ideas and details in a passage. Experimentals outperformed controls in ability to underline important information in a passage and write summaries of what they had read. These findings are encouraging even though the

participants were not identified as learning disabled, for often students with learning disabilities have characteristics similar to poor readers and benefit from similar instruction (Spear-Swerling & Sternberg, 1996).

Other researchers have discussed the summarization abilities of student with learning disabilities. Seidenberg (1986, 1989) defined effective summarizing as an ability to use a set of decision rules for summarizing texts, identify important information, and integrate separate ideas into larger units. The summarizing rules included deleting unnecessary information, deleting redundant information, substituting superordinate terms for lists of items, substituting a superordinate action for a list of actions, selecting a topic sentence, and inventing a topic sentence if none exists. Seidenberg suggested that the use of these rules is developmental and that poor readers or readers with learning disabilities often have deficiencies in both awareness of these rules and the ability to effectively use them. Citing literature that demonstrated the effectiveness of teaching summarization skills of expository text to general education students, Swanson and De La Paz (1998) provide an outline of how to teach these skills to students with learning disabilities. Swanson and De La Paz differentiated between rule-governed summaries and hierarchial summaries.

Passage organization has also been studied as it relates to a student's ability to recall the information in the text. Wong and Wilson (1984) reported that students with learning disabilities were less sensitive to expository passage organization than their normally achieving peers. The authors conducted a study to train students with learning disabilities how to recognize and reorganize a disorganized passage. Wong and Wilson taught each participant individually how to use a five-step procedure to reorganize passages created by the authors that were intentionally disorganized. Following training, each student was asked to study a transfer passage for understanding and then recall it. Students were assessed on both passage reorganization and recall. All students showed significant improvement over their scores in the first study on both measures. The authors

suggested that the ease of this training illustrates the relatively simple but often overlooked process of strategy training for students with learning disabilities in the area of expository text comprehension.

Several studies have focused on one particular text structure in its instruction. Kinder and Bursuck (1991) proposed that teaching students how to recognize and understand the components in a problem-solution text facilitates learning of social studies material. Using a multiple baseline across classes study, mean test scores on social studies material increased from 45% correct to 75% correct after the introduction of text pattern instruction. Dickson, Simmons, and Kameenui (1995a) focused on the compare/contrast text pattern, presenting five instructional principles to be used when teaching this pattern to students with learning disabilities. The selection of text structure type was dependent on the researchers' purposes in both of these reports.

Other researchers have explored the effects of adapting textbooks in order to improve reading comprehension of expository material for students with learning disabilities. Bergerud, Lovitt and Horton (1988) explored the effectiveness of two types of textbook adaptations—graphics and study guides—when compared to self-study. The participants were 49 high school students with learning disabilities receiving science instruction in three special education classrooms. Each class was exposed to each treatment (graphics, study guides, and self-study) and to every passage, with the introduction of the treatments being randomly assigned and counterbalanced among classes. For all three classes, percent correct on reading comprehension tests following instruction using graphic representation of the material was superior to their performance following study guide or self-study instruction. Jarrett (1999) also endorsed using graphic representation and study guides as a way to aid in comprehension of science material for students with learning disabilities.

## Graphic organizers as an Aid to Improve Comprehension of Expository Text

*Graphic organizers*, defined by Doyle (1999) as “any type of visual representation of concepts which helps organize information in a manner that makes the information easier to learn” (p. 12), have been used to facilitate both comprehension and composition of text, although most of the literature focuses on graphic organizers as an aid in comprehension. The graphic organizer, originally called a structured overview (Barron, 1969), was developed as an attempt to interpret and operationalize David Ausubel’s (1960) cognitive theory of meaningful reception. Ausubel believed that a major factor in learning new material in a content area is one’s prior knowledge or existing schemas (Anderson, 1984). Ausubel hypothesized that, if existing knowledge of any content area material is clearly organized and enhanced by advanced organizers, new learning would be facilitated.

Building on Ausubel’s work, Barron (1969) proposed that the visual representation of the information contained in advance organizers would further enhance learning. These visual-spatial representations became known as structured overviews. Originally, structured overviews were completed by the teachers and presented as a supplement to the material prior to reading. However, initial investigations by Barron yielded inconsistent results regarding the effectiveness of these structured overviews. Barron and Stone (1974) speculated that if students developed their own organizer following reading, they would be better able to integrate new information into their existing knowledge. Barron and Stone (1974) found that students who generated a graphic organizer as a postreading activity outperformed those who completed one prior to reading and those who were provided one by the teacher on a vocabulary measurement. Eventually, the term *graphic organizer* replaced *structured overview*. The primary difference is that students, rather than teachers, are responsible for the construction of the graphic organizers.

Dye (2000) reviewed the development of graphic organizers, emphasizing the important role schema theory plays in the use of graphic organizers. According to Dye, teachers' roles are to ensure that students have prior knowledge of the subject at hand and provide a means to assist a child to make meaningful connections between new and existing knowledge. Dye acknowledged that students with learning disabilities often lack background knowledge and have difficulty organizing new information. For these students, graphic organizers may be particularly helpful by making organization and connection of new information explicit.

Moore and Readence (1980, 1984) conducted two reviews on the effectiveness of graphic organizers. The later review was an updated expansion of the first. These reviews yielded several significant findings regarding the use of graphic organizers. First, graphic organizers were more effective when constructed by students and when used as a postreading activity. Second, graphic organizers used with expository text passages were more effective than those designed to review course content. Third, graphic organizers appeared to direct students' attention to vocabulary rather than concepts. Finally, secondary students with high verbal ability seemed to benefit the most from the use of graphic organizers.

Alvermann and Swafford conducted two reviews (Alvermann & Swafford 1989; Swafford & Alvermann, 1989) that evaluated whether reading strategies recommended by professional journals and textbooks had an empirical base. For students in Grades 7 through 12, graphic organizers were found to be effective in six out of eight of the studies identified. However, in the review of research involving postsecondary students, only two out of five studies demonstrated effectiveness of graphic organizers. Alvermann and Swafford (1989) concluded that graphic organizers are more effective with secondary students than with postsecondary students, but that further research is needed to investigate the conditions under which graphic organizers are most effective.

For normally achieving students, it has been demonstrated that graphic organizers facilitate written recall of main ideas of expository prose (Alvermann, 1982; Troyer, 1994), improve summarization ability (Balajthy & Weisberg, 1988; Weisberg & Balajthy, 1989), and are beneficial in writing workshop for upper elementary students (James, Abbott, & Greenwood, 2001). Graphic organizers have also been identified as facilitating comprehension of expository text (Griffin & Tulbert, 1995). McMackin (1998) described a system for introducing expository text to upper elementary and middle school students using graphic organizers and narrative books as a bridge. Such a transition can assist students in developing text pattern awareness and facilitating comprehension of expository text. Pearson and Fielding (1991) reported that 13 studies teaching students to create visual representations of main ideas of a text demonstrated beneficial results in fostering comprehension of expository prose.

However, there have been discrepant findings on the effectiveness of graphic organizers. Simmons, Griffin, and Kameenui (1988) examined the effectiveness of graphic organizers as a postreading strategy versus advance organizers. They randomly assigned students in a general education sixth-grade classroom to one of three conditions: use of graphic organizers before reading, use of graphic organizers after reading, or control. Acquisition and retention of science material was measured using both immediate and delayed tests. There were no significant differences among experimentals and controls on any measure. These findings highlight the need for more research to determine the conditions that foster effective use of graphic organizers (Alvermann & Swafford, 1989).

Graphic organizers have also been used as an organizational strategy for children with language disorders (Pehrsson & Denner, 1988) and children with below-average intelligence (Lehman, 1992). Horton, Lovitt, and Bergerud (1990) conducted a series of studies to investigate the effects of graphic organizers on middle and high school students with a range of abilities that included remedial students, average-ability students, and

students with learning disabilities. Their studies compared instruction in graphic organizers to independent studying. Instruction in using graphic organizers to visually represent text had consistently positive findings regardless of age or content area. For students in all ability ranges, instruction in graphic organizers resulted in significantly higher scores on recall than independent study. The greatest benefit was for the students with learning disabilities, and the second greatest benefit was for the remedial students. Horton et. al. (1990) concluded that, while instruction in visual representation of text facilitates comprehension for students with differing abilities, students with learning disabilities seem to benefit the most from such a strategy.

Darche and Carnine (1986) evaluated the effectiveness of visual displays on sixth-grade students' learning of science and social studies. Using both an experimental group (graphic organizers) and a control group of students with learning disabilities, Darche and Carnine (1986) found that students who received instruction in using graphic organizers while reading expository text outperformed students in the control group on immediate recall measures but not on delay tasks. This result was not surprising, for the authors acknowledge the difficulty students with learning disabilities have with retention of information and transfer of strategies.

Griffin, Simmons, and Kameenui (1991) examined the effects of graphic organizers on the acquisition and recall of science material for students with learning disabilities. Twenty-eight middle school students were randomly assigned to either a graphic organizer condition or a no-graphic organizer condition and were taught identical science content from the basal science text for four days. Immediate dependent measures included oral-retellings, production tasks, and choice response tasks, and delayed measures included production and choice-response tasks. There were no significant differences between the groups. The authors concluded that graphic organizer instruction must be more explicit than it was in their study, and that instruction must clearly demonstrate the relationship between concepts of a passage.

In response to these recommendations, Griffin, Malone, and Kameenui (1995) attempted to determine the degree of explicit instruction necessary for independent use of graphic organizers for students with learning disabilities. The authors randomly assigned students to one of four groups: (a) explicit graphic organizer instruction, (b) explicit instruction without graphic organizers, (c) implicit graphic organizer instruction, or (d) implicit instruction without graphic organizers. Students in both explicit instruction groups outperformed those in both implicit instruction groups on measures of transfer, with the explicit graphic organizer group outperforming all other students. The results suggested that the explicitness of instruction and use of graphic organizers play important roles in students' ability to comprehend expository text and generalize instruction to novel materials.

Crank (1995) investigated the effects of graphic organizers on the comprehension of expository text for secondary students with learning disabilities. Students were randomly assigned to either a treatment group or a traditional lecture group. Students in the treatment group, referred to as the Visual Depiction Instructional Routine, were provided verbal instruction supplemented with teacher-created graphic organizers; students in the control group received traditional lecture instruction with no supplements. A multiple-choice comprehension test was administered after both groups had received instruction on the same content, and results indicated that the students in the treatment group achieved significantly higher scores than those in the control group. These results suggest that enhancing instruction with visual aids can foster better comprehension of lecture material for secondary students.

In a similar study, Doyle (1999) examined the effectiveness of two approaches to enhancing the reading comprehension of social studies material for high school students with learning disabilities. An approach of using graphic organizers to display lecture and discussion material was compared to traditional lectures with linear note taking. Eight students with learning disabilities were taught four textbook chapters over four months.

Students served as their own controls, with two of the chapters being taught with the traditional format and two with the use of graphic organizers. Although there were possible confounding variables in this study such as history, testing, and maturation, results generally supported the use of graphic organizers. Comprehension scores were significantly higher following the graphic organizer condition, lending support to Crank's (1995) assertion that students with learning disabilities at the high school level appear to benefit from the visual display of information.

There also is support for the use of graphic organizers as a general education classroom modification for students with learning disabilities. In her manual on general education accommodations, Beech (1999) identifies graphic organizers as an easily implemented and modified strategy for inclusive content area classrooms in middle and high schools. Similarly, Lovitt and Horton (1994) provide a rationale for modifying textbooks for adolescent students with learning disabilities within a general education classroom. One of their recommendations is the use of graphic organizers to present and interpret content material. It should also be noted that graphic organizers are recommended for use with students dually identified as gifted and learning disabled (Howard, 1994). It is clear that graphic organizers are adaptable for many types of learners, and there are a plethora of resources available to assist educators on how to use graphic organizers in their instruction to improve comprehension and composition of expository material (Alvermann, 1982; Alvermann & Phelps, 1998; Dymcock, 1999; Gunning, 2000; Piccolo, 1987).

### Summary

This chapter provided a review of the literature in the areas of expository text comprehension and students with learning disabilities. Specifically, it explored literature that addressed the characteristics of students with learning disabilities and how these characteristics interact with comprehension of expository text. Strategies that have proven effective in fostering comprehension of expository text were identified with an

emphasis on the use of graphic organizers. The purpose of the current dissertation was to explore the use of text structure and graphic organizers as a means to enhance the comprehension of expository text for students with learning disabilities.

Specifically, the present study investigated the effectiveness of a two-pronged intervention on comprehension of expository text for young adolescents with learning disabilities. The intervention combined the explicit instruction of text patterns with use of corresponding graphic organizers. Using single-subject methodology, this study addressed the following research question: Will instruction on awareness of text patterns of a science textbook and corresponding use of graphic organizers increase percent correct of reading comprehension questions for eighth-grade students with learning disabilities? It was anticipated by the author that: (a) the intervention would increase the percent correct of reading comprehension questions, and (b) that improved performance on the comprehension measure would maintain during follow-up data collection.

## CHAPTER 3

### METHODS

The purpose of this chapter is to describe the methodology employed in this study. Design is discussed first, followed by a description of the participants, research setting, materials, and procedures. The chapter concludes with a description of scoring and data analyses.

#### Design

A single-subject, multiple-probe across participants design (Tawney & Gast, 1984) was used to evaluate the effectiveness of a two-component teaching package (text patterns and graphic organizers) on the percent correct of reading comprehension questions in an eighth-grade science textbook for students with learning disabilities. Consistent with multiple-probe designs, experimental control was achieved by staggering the introduction of the intervention across students. Consistent with multiple baseline methodology, if a positive change in level and trend of percent correct (dependent measure) is observed only after the introduction of the intervention (independent variable) for each student, experimental control is demonstrated.

A multiple-probe across students design does not demonstrate replication of effect within each student, presenting a threat to internal validity (Tawney & Gast, 1984). However, staggering the introduction of the intervention across students addressed this threat by demonstrating replication of effect across students upon introduction of the intervention. Validity was demonstrated by replicating effect across students rather than within students. Other threats to internal validity (history, maturation, and testing) were controlled by waiting until the first participant reached criterion following the

introduction of the intervention to introduce intervention to the second student, and repeating this procedure across all participants. By doing so, it can be demonstrated that the introduction of the intervention, not other possible confounds, are responsible for a change in the dependent measure. Meeting criterion on both procedural and dependent measure reliability controlled for instrumentation. External validity was addressed by replication of effect across four students.

### Participants

Four students with learning disabilities ranging in age from 13 years 7 months to 14 years 2 months participated in this study. To protect confidentiality, pseudonyms were assigned to each participant. Each student met the federal and state criteria for learning disability, having at least a 20-point standard-scale discrepancy between intelligence (as measured by the *Differential Ability Scale*) and performance (as measured by one of several achievement scales used by district psychologists). None of the participants were dually diagnosed with an additional disability. Table 1 presents scores, demographics, and descriptive information for each participant.

All participants had been evaluated previously by local school personnel and determined to be eligible for services in the special education program for students with learning disabilities. The IEP (Individualized Education Program) team for each student determined during the 2001-2002 school year that each student would receive services through the eighth-grade resource teacher for the 2002-2003 school year. The eighth-grade resource teacher is the dissertation researcher. All participants received language arts instruction directly in the researcher's classroom.

All participants were functioning in the average range of intelligence, which is defined as plus or minus one standard deviation (85-115) from the mean on the *Differential Ability Scale*, a standardized test of intelligence. Participants also scored in the average range in word identification and reading comprehension, which is defined as plus or minus one standard deviation (85-115) on the reading subtests of the *Weschler*

Table 1: Participant Information

	Student 1 “Sean”	Student 2 “Kyle”	Student 3 “Michael”	Student 4 “Jeff”
Chronological Age	14-2	13-7	13-9	13-7
Intelligence Quotient*	110	95	90	97
Reading Composite**	97	86	89	89
Eligible for Free or Reduced Lunch	No	No	Yes	Yes
Length in Program for LD	6 years	5 years	5 years	4 years
Medications	None	None	None	None
Grades Repeated	Seventh	None	None	None
Excessively Absent (defined as 15 or more unexcused absences in 2002-2003 school year)	No	No	No	No
Time of Day Receiving Intervention	9:35 – 10:30 a.m. (2 <sup>nd</sup> period)	2:40 – 3:30 p.m. (8 <sup>th</sup> period)	12:10 – 12:55 p.m. (5 <sup>th</sup> period)	2:40 – 3:30 p.m. (8 <sup>th</sup> period)

\*General Conceptual Ability from the Psychological Corporation. (1990) *Differential Ability Scales (DAS)* San Antonio, TX.

\*\* Basic Reading and Reading Comprehension Standard Scores from The Psychological Corporation. (1992) *Wechsler Individual Achievement Test (WIAT)*. San Antonio, TX.  
Note: Pseudonyms are used for participants here and elsewhere in this dissertation.

*Individual Achievement Test (WIAT)*. The researcher conducted informal reading inventories with each participant prior to the implementation of the study. The scores on these inventories supported those of the *WIAT*, indicating that participants were in the average range in word recognition and reading comprehension. Following is a more detailed profile of each participant.

*Sean*

As noted in Table 1, Sean was 14 years, 2 months at the time of the study and had been receiving special education services for 6 years. Sean is generally a successful student and is well liked by his teachers and peers. His learning disability is in the area of written expression. His IEP goals included improving written text organization and writing mechanics such as grammar, punctuation, and spelling. Sean was able to complete written assignments in content area classes but needed extended time to draft and proofread. Teachers reported that while Sean's writing was below that of his peers, his reading was on grade level. He was able to keep up with the material, but he failed daily reading tasks such as end-of-chapter comprehension questions. Sean viewed himself as a good reader of content material and was therefore frustrated by his low performance on reading tasks. Sean was motivated to do well, but overwhelmed by continued failure on reading measures despite adequate scores.

*Kyle*

Similar to Sean, Kyle was a motivated and well-liked student by teachers and peers. Kyle was 13 years, 7 months at the time of the study and had been in the learning disabilities program for 5 years. Kyle had a disability in the area of written expression. His IEP goals focused on increasing the quantity of text written given a prompt and improving his self-editing skills. Kyle would write the least amount of text possible and became upset when asked to expand on what he had written. His handwriting was legible, but writing was laborious for Kyle. He was a self-proclaimed "good reader" even though his reading composite score was bordering on low average. Kyle read and wrote very slowly, and as a result, he fell behind quickly during content area classes. If given additional time, Kyle's comprehension of content material was adequate. However, due to the pace of the classes, he often failed reading measures and assessments. Kyle was given opportunities to make-up failed assignments in the resource room, but often it was days later and he would have a hard time recalling the material.

*Michael*

Michael was 13 years, 9 months at the time of the study. Michael had been in the learning disabilities program for 5 years for a disability in written expression. Michael had an exuberant personality and would often attempt to mask his failures in content areas with humor or persuasion to drop the grade. Michael's disability was considered mild and would manifest itself in the mechanics of his writing. His IEP goals focused on improving writing mechanics and task completion. Michael would frequently turn in incomplete assignments and claim that he ran out of time. Teachers suspected that he was having difficulty with the assignments and was hesitant to seek out assistance. Michael had many excuses for his failing grades, but he was visibly frustrated by his performance on comprehension measures. He expressed many times that he thought he had done better than he actually had. Michael was willing to redo written assignments and proofread for mechanical errors, but he resisted redoing comprehension assessments claiming that he knew how to read and the assignment was unfair.

*Jeff*

Jeff was 13 years, 7 months at the time of the study. Jeff had been receiving special education services for 4 years for a disability in written expression. Jeff's writing was highly disorganized and often illegible. He frequently could not read his own writing. Jeff was able to express his ideas orally, but he was unable to form coherent sentences and paragraphs on paper. He enjoyed his content classes, particularly science. Teachers reported that he participated well in class discussions and was reading on grade level, but he rarely completed written or reading tasks. Unlike the other participants, Jeff's disability extended beyond reading and writing tasks. He was disorganized in all aspects of school and home including materials, books, and personal belongings. As a result, his IEP goals focused on improving not only his text organization but on developing strategies to improve in organizational skills in other areas. Despite his interest and ability in passing content classes, he repeatedly failed assignments.

In summary, students were chosen to participate in this study because, despite adequate word recognition skills and average general comprehension ability, each struggled to answer textbook-based questions. Each participant failed science or social studies for at least one grading period during the 2001-2002 school year. As noted in their IEPs, the students' content area teachers were concerned with their ability to comprehend and compose expository text despite having average general comprehension scores in the average range. Therefore, criteria for participation in the study included: (a) grade level word recognition skills, (b) difficulty with content area reading as demonstrated by failing grades in science or social studies during the 2001-2002 school year, (c) average general comprehension ability, and (d) average intelligence.

Approval for research from the local school system's research office, school principal, and the university's Institutional Review Board were obtained prior to data collection. Parent or guardian written permission (see Appendix A) and student assent (see Appendix B) were obtained. Data were collected from January to March 2003.

#### Research Setting

The study took place in an 800-student, Grade 6-8 public middle school. The school was located in a medium-sized Southeastern U.S. city. The intervention was provided in the participants' eighth-grade resource classroom. Data were collected during the students' 50-minute daily language arts class. Data were collected by the researcher, one-on-one, in a private location in the classroom to limit distractions. The researcher's teaching assistant and a student teacher who was present during the data-gathering timeframe monitored the work of the other students during data collection to minimize disruptions.

#### Materials

##### *Textbook Passages*

Passages for all conditions came from the adopted eighth-grade science textbook, *Science Explorer* (Padilla, Miaoulis, & Cyr, 2002). The five text patterns taught during intervention (compare/contrast, cause/effect, description, time order, problem/solution)

occur throughout the textbook. Table 2 presents descriptive information for each passage, including topic, pattern, and textbook page numbers. Each textbook chapter is divided into sections and subsections, each of which is lead by a heading. For the purpose of this study, a *passage* was defined as a subsection of a chapter that was between three and five paragraphs long and covered the same topic. Passages ranged in length from 150 to 250 words. This length allowed for a sufficient amount of text to develop a text pattern but short enough to be covered in one 20-minute session. Appendix C presents a sample passage 152 words in length that is titled “Oxygen.” It is organized around a description

Table 2: Passage Information

Passage #	Topic	Page #	Pattern
1	Atmosphere	14	Description
2	Oxygen	16	Description
3	Carbon Dioxide	16	Compare/ Contrast
4	Air Pollution	20	Cause/Effect
5	Acid Rain	22-23	Problem/ Solution
6	Air Quality	23	Problem/ Solution
7	Air Pressure	25-26	Description
8	Altitude	28-29	Cause/Effect
9	Layers of the Atmosphere	31	Time Order/ Sequence
10	Thermosphere	35	Compare/ Contrast
11	Energy from the Sun	42-43	Description
12	Energy in the Atmosphere	43	Description
13	Heat Transfer	50-51	Cause/Effect
14	Wind	52	Cause/Effect
15	Jet Streams	60	Description Compare/ Contrast
16	Water	61	Problem/ Solution
17	Precipitation	69	Description
18	Air Masses	77	Compare/ Contrast
19	Lightning	84	Cause/Effect
20	Thunderstorms	85	Problem/ Solution

text pattern. Each passage presented to the students was novel, for it was taken from the final textbook of the school year not yet distributed to the student.

To ensure that each passage was of comparable difficulty in content, two science teachers from the school were asked to randomly select five passages from the study and independently rate them. Both teachers rated all of the selected passages and the corresponding questions as being of comparable difficulty.

### *Assessment Materials*

The first two levels of Pearson and Johnson's (1978) three-level taxonomy of comprehension questions, textually explicit and textually implicit, were used to construct comprehension questions. *Textually explicit questions* were defined as having obvious answers right there on the page: "A question-answer relation is classified as textually explicit if both the questions and answers are derivable from the text *and* if the relation between question and answer was explicitly cued by the language of the text" (Pearson & Johnson, 1978, p.163). *Textually implicit questions* were defined as requiring the student to infer a response from text-based information: "A question-answer relation is classified as textually implicit if both question and answer are derivable from the text *but* there is no logical or grammatical cue tying the question to the answer *and* the answer given is plausible in light of the question" (Pearson & Johnson, 1978, p.163). Appendix C presents five comprehension questions for the "Oxygen" passage, three of which are textually explicit and two of which are textually implicit. Pearson and Johnson's third level of their taxonomy, structurally implicit, was not used because the author's purpose in this dissertation was to explore text-based rather than schema-based comprehension.

Data were collected using answer sheets on which the students were instructed to write answers to the five reading comprehension questions for each passage. These answer sheets had the passage name and page number indicated for each session. An additional space was provided for the student's name and the date. Following each question, a space was provided for a written response. Students read the passages directly from the textbook. An open-ended response format was chosen over multiple-choice due

to the amount of working memory it requires to process a multiple choice question. Students with learning disabilities have a difficult time retaining and processing the question and all possible answers in a multiple-choice format (Swanson, 1996). Open-ended questions allow students to focus on the required response rather than processing and evaluating extraneous information.

Interrater reliability data, when collected, was recorded on the bottom of the response sheets. Appendix D presents the data collection sheet for the “Oxygen” passage. Following the questions, students rated their prior knowledge of the topic on a scale of 1-10 with 1 being not very much and 10 being great. The participants also rated themselves on a scale of 1-10 on how they thought they had performed on each passage.

### *Instructional Materials*

The intervention phase of the study included two instructional materials. The first was the Text Pattern Identification Guide (see Appendix E). This guide, presented in chart format, is modeled after one created by Singer and Donlan (1989, p.128). The guide lists five text patterns commonly found in science textbooks as reported by Bakken, Mastropieri, and Scruggs (1997), a definition of each pattern, examples of signal words that correspond with each pattern, and a sample passage for each pattern.

The second instructional material was a Graphic Organizer Guide (see Appendix F). This guide presents the five text patterns with corresponding graphic organizers. During intervention, the researcher modeled completing each of these graphic organizers using sample passages. These completed graphic organizers allowed students to view how the information from the sample passage was filled-in using an appropriate visual display. Appendix G presents a completed description graphic organizer for the “Oxygen” passage. An additional set of blank graphic organizers was provided for students’ use during intervention.

## Procedures

### *General Procedures*

Sessions were scheduled for 20 minutes each. The sessions were scheduled for the first half of each language arts period. Sessions began with the researcher providing the directions for that day, which varied by condition. The researcher's teaching assistant delivered the daily instruction to the remaining students and monitored their work. On the days that reliability data were collected by the teaching assistant, the researcher's student teacher monitored the class.

### *Experimental Procedures*

There were three procedural conditions that were conducted in the following order: baseline, intervention, and maintenance.

#### *Baseline*

The purpose of the baseline condition was to assess how effectively the students independently answered reading comprehension questions in the science textbook prior to the introduction of the intervention. The baseline condition occurred before intervention and maintenance conditions. The baseline assessments occurred daily for all four students on three consecutive days. Intervention was introduced after this three-day period to the first participant while baseline data in the form of probes were collected for the remaining three participants. To move to intervention, the data for each participant must have been stable. For the purpose of this study, *stability* was defined as 80% of data points of a condition falling within a 20% range of the mean level of all data point values of a condition (Tawney & Gast, 1984).

A baseline session began with the researcher providing the student with the science textbook and a response sheet. On the top of the response sheet, the page numbers for the appropriate passage were marked. The directions on the top of the response sheet read, "Please read the passage indicated above. After you have completed reading, please answer the questions in the space provided. Answer all questions in writing. You may not look back in the text. Return this response sheet to me when you

have finished” (see Appendix D). No further instruction or assistance was provided during this condition. Feedback on correct or incorrect answers was not provided.

### *Intervention*

The independent variable in this study was the teaching of a two-component instructional package that included identification of text patterns and use of graphic organizers. This condition was referred to as intervention. The instructional procedures to be followed in this condition were modeled after those outlined by Richgels, McGee, and Slaton (1989). Their model used well-structured sample passages from textbooks and graphic organizers to show general education, fourth-grade students what text patterns are, how to identify signal words, and how ideas within a passage are related to one another.

Intervention was staggered across students (see prior explanation in “Experimental Design” section). Each student was informed that the researcher was going to provide instruction on how to use the instructional materials. The intervention condition was four days of direct instruction by the researcher plus as many additional days as it took for the student to reach criterion. *Criterion* for this condition was defined as three consecutive days at 80% correct or higher on the reading comprehension questions with minimal researcher intervention. *Minimal researcher intervention* was defined as answering questions and making clarifications on student-initiated inquiries for previously taught concepts or components of the materials.

The intervention was designed to tap into the strengths of a student with learning disabilities. Specifically, it was organized and presented in a logical manner, provided concrete examples, asked the student to use prior knowledge, was multimodal, reviewed concepts frequently, and allowed students to participate and inquire during instruction. The teacher collected all materials at the end of each session. The steps of the intervention were implemented over four sessions are as follows:

*Session 1: Introduction to the idea of text structure and to graphic organizers.*

- Explain to the student that authors of textbooks organize and structure the material to help students better understand what they are reading.
- Link these structures to story grammars used in narrative texts by having the student tell a favorite story and identify the parts (setting, conflict, resolution, etc).
- Explain that the patterns used in textbooks have a similar purpose, but are called *text structures*.
- Tell the student that textbooks are expository in nature (nonfiction material) and that the author's purpose is to inform rather than to entertain.
- Tell the student that understanding the text structures of a passage can help with comprehension and learning.
- To introduce graphic organizers, explain that graphic organizers are visual displays of information in a text that relate ideas to one another. They allow for better understanding of the material.
- Show the student five blank graphic organizers, one for each pattern to be taught.
- Ask the student to name two different teachers at the school. Using the compare/contrast graphic organizer, ask the student to tell what is similar and different about these two teachers and fill in the diagram appropriately. Check for understanding.

*Session 2: Introduction to the five text patterns and modeling of materials.*

- Using the Text Pattern Identification Guide (Appendix E), present each pattern individually. For each pattern, read the definition, the signal words, and the sample passage.
- Ask the student to read all of the information back to you for comprehension.

- Have the student write a list on paper of all five pattern names and their corresponding signal words.
- Show each corresponding graphic organizer for each pattern, one at a time.
- Model how to complete each graphic organizer using the sample passage from the Text Pattern Identification Guide.
- Ask the student to reiterate your explanation in his or her own words and clarify as needed.
- Tell the student that a text passage may contain more than one text pattern, and that he may need to use several graphic organizers.

#### *Session 3: Modeling of Steps*

- Model the process of reading a science passage aloud, writing down any signal words, identifying the text pattern using the Text Pattern Identification Guide, identifying the appropriate graphic organizer, and filling it in with relevant information.
- Think aloud and explain all steps to the student. Encourage the student to ask questions or provide input as you go through the process.
- Answer the reading comprehension questions at the end of the passage using the graphic organizers and text as needed. Explain to the student that this is what he will be doing during the next few sessions.

#### *Session 4: Guided Practice*

- Provide the student with one passage from the science text, a Text Pattern Identification Guide, Graphic Organizer Guide, a set of blank graphic organizers, and a response sheet.
- Sit next to the student and ask him to go through the steps modeled during the previous session.

- Provide input and redirection as needed, making sure that the student is not making any errors. Answer all questions and provide additional modeling if necessary.
- Review all of his steps once he has completed the reading comprehension questions.

After students had completed the fourth session, they continued to practice the entire process on a daily basis. The researcher sat next to the student during all of the practice sessions and answered questions only if student-initiated. The students were told they could ask for help. Criterion to move on to the maintenance phase was a minimum of 80% of reading comprehension questions answered correctly for three consecutive sessions following the last day of instruction. Students were asked to complete only one passage per session. They were allowed to use all materials while answering comprehension questions. Criterion was met if responses were correct even if the graphic organizer was not completed or done correctly. Upon meeting criterion, the students were told they had successfully learned how to use the materials and would be asked to join the teacher every few days and repeat the procedures to ensure maintenance.

### *Maintenance*

The purpose of the maintenance condition was to measure students' retention of skills over time while fading out researcher intervention and guidance. The maintenance condition was introduced to students after they had met criterion during the intervention condition. Maintenance data were collected at least once every five days. Students did not know prior to class whether they were participating in maintenance probes.

During the maintenance phase, the researcher again provided the student with the science textbook, a response sheet, and both instructional materials. During this condition, the researcher instructed the student to read the indicated passage and answer the questions on the response sheet. Students were told that they could use all instructional materials. The researcher answered student-initiated questions on the use of the materials during maintenance. Researcher responses were limited to review or

clarification of the components included during the instructional phase. No feedback on whether responses were correct or incorrect was provided during maintenance.

Following intervention, the researcher interviewed all participants. Using an open-ended format, the participants were asked their opinions about the intervention, its usefulness, and its strengths and weaknesses. Participants were asked to offer suggestions on how the intervention might be improved. They were also asked about their own performance. Appendix H is an interview protocol used.

### *Reliability*

Interrater agreement on the dependent measure of student response and procedural reliability data on the independent measure of intervention were collected for a minimum of 20% of all sessions throughout the entire study. Data on both measures were collected for each student at least once during each experimental condition. The researcher's teaching assistant collected these data after receiving training by the researcher. Training consisted of the researcher demonstrating how to score student responses using her answer key and calculating percent correct. The researcher observed the assistant correctly complete these steps twice. For reliability checks, the researcher photocopied a student's response sheet, and both the researcher and assistant independently scored them. Interrater agreement was calculated by using the point-by-point method (Tawney & Gast, 1984) in which the number of agreements was divided by the number of agreements plus disagreements, multiplied by 100. A minimum of 90% agreement was required to move into the next condition. If 90% was not achieved, the author conferred with the assistant and reviewed the differences between the protocols.

Procedural reliability data were collected on how well the researcher followed, in the correct order, the steps outlined in the intervention phase. These data were collected for a minimum of 20% of sessions during intervention for each student. The following researcher behaviors were monitored: (a) introduction to the idea of text structure (all components), (b) introduction to the graphic organizers (all components), (c) introduction to the five text patterns (all components), (d) modeling use of materials (all components),

and (e) providing feedback during student practice sessions (see Appendix I for procedural reliability collection sheet and all components monitored).

Reliability training consisted of the researcher providing a detailed explanation of all of the steps involved and a demonstration on the appropriate use of the materials. The researcher and the assistant teacher practiced twice using a student volunteer who was not participating in the study. If a step was completed out of order, it was scored as a nonoccurrence, as were all omissions of steps. Using a procedural reliability collection sheet (Appendix I), the assistant marked “yes”, “no”, or “out of order” to each occurrence or nonoccurrence of each component of the procedures. Reliability estimates were calculated by dividing the number of “yes” responses by the total number of “yes” opportunities, multiplied by 100. Percentage of occurrences was reported for each behavior monitored. A minimum of 90% occurrence of all researcher behaviors monitored was required to continue to the next condition.

### Scoring

A correct response to a reading comprehension question was defined as writing down the correct answer as predetermined by the researcher. Answers were scored as correct even if misspelled as long as the researcher could decipher the student’s intent. Answers written in the wrong space on the response sheet were scored as incorrect. Oral responses were not accepted. Students were not allowed to look back to the text for their answers during baseline or maintenance conditions. The researcher collected response sheets from the students once they indicated that they were finished. A percent correct for each passage was calculated by dividing the number of correct answers by the total number of questions multiplied by 100. These recording procedures and response criteria were used during all conditions.

### Analyses

Data were analyzed using visual analysis with appropriate descriptive statistics. There are several advantages in analyzing the data visually when conducting single-

subject research (Neuman & McCormick, 1995). First, it is a dynamic process that allows for continuous evaluation of the effectiveness of the intervention. Decisions regarding length of time in a condition are made on an ongoing basis. Second, the concrete nature of session-by-session feedback allows for the examination of effectiveness across individual students. This type of individual assessment leads to instructional decisions for each student. Third, unlike statistical analyses used in group designs, visual analysis of data is conservative in its estimation of effectiveness (Tawney & Gast, 1984).

Variation in human behavior, normally controlled for using statistical procedures, is exposed and addressed in single-subject research (Neuman & McCormick, 1995). Considering the amount of variation among students with learning disabilities as a group, visual analysis is appropriate for assessing the effectiveness of any given intervention on a student. Visual analysis also permits a researcher to discover unanticipated findings unrelated to the original research question. The findings, referred to as *serendipitous* by Tawney and Gast (1984), are possible due to the collection and display of data and can be important for designing and evaluating instruction for individuals or small groups.

Additional reasons for using graphic displays and visual analysis involve data organization and numerical summary of behavior (Tawney & Gast, 1984). For the researcher, a graph is a vehicle for organizing, plotting, and evaluating data over time. Graphic representation of data provides the researcher and reader with a concise summary that communicates the sequence of conditions, time spent in each condition for each student, the variables, the experimental design, and the relationship between the variables. Because all data collected are displayed, researchers and readers can determine for themselves whether or not an intervention is effective for each student. This independent analysis of relationships between variables is one of several benefits of using visual analysis.

Data collected in the current study were analyzed within conditions and between conditions using both visual analysis and descriptive statistics. Within each condition, a

median level value of all data points was calculated. Median value was used instead of mean value because it was less susceptible to extreme values. *Data stability* was defined as 80% of the data points falling within 20% of the median value of the data series. To calculate this 20% range, the median value was multiplied by .20 and the results were the floor and ceiling of stability. For example, if a median value was 4 for a given data series, the stability range was  $\pm .80$  ( $4 \times .20 = .80$ ). Therefore, stability was determined if 80% of all data points fell between 3.2 and 4.8. A flat or descending trend in baseline can also warrant the introduction of an intervention if the target behavior is one to be increased.

The second analysis for a within-condition data series was to find the trend using the split-middle method (Tawney & Gast, 1984). The data series was split in half, and the median value for each of the two groups of data points was calculated. Each group of data was then split in half again, and where this line, called the quarter intersect line, crosses the median value line was determined. By connecting this intersection point to the intersection point from the other data series, the trend was determined. Trends can be ascending, descending, or flat. Acceptable trends depend on the condition. For example, flat or descending trend in performance in the baseline condition would warrant the introduction of the intervention, whereas an ascending trend in performance would not. If one's performance is improving prior to the intervention, it cannot be determined if the intervention itself is responsible for any subsequent improvement. Similarly, one would hope for an ascending trend during intervention and a flat trend at a higher level during maintenance.

Between-conditions analysis also encompassed both data level and trend. Changes in level between conditions was analyzed for absolute change by comparing the last data point of one condition to the first data point of the next condition and for relative change by comparing median values of each condition. Trends were compared by calculating the trends within conditions and comparing their direction and stability across conditions.

Percentage of overlap of data points from one condition to the next was calculated. This was done by determining the number of data points in the second condition that fall within the range of the data points in the first condition, dividing this number by the total number of data points in the second condition and multiplying the result by 100. For example, if four out of eight data points in the second condition fall within the range of data in the first condition, it would be a 50% overlap. For overlap to be considered minimal, less than 25% of data points should overlap from baseline to intervention (Tawney & Gast, 1984). It was anticipated that overlap between intervention and maintenance would be higher since data should be stable at a higher level during maintenance that corresponded to criterion during instruction.

## CHAPTER 4

### RESULTS

The purpose of this chapter is to present the results of reliability, the effectiveness of the intervention for each participant, the interviews conducted, and the self-rating scores on performance and prior knowledge of the subject. This chapter presents raw data (i.e., percentages and verbatim comments) and their straightforward interpretation. Chapter 5 provides a discussion, limitations, and implications of the findings.

#### Reliability

Reliability data were collected on both the dependent measure of student responses and the independent measure of the intervention, or *procedural reliability*. On the dependent measure, reliability data were collected on 35% of all sessions. Mean agreement on student responses was 98% percent across all students and conditions. Procedural reliability, reported as percent occurrences of outlined teacher behaviors during intervention, was collected during 100% of intervention sessions across all four participants. Procedural reliability was 94% across students. All procedural errors recorded were “out of order,” indicating that on six occasions, a step in the intervention was implemented but was done so out of the correct order. Table 3 presents dependent measure reliability data by condition and participant.

#### Sessions

As per single-subject methodology, the number of sessions for each participant varied by condition. A multiple-baseline design dictates that the first participant engages in fewer baseline sessions than the remaining participants due to the early introduction of the intervention and more maintenance conditions. Similarly, the final participant, Jeff in

Table 3: Dependent Measure Reliability Scores by Participant and Condition

Participant	Baseline		Intervention		Maintenance
Sean	Collected Score	25% 100%	Collected Score	100% 100%	Collected 33% Score 100%
Kyle	Collected Score	50% 100%	Collected Score	100% 93%	Collected 25% Score 100%
Michael	Collected Score	44% 95%	Collected Score	100% 92%	Collected 25% Score 100%
Jeff	Collected Score	33% 100%	Collected Score	100% 90%	Collected 50% Score 100%
Averages	Collected Score	38% 98%	Collected Score	100% 94%	Collected 33% Score 100%

this study, was in baseline for the longest duration and in maintenance for the shortest time. Jeff was in maintenance for only two probes not only due to the design of the study but also due to spring break at the end of data collection. If data gathering had resumed for Jeff following spring break, this would have introduced a possible confound to data collection, so the researcher made the decision to terminate data collection at that time. Each participant was in intervention for 7 days due to the predetermined length of the instruction (4 days) and length of time each took to meet criteria (3 days). Table 4 presents the number of sessions that each participant was in each of the three conditions.

Table 4: Number of sessions each participant spent in each condition

Participant	Baseline	Intervention	Maintenance	Total Sessions
Sean	4	7	30	41
Kyle	12	7	22	41
Michael	20	7	15	42
Jeff	26	7	4	37

### Effectiveness of the Intervention

Graphic displays of the percent correct of reading comprehension questions are presented in Figures 1-5. The instruction on awareness of text patterns of a science textbook and corresponding use of graphic organizers resulted in an abrupt change in level of percent correct for all four participants. The increase in percent correct was maintained during the maintenance phase. Intersubject direct replication was achieved indicating that the intervention was effective for all four participants.

#### *Sean*

Figure 1 presents Sean's data. Sean's median percent correct of reading comprehension scores during baseline was 30% over four sessions. The data trend was flat, indicating stability in the data. An abrupt change in level occurred following the introduction of the intervention, indicating a positive effect of the intervention on comprehension scores. Sean's median percent correct during intervention increased to 80% with stability in level. Sean met criterion, defined as scoring a minimum of 80% correct for three consecutive sessions, in three sessions. There was an ascending trend in the data during intervention reflecting a gradual increase in percent correct of questions.

There was 0% overlap of data points between baseline and intervention. No overlap between conditions indicates an abrupt, positive change in performance. For maintenance, Sean's median percent correct was 70% over six sessions. There was an increase in percent correct from the last day of intervention to the first day of maintenance. However, percent correct decreased over the following two maintenance sessions. There was a descending trend in the data during maintenance indicating a

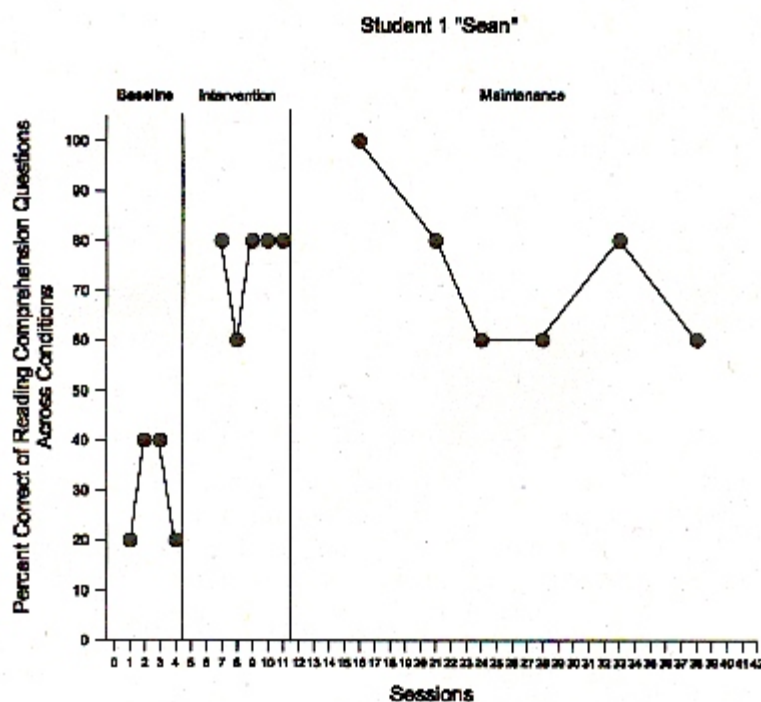


Figure 1

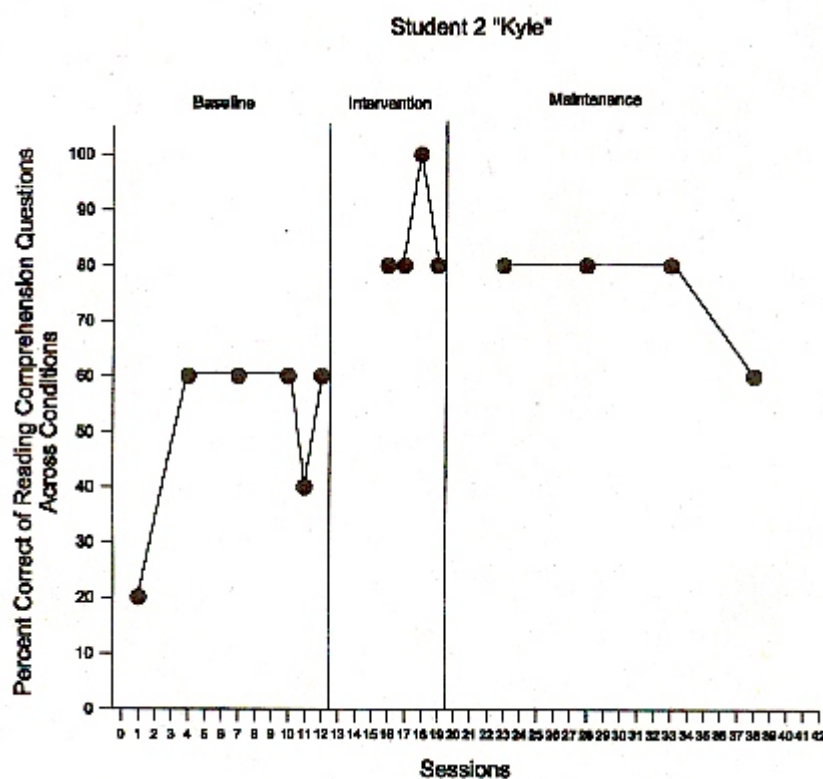
declining performance on the comprehension measure. Percent overlap between intervention and maintenance was 83%. Overlap between intervention and maintenance was anticipated to be high. This overlap demonstrated that Sean was able to maintain his scores, although they did decline somewhat over time. The intervention was effective in initially raising Sean's comprehension scores.

### *Kyle*

Kyle's data are represented in Figure 2. Kyle's median percent correct during baseline was 60% over six sessions. This baseline median was higher than Sean's but still fell short of the required performance to pass classroom assignments and tests. Stability in the data was achieved as a result of a flat trend. Kyle's median percent correct during intervention increased to 90%, resulting in an abrupt change of level and 0% overlap of data points between baseline and intervention. As with Sean, the intervention had a

positive effect on his performance. There was an ascending trend in the data during intervention. Kyle met criterion during intervention in three consecutive sessions.

Kyle's median percent correct decreased to 80% over four sessions during maintenance. He achieved 80% correct for the first three sessions of maintenance and demonstrated a drop to 60% correct for the fourth session, or a descending trend. Kyle's performance declined over time. Percent overlap between intervention and maintenance was 75%. For Kyle, the intervention was effective in increasing percent correct of reading comprehension scores, but his performance, as was the case for Sean, declined slightly during maintenance.



*Michael*

Figure 3 presents Michael's data. Michael's median percent correct during baseline was 40% over nine sessions. Although stability was not achieved by determining that 80% of the data points fell within 20% of the median value, there was a descending trend in the data during this condition. Whereas flat trends represent data stability, a descending trend during baseline also warrants introduction of the intervention if the anticipated results will increase the behavior. The final four sessions resulted in scores falling below the median of 40% correct and creating a descending trend in the data.

Michael's median percent correct increased to 80% during intervention with an abrupt change in level from baseline. The intervention had a positive effect on Michael's performance. There was 25% overlap in the data between baseline and intervention. Although 0% overlap is ideal between these two conditions, 25% indicates a small and

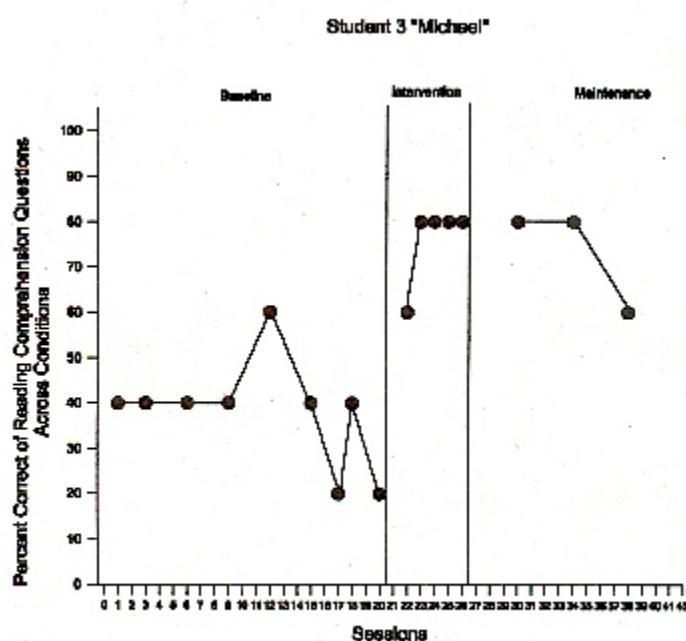


Figure 3

acceptable amount of overlap. There was an ascending trend in the data during intervention. Michael reached criterion during intervention in three consecutive sessions. Michael maintained a median percent correct of 80% over three sessions during maintenance. However, there was a decrease in the final session to 60% correct, resulting in a descending trend of the data. His performance maintained for the first three sessions but declined slightly on the final one. There was 100% overlap between intervention and maintenance. This indicates that the intervention was, in fact, effective for Michael, but not to the extent that it was for Sean and Kyle.

### *Jeff*

Figure 4 presents the data for Jeff, the final participant. Jeff's median percent correct during baseline was 40%. The trend during baseline was flat, indicating data stability. There was an abrupt change in level from baseline to intervention. Jeff's median percent correct during intervention increased to 80%. The intervention was effective for

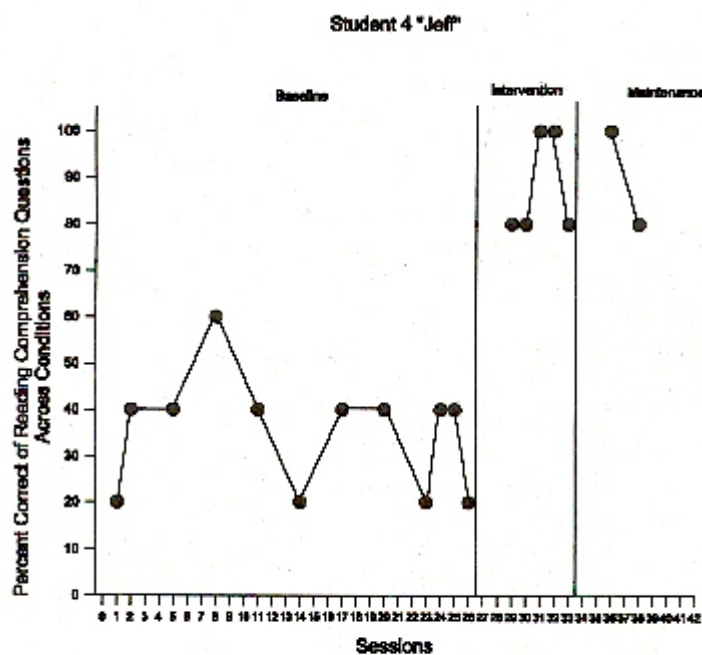


Figure 4

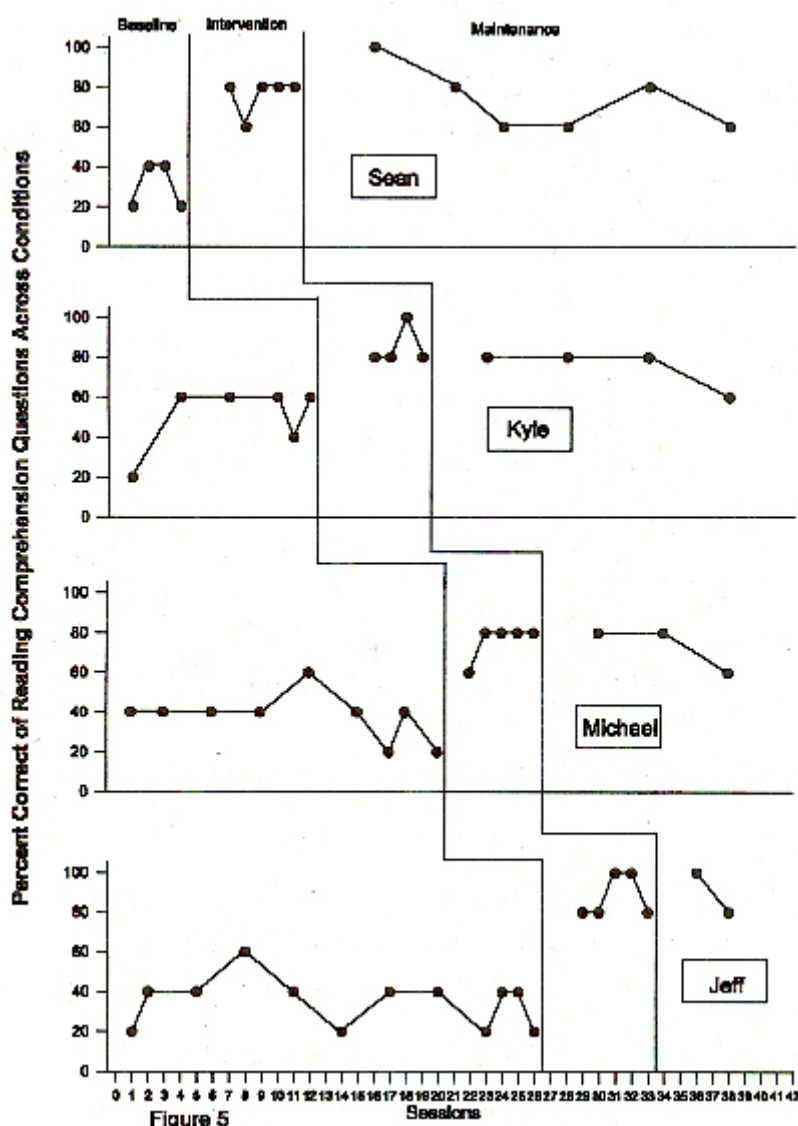
Jeff, having a positive impact on his reading comprehension scores. There was an ascending trend in the data during intervention. There was 0% overlap in the data between baseline and intervention, representing an immediate and positive effect of the intervention.

Jeff's median percent correct during maintenance was 90% over two sessions. Jeff participated in maintenance for the shortest duration of all participants with two scores in this condition. There was a descending trend in the data during maintenance with the first session being 100% correct and the second decreasing to 80% correct. This decrease represents a decline in performance over the two sessions. There was 100% overlap in the data between intervention and maintenance indicating that although his scores dropped during maintenance, they did not fall below his scores during intervention. The intervention was effective in raising his reading comprehension scores.

#### *Summary Across Students*

Figure 5 presents the data juxtaposed for all four participants. In summary, the intervention resulted in abrupt changes in both level and median percent correct for all four students. The averaged median scores for all four students rose from 43% during baseline to 83% during intervention. This increase in percent correct of reading comprehension scores indicated that the intervention was effective in increasing comprehension of science material. There were ascending trends during intervention for all four students. Ascending trends are typical of academic interventions and reflect positive, incremental changes in performance over time.

Direct replication of the effectiveness of the intervention was demonstrated across all four students. By repeating its effectiveness across students, the intervention gains limited external validity within the population of students included in this study. Maintenance median scores averaged 70%. This median is higher than the baseline median, representing an improvement in comprehension scores that was maintained over time. However, comprehension scores declined gradually for all four participants, perhaps indicating a need for follow-up instruction.



In response to the research question, instruction on awareness of text patterns of a science textbook and corresponding graphic organizers did increase the percentage correct of reading comprehension questions for eighth-grade students with learning disabilities. The intervention was effective for all four participants. However, there were descending trends in the data during maintenance for all four students indicating a

possible decay of effectiveness. As the results are encouraging for the effectiveness of the intervention, its persistence over time was not as strong as had been anticipated.

### Interview Results

Following data collection for all four participants, the researcher conducted individual interviews with each participant. Appendix H presents the interview protocol. There were six, open-ended questions asked by the researcher. The participants' words were recorded on the protocol. Table 5 presents the participants' responses by question.

Overall, the participants responded favorably to the intervention. It was the students' general perception that the intervention was helpful and perhaps made science a bit more interesting. Each participant was able to provide concrete feedback on how to modify the instructional program, such as making it into a game or making the materials colorful. Several comments indicated that the participants enjoyed the one-on-one attention. It was encouraging that on the final question, "What did you get out of participating?" each participant had a positive response. The favorable response of the participants furthers the validity of the effectiveness of the intervention.

### Self-Rating Scores

On the bottom of each response sheet, participants were asked to rate their performance during that session and their prior knowledge of the passage topic. They were asked to rate themselves on a scale of 1-10. The performance scale ranged from "poorly" (1) to "very well" (2) and the prior knowledge scale ranged from "low" (1) to "high" (2). Overall, performance scores rose following the intervention indicating that the participants rated their own performance on the reading comprehension questions higher after intervention. Prior knowledge scores increased slightly following intervention, but not more than 2 points for any of the participants. Table 6 presents the average self-rating scores for each participant by condition on both performance and prior topic knowledge.

Table 5: Participants' verbatim responses to interview questions

	Sean	Kyle	Michael	Jeff
1. What did you think of the intervention?	The graphic organizers were helpful. It was a good idea. Science is so boring.	It was pretty easy. I have a good memory, so I don't really need help.	The graphic organizers helped. They made science more fun.	It was pretty long, but helpful. It helped me remember what I had read.
2. How would you change it?	Maybe make the instruction longer. I forgot some stuff.	Make the materials colorful.	Give me more help after you taught me how to use them.	Make it into a game. Maybe shorten it. It was pretty long.
3. How do you think you performed before and after intervention?	Better after instruction- using the graphic organizers on my own.	You sitting with me helped more, and taking notes helped more, too.	It was hard at first. I liked it when you taught me. It helped me use the organizers.	Before, I wasn't really thinking about it. After, it was easier with the graphic organizers.
4. How would you describe this to a friend?	That science reading was made more interesting and that the organizers were kind of hard.	That we worked in science, reading, and you taught us how to fill in graphic organizers.	That you were trying to help us with science reading. You like to use visual stuff.	That I was using something to help me do better in reading science.
5. What did you get out of participating?	Found the answers easier	Ideas about how to use graphic organizers.	Lots of attention! And help with science.	There are things out there to help with boring science.
6. Any other comments or suggestions?	Pretty cool – good idea for all kids.	May help bad readers, like young students.	It was off the chain, but kind of hard.	It was easier when you worked with me. Good idea.

Table 6: Self-Rating Scores for Each Participant by Condition

Participant	Baseline		Intervention		Maintenance	
	Performance	Prior Knowledge	Performance	Prior Knowledge	Performance	Prior Knowledge
Sean	7	9	8	9	9	9
Kyle	7	7	10	9	10	9
Michael	5	5	9	7	10	7
Jeff	3	3	8	4	10	4

## CHAPTER 5

### DISCUSSION, LIMITATIONS, AND IMPLICATIONS

The purpose of this study was to evaluate the effectiveness of an intervention designed to increase percent correct of reading comprehension questions of science material for eighth-grade students with learning disabilities. The intervention was designed to promote students' awareness of text patterns and use of graphic organizers while reading in order to assist them in answering comprehension questions. The results indicated that the intervention increased percent correct of reading comprehension questions for all four participants. Additionally, students responded favorably to the intervention as reflected by their interview data. This chapter provides a discussion of the results of both the intervention and the interviews, frames these findings in relevant research and theory, identifies limitations of the study, and presents both instructional and research implications.

#### Discussion

The results of this study were as predicted: The intervention resulted in an increase in percent correct of comprehension questions on science material for young adolescents with learning disabilities. Baseline data on all four participants indicated that, despite having adequate word recognition skills and average general comprehension ability, each struggled to correctly answer both explicit and implicit comprehension questions on expository science passages. Kyle's median percent correct during baseline was somewhat higher than the other students (60% for Kyle, 43% group mean).

However, this mean still falls short of the required passing grade in class of 70%. Intervention can be considered successful for Kyle since his median percent correct increased to the passing range.

There was an ascending trend in the data for all four participants during intervention, representing a steady increase in performance. This is typical of many instructional programs as improvements in academic behaviors are usually incremental. All four participants reached criterion during intervention in three days following instruction. This suggests that the intervention was, in fact, efficient in teaching the participants to use text patterns and graphic organizers. After the completion of instruction, only Michael asked questions during the criterion sessions. He asked several times if he was spelling words correctly and completing the graphic organizers appropriately. He also inquired whether I was going to sit with him for the entire session. These questions are typical of Michael, for he is a student who requires a good bit of support and reassurance during both group instruction and seatwork. He is capable of successfully completing assignments independently, but he desires teacher attention and assurance. The other three participants worked independently during criterion sessions, seeking assistance only when completing questions.

The maintenance data indicated a possible degradation of intervention effect over time. For all four participants, there was a descending trend in the data during this phase, that is, a decline in percent correct of comprehension questions over time. Sean was in the maintenance phase the longest, with six sessions over a five-week period. Although his maintenance scores never fell below his lowest intervention score (60% correct), the trend in the data indicates a drop in performance over the five weeks. Similar trends were evident for the other three participants. These results suggest that future implementation of this intervention should include follow-up instructional sessions with probes being conducted more frequently to avoid decay. As is the case with many instructional

programs, refresher sessions are reflective of good practice (Richgels, McGee, & Slaton, 1989).

When reviewing the answer sheets for each student, several patterns of responses were discovered. Before the intervention (during baseline), all four participants consistently rated themselves as having done poorly. However, following intervention, their self-ratings rose to 7-10 on the same scale, which corresponded with having done well. Their ratings on their knowledge of the topics varied from student to student, with Sean reporting the most prior knowledge on all topics. However, their ratings on prior knowledge did not rise significantly following intervention. This is logical, as the participants would not necessarily know more about the topics that were introduced following intervention. When asked if they had ever been trained on how to use graphic organizers in content classes, all four participants responded that they had not.

The increase in self-ratings for these students could be a result of what Schunk (1989, 1993) referred to as *perceived self-efficacy*, or personal beliefs about one's capabilities to implement actions necessary to perform a given task. According to Schunk, self-efficacy can have negative effects on achievement behaviors if there is a history of failure within an academic setting. Participants in this study had a history of failure in content areas, which could have played a role in their initial, low ratings of their own performances. Perhaps as a result of the one-on-one instruction or high persuader credibility (Schunk, 1989), the students anticipated success and, therefore, rated their performance higher following the intervention. Other factors, such as positive and on-going performance feedback, could also have played a role in the increased self-perceptions of the participants.

According to Guthrie, Wigfield, Allan, and Cox (1999), self-efficacy is one of several motivational variables that contribute to reading achievement and text comprehension. These authors conducted two studies that assessed the role of self-efficacy as one motivational factor in both reading volume and comprehension. Self-

efficacy was referred to as reading efficacy and defined as the student's sense of being able to read. Within the reading tasks, it was associated with use of strategies, self-regulation, and text comprehension. Results suggested that motivational factors such as self-efficacy predicted both reading volume and performance. The motivational construct of self-efficacy for reading was highly associated with time spent engaged in a reading activity. Students who expressed anticipated success on reading tasks generally outperformed those that anticipated failure.

The present study did not directly assess self-efficacy as a predictive factor in performance. However, the increase in self-rating scores suggests there was a rise in self-efficacy during and following intervention. This increase in self-rating scores corresponded to increase in performance for all participants. These findings support Guthrie et. al.'s (1999) notion of the direct relationship between motivational factors such as self-efficacy and actual performance. The construct of self-efficacy can be differentiated from self-concept. Self-efficacy refers to learners' judgments of their capabilities to perform a specific task or execute a course of action required to complete a specific task (Bandura, 1986). Self-concept is a more generalized belief about one's own success in a given area (Chapman & Tunmer, 1997). Although the current study did not specifically measure or address either of these constructs, the overall increase in self-rating scores on performance are indicative of a possible rise in motivation during and after intervention.

A second pattern involved the similarity between each participant's responses to the comprehension questions and work samples from other class assignments outside of this study. Michael frequently answered the fifth question on each response sheet incorrectly. This is reflective of his work in other academic areas. His performance declines towards the end of an assignment, possibly because he is eager to finish or because he becomes fatigued. The participants that typically struggle with spelling, Jeff and Michael, misspelled many of their responses even though the correct spellings were

on their completed graphic organizers. I frequently note in classes that these two students copy things incorrectly by misspelling them.

Several other patterns were noted for Kyle and Jeff. Kyle reads for pleasure and often seeks out teacher assistance in classes, so it not surprising that his baseline performance was higher than the other participants. Kyle is confident in his ability to read, and he becomes frustrated when he fails science assignments from the textbook. Jeff left many questions on his response sheets blank rather than risk answering them incorrectly. This is typical of Jeff in other academic areas. These trends for Jeff and Kyle suggest that it is more likely that skills learned and demonstrated during the intervention are reflective of how they perform in general academic settings.

The data collected during interviews provided insight into the participants' perspective regarding the intervention. Sean, Michael, and Kyle commented that they believed the intervention to be helpful. Kyle stated that he doesn't really need help, although his grades reflect otherwise. Kyle later stated that the instruction on how to take notes using the graphic organizer was helpful. Kyle perceives himself as a good reader, and therefore needing assistance in other areas such as note taking. All of the participants made insightful suggestions on changes to the intervention, such as adding color to the materials and making it into a game. These are modifications that I often incorporate into my teaching. Sean and Michael implied that they could have used more instruction during maintenance. Apparently, these students were aware of their declining performance during this final phase. Their comments coincide with the data collected during maintenance and reiterate the need for follow-up instruction.

Several of the comments made during the interviews indicated that the participants perceive science as difficult or boring. Sean stated that "science is boring," and Jeff indicated that there were "things out there to help with boring science." Michael commented that the intervention made science more fun. It is not surprising that these students held a negative perspective towards content area classes, particularly science, for

they have a history of failing science or social studies, and all frequently seek assistance on tests and projects in these classes. The participants agreed that the intervention helped them to use the graphic organizers as a tool for answering comprehension questions. It appears as though the intervention enabled students to approach content area reading with a concrete strategy, thereby holding their interest and sustaining their attention.

Overall, the students responded favorably to the intervention. Sean, Michael, and Jeff used descriptors such as “pretty cool,” “off the chain,” and a “good idea.” Kyle indicated that he thought it would be helpful for “bad readers.” Sean and Jeff indicated that they viewed the intervention as useful because it assisted with science. Kyle and Michael seemed to have enjoyed the one-on-one attention as much, if not more, than the assistance the intervention provided. Michael responded that he got “lots of attention” by participating, and Kyle stated that sitting with him during intervention helped. While these comments are positive in nature, it is important to note that one-on-one instruction may not always be possible when implementing an intervention or when providing regular classroom instruction.

There were several additional variables specific to this study that warrant mentioning. First, time of day did not appear to affect students’ performance or their perceptions of the intervention. Second, class size and composition varied across periods, and neither appeared to interact with students’ participation or performance.

#### Results in Relation to Research and Theory

This study both supports and extends the literature in the area of students with learning disabilities and comprehension of expository text. Characteristics of students with learning disabilities and how they relate to comprehension of expository text were explored in this study. It is apparent from the low, median scores of the participants during baseline that, despite adequate word recognition skills and average general comprehension ability, these students were having difficulty answering comprehension questions related to science textbook content. Participants’ baseline performance supports

evidence that students with learning disabilities generally lack sensitivity to text structures (Englert & Thomas, 1987; Wong & Wilson, 1984) and, as a result, have diminished performance on comprehension measures (Penning, 1985; Penning & Raphael, 1992). Baseline data also support Seidenberg's (1989) suggestion that students with learning disabilities lack the prerequisite knowledge of text organization. The effectiveness of the intervention in this study supports Weisberg and Balajthy's (1986) findings that, although students with learning disabilities can be initially unaware of text patterns, training in the use of graphic organizers can significantly improve their comprehension of expository passages.

This study also affirms research on the efficacy of explicit instruction of text patterns as a means to enhance comprehension of expository text (Armbruster, et. al., 1989; Moore, 1996; Moustafa, 1999; Spiro & Taylor, 1980; Taylor & Beach, 1984). This study reinforces findings specifically for students with learning disabilities (Bakken et. al., 1997; Englert, Raphael, Anderson, Gregg, & Anthony, 1989), and results are similar to Bakken et. al. (1997) finding that text-structure-based strategy instruction improved reading comprehension of science material for eighth-grade students with learning disabilities. Similar to Bakken et. al. (1997), comprehension of science material improved as a result of text structure instruction. Because the current study employed graphic organizers and single-subject methodology, it extends the extant research base both substantively by employing a two-prong intervention and methodologically by using a single-subject design.

The successful use of graphic organizers in this study supports earlier studies conducted with students both with and without learning disabilities (Alvermann, 1982; Doyle, 1999; Horton, 1990; Troyer, 1994). In their examination of the effectiveness of graphic organizers in recall of science material for middle school students with learning disabilities, Griffin, Simmons, and Kameenui (1991) argued that instruction must be explicit to be beneficial. In a follow-up study, Griffin, Malone, and Kameenui (1995)

found that explicit instruction on the use of graphic organizers improved comprehension of expository text for middle school students with learning disabilities. Crank (1995) reported similar results with secondary students with learning disabilities. The current study supports both of these findings while furthering our understanding of students' response to such an intervention through the use of interviews. Not only were the graphic organizers effective as part of the intervention, but they also were received well by the participants and described as helpful. Student endorsement plays a critical role in the appropriateness of any given instructional intervention.

This study addressed limitations in the literature identified by several researchers. Dickson, Simmons, and Kameenui (1995) called for research in the area of expository text comprehension that better assessed the individual performance of each student. By using single-subject research methodology, the current study was able to evaluate each student's performance on a daily, on-going basis. Williams (2000) called for more research that used materials relevant to the student's learning, such as grade level textbooks, rather than researcher-contrived materials, which was addressed by using the adopted eighth-grade science textbook.

The author was also the researcher, which addressed Pearson and Fielding's (1991) call for additional teacher-research studies on comprehension. Talbott, Lloyd, and Tankersley (1994) further contended that many interventions prove beneficial in highly controlled settings but do not transfer to classroom settings. In contrast, this more naturalistic teacher-research study resulted in enhanced ecological validity (Bronfenbrenner, 1976), making it more likely that special education teachers will view the instructional package employed in this study as transferable to their classrooms. Bakken et. al., (1997) noted that there was limited empirical research on adolescents with learning disabilities and expository text comprehension, reporting that of all the comprehension studies conducted with students with learning disabilities, fewer than 25% involved adolescents. Griffin and Tulbert (1995) called for more research on the use of

graphic organizers: “If the next two decades are to be fruitful for the use of the graphic organizer, researchers must design studies that are methodologically sound and are sensitive to the needs of the students who are poor comprehenders and their teachers” (p.86). The present study addressed both of these issues.

### Limitations

There were several limitations to this study. First, due to the small number and uniqueness of the participants, generalization is limited. External validity is an inherent limitation of single-subject research methodology. It is difficult to determine if this intervention would be effective for students of other abilities or could be taught to large groups of students. Thus it will be important to replicate this study across settings, participants, and researchers.

The necessity of one-on-one intervention in single-subject research represents another possible limitation. It would be difficult for most teachers to spend 20 minutes per class individually with one student and to provide instruction in a way that addressed students’ individual learning needs. This responsive, individual instruction is unique to single-subject research and would be difficult to implement with a large group of students.

Teacher research has several drawbacks that warrant mentioning. First, logistically, it is difficult to balance the responsibilities inherent of full-time teaching with research tasks (Baumann, 1996). As a teacher, your responsibilities in a classroom are first and foremost to the students’ education. Parents and colleagues may perceive your research as a distraction to your teaching (Goldstein, 1996). Second, a teacher cannot easily assume both the role of teacher and researcher with the students. If research demands that a teacher engage in behaviors atypical of her teaching style, a student may be confused by or resentful of the research. By definition, teachers are insiders in their own classrooms and while many see this emic perspective as a possible advantage

(Baumann, Shockley, & Allen, 1996), data collected by a teacher will inevitably be through the primary teacher-student relationship and only secondarily as a researcher.

Despite these limitations, this study demonstrated that an intervention incorporating text pattern identification and graphic organizers increased the percent correct of comprehension questions on science material for young adolescents with learning disabilities. Furthermore, it successfully employed single-subject research methodology to explore variability among participants' response to the intervention. The results suggest several new areas of research and provide instructional strategies that may be useful for teachers of students with learning disabilities interested in fostering comprehension of expository text.

### Implications

This dissertation offers implications for both instruction and future research. Regarding instruction, this study suggests that adolescents struggling with reading comprehension in the content areas benefit from the use of materials that explicitly teach and visually display text patterns. Teachers of students with learning disabilities often find that content area material is difficult for their students despite adequate word recognition skills. Instruction on the identification of text patterns and use of graphic organizers are two ways that appear to address the unique needs of students with learning disabilities. As demonstrated by this dissertation, such an intervention can be effective and perceived as useful by its recipients.

The decline in performance during maintenance demonstrated by all four participants suggests the need for further instruction following the initial intervention. The intervention was effective in increasing the percent correct of comprehension questions. However, future use of this strategy could incorporate follow-up instruction or prolonged intervention to avoid a decrease in percent correct over time. Sean and Michael implied that additional instruction during maintenance would have been helpful and, as evident by the data, is perhaps necessary in future employment of this strategy.

Other instructional implications arise from the students' comments on how to modify the intervention. Kyle suggested adding color to the materials. Future interventions could color-code the graphic organizers and the text patterns to correspond with one another. For example, compare-contrast could be coded red, and the compare-contrast graphic organizer could be on red paper. Jeff suggested making the instruction into a game. A teacher could use points or rewards for successful completion of a session or a correct answer. This may assist in motivation as well as performance. In the present study, there was no noted significance of time of day, implying that these and other modifications could be implemented at any time of day and with classes varying in size.

In addition to the answers this study provides, it also suggests the need for further research. Because of the small populations used in single-subject methodology, generalization of findings comes from the systematic replication of studies across different settings, researchers, and students. Therefore, replication of the current study is required to determine whether the intervention will be effective with older and younger populations, students with other mild disabilities, or the same population in a different setting (e.g. a general education, inclusive classroom). Findings could also be replicated with experimental methodology using whole-group instruction rather than one-on-one intervention. The intervention also could be explored with normally achieving adolescents in a content area class. Such results could be compared to those from students with learning disabilities for similarities in responses or differences that could provide valuable, instructional insight.

Other future research questions involve domain-specific knowledge and possible carry over effects of instruction. Would the same or similar intervention be effective in other content areas such as social studies? A longitudinal study of effects could assess whether or not skills demonstrated by the participants could carry over to other content areas, classroom settings, and be maintained in subsequent science curriculum and instruction. Researchers might also investigate possible ways to promote students'

retention of skills over time and how to avoid the decay seen in this study during maintenance.

Variations in assessment could be explored to investigate whether instruction in the comprehension of expository text carries over to improvement in expository composition skills within each student. Investigations exploring these and similar questions would advance both research and practice, for it is clear that the topic of expository text and students with learning disabilities provides fertile ground for future research.

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## APPENDIX A

### PARENTAL CONSENT FORM

## Appendix A

## Parental Consent Form

I give consent for my child \_\_\_\_\_ to participate in the research titled, *The Effects of Direct Instruction of Expository Text Structure and Use of Graphic Organizers on Reading Comprehension for Adolescents with Learning Disabilities*, which is being conducted by Allison Nealy, a graduate student in the Department of Reading Education at The University of Georgia (phone 543-6547). This research is being conducted under the supervision of Dr. Jim Baumann, also of the Department of Reading Education (phone 542-2718). I do not have to allow my child to be in this study if I do not want to. My child can stop taking part at any time without giving any reason, and without penalty. I can ask to have the information related to my child returned to me, removed from the research records, or destroyed.

- The reason for the research is to investigate whether or not teaching text patterns found in science textbooks and the use of graphic organizers assist in reading comprehension of the material.
- Students who take part may improve their reading comprehension of science textbooks, their attitude toward science, and science test scores.
- Students will be asked to read a passage from their science textbook and answer several reading comprehension questions. Next, each student will individually receive instruction on how to use the instructional materials to identify text patterns and fill out a graphic organizer to assist in answering reading comprehension questions in the textbook. Once each student is able to follow the steps independently and maintain a score of 80% or higher on the questions for three days, participation will only occur for follow-up probes.
- No discomforts or stresses are foreseen.
- No risks are foreseen.
- The results of this participation will be confidential and will not be released in any individually identifiable form unless otherwise required by law. All data collected during the study will be kept in a secure location. The data will be kept indefinitely. Any writings regarding this study will contain pseudo names only.
- The researcher will answer any further questions about the research, now or during the course of the project, and can be reached by phone at (706) 543-6547 between the hours of 8:00 a.m. and 4:00 p.m. or (706) 310-1437 after 6:00 p.m.

Please sign both copies of this form. Keep one and return the other to the researcher, Allison Nealy.

Researcher: \_\_\_\_\_  
Allison U. Nealy

Date: \_\_\_\_\_

Parent / Guardian: \_\_\_\_\_

Date: \_\_\_\_\_

Research at The University of Georgia which involves human participants is overseen by the Institutional Review Board. Questions or problems regarding your rights and the rights of your child as a participant should be addressed to the Institutional Review Board; Office of V.P. for Research; The University of Georgia; 606A Graduate Studies Research Center; Athens, Georgia 30602-7411; Telephone (706) 542-6514.

APPENDIX B

STUDENT ASSENT FORM

## Appendix B

## Student Assent Form

I, \_\_\_\_\_, have been asked to participate in a research study being conducted by Mrs. Allison Nealy. The purpose of this study is determine if instructional materials that Mrs. Nealy will use will help improve my comprehension of science material. I understand that I will be asked to work one-on-one with Mrs. Nealy some school days for about 20 minutes at a time for several weeks. I understand that I will be asked to read passages from my science textbook and answer reading comprehension questions related to the text. I will receive instruction on how to use the materials.

My parent or guardian has also signed permission for me to participate in this study. I will be allowed to ask questions regarding the study at any point. I understand that my participation in this study is confidential, meaning that no one other than myself, my parent(s), Mrs. Nealy, and her university professors will know which data belong to me. Mrs. Nealy will use fake names of students on papers she writes. It is anticipated that my comprehension of my science textbook will improve.

My participation in this study is voluntary and will not affect my grades in any way. I will not receive any incentives or rewards for my participation, and I can withdraw at any time. Mrs. Nealy has answered my questions to the extent of not compromising her research.

---

Student Signature

---

Date

---

Allison Nealy, Researcher

---

Date

## APPENDIX C

### SAMPLE PASSAGE AND QUESTIONS

## Appendix C

## Sample Passage and Questions

## Passage

**Oxygen.** Most oxygen molecules have two oxygen atoms. Even though oxygen is the second-most abundant gas in the atmosphere, it makes up less than one fourth of the volume. Plants and animals take oxygen directly from food in a usable form.

Oxygen is also involved in other important processes. Any fuel you can think of, from the gasoline in a car to the candles on a birthday cake, uses oxygen as it burns. Without oxygen, a fire will go out. Burning uses oxygen rapidly. During other processes, oxygen is used slowly. For example, steel in cars and other objects reacts slowly to oxygen to form iron oxide, or rust.

Have you ever noticed a pungent smell in the air after a thunderstorm? This is the odor of ozone, which forms when lightning interacts with oxygen in the air. **Ozone** is a form of oxygen that has three oxygen atoms in each molecule instead of the usual two.

Questions (answers in parentheses):

Textually Explicit:

- 1) How many molecules do most oxygen atoms have? (two)
- 2) How much volume of the atmosphere does oxygen take up? (less than one fourth)
- 3) Define ozone. (a form of oxygen that has three oxygen atoms in each molecule)

Textually Implicit:

- 4) Oxygen is involved in what important process? (burning of fuel)
- 5) Under what condition is oxygen used slowly?

APPENDIX D  
RESPONSE SHEET

## Appendix D

## Response Sheet

Name: \_\_\_\_\_ Date: \_\_\_\_\_  
Passage Name: Oxygen Page # 132

Please read the passage indicated above. After you have completed reading, please answer the questions below in the space provided. Answer all questions in writing. You may not look back in the text. Return this response to me when you have finished.

**1: How many molecules do most oxygen atoms have?**

Response:

---

---

**2: How much volume of the atmosphere does oxygen take up?**

Response:

---

---

**3: Define ozone.**

Response:

---

---

**4. Oxygen is involved in what important process?**

Response:

---

---

**5. Under what condition is oxygen used slowly?**

Response:

---

---

TO BE COMPLETED BY THE TEACHER

Condition _____	Session # _____	Score _____
Reliability Data Collected: Yes / No		
Interrater Agreement Score _____		

APPENDIX E

TEXT PATTERN IDENTIFICATION GUIDE\*

## Appendix E

## Text Pattern Identification Guide\*

Pattern	Definition	Signal Words	Example
Compare/Contrast	Shows similarities and differences between topics, events, or people	However, unlike, like, by contrast, in comparison, whereas, similar to different from	There are two basic types of graphs in science – the line graph and the bar graph. Both graphs visually display data, and both have an x axis and a y axis. However, a line graph is better for plotting change in one data set whereas a bar graph is better for comparing differences in data. The best one depends on your data.
Cause/Effect	Tells the results of an event or occurrence and the reasons it happened	Because of, as a result, consequently, thereby, therefore, due to	The tectonic plate theory explains the causes of earthquakes. They are the result of the movement of plates on which the continents rest. This movement causes the surface of the earth to shake.
Description	Lists attributes or describes a topic, event, or person	For example, for instance, such as, also, in addition	Observation is one of the most basic scientific skills. For example, it involves watching, listening, smelling, and touching. It also involves making guesses.
Time Order/Sequence	Tells the order in which steps in a process or series of an event occur	Next, first, second, last another, then, additionally, afterwards, finally	The scientific method involves several steps. First, you observe what you'd like to learn about. Second, you form a hypothesis. Third, you test your hypothesis. Finally, you share your results.
Problem/Solution	Identifies a problem or conflict, outlines the attempted steps to resolution	Problems is, solution is, the questions is, the answer is, attempts to solve the issue	The problem with low water level in ponds is evaporation. Water in the pond changes to gas when it is heated, lowering the water level. One solution to evaporation is to plant trees round a pond for shade. This keeps the water cool.

\* Modeled after the guide in Singer & Donlan (1989, p. 128)

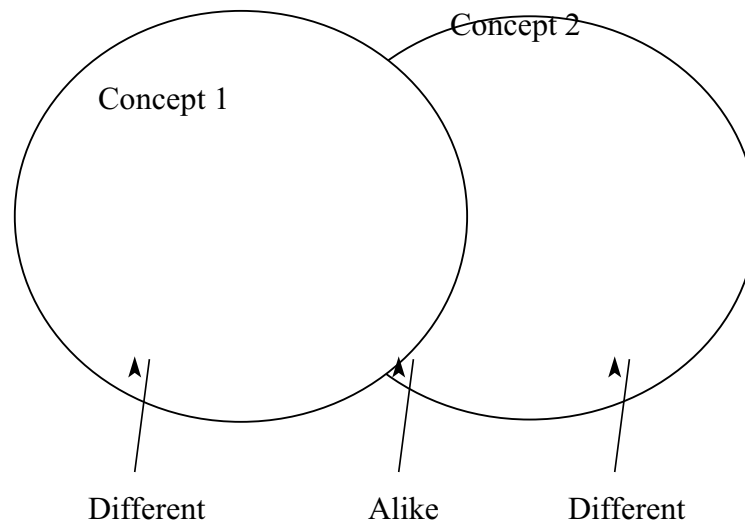
APPENDIX F

GRAPHIC ORGANIZER GUIDE

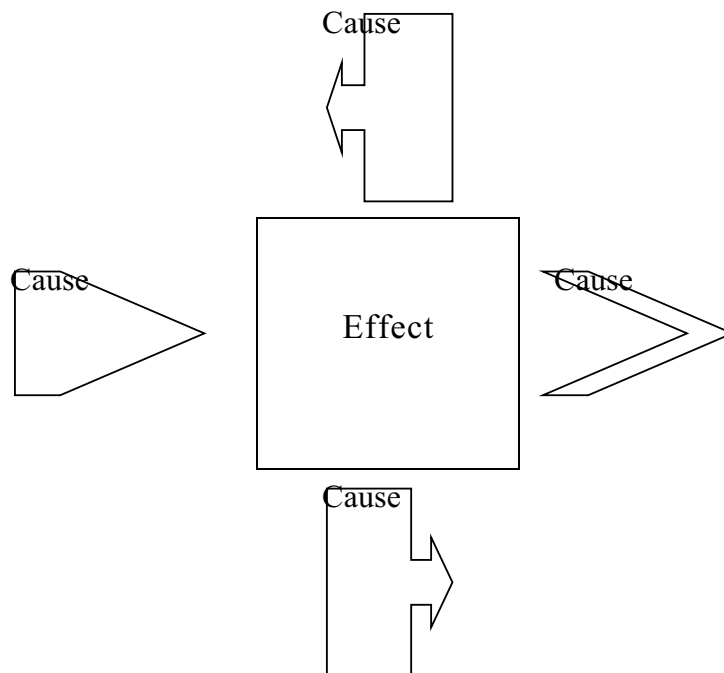
## Appendix F

## Graphic Organizer Guide

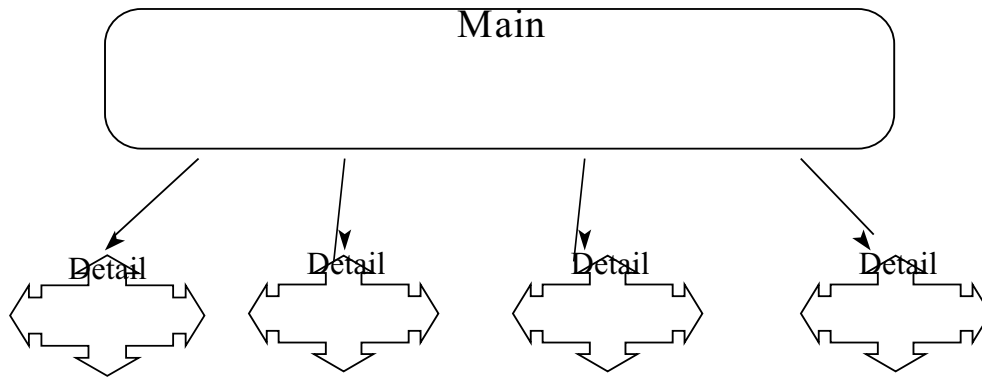
## Graphic Organizer 1: Compare / Contrast



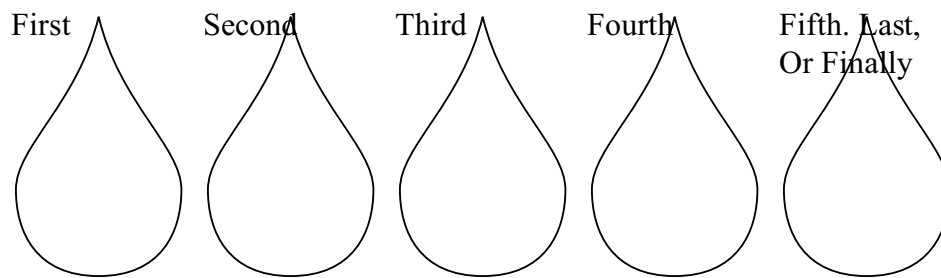
## Graphic Organizer 2: Cause/Effect



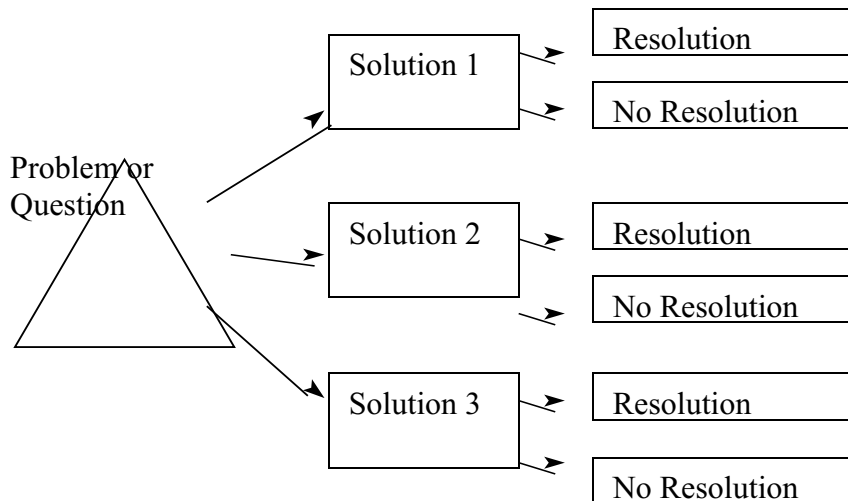
Graphic Organizer 3: Description



Graphic Organizer 4: Time Order/Sequence



Graphic Organizer 5: Problem / Solution



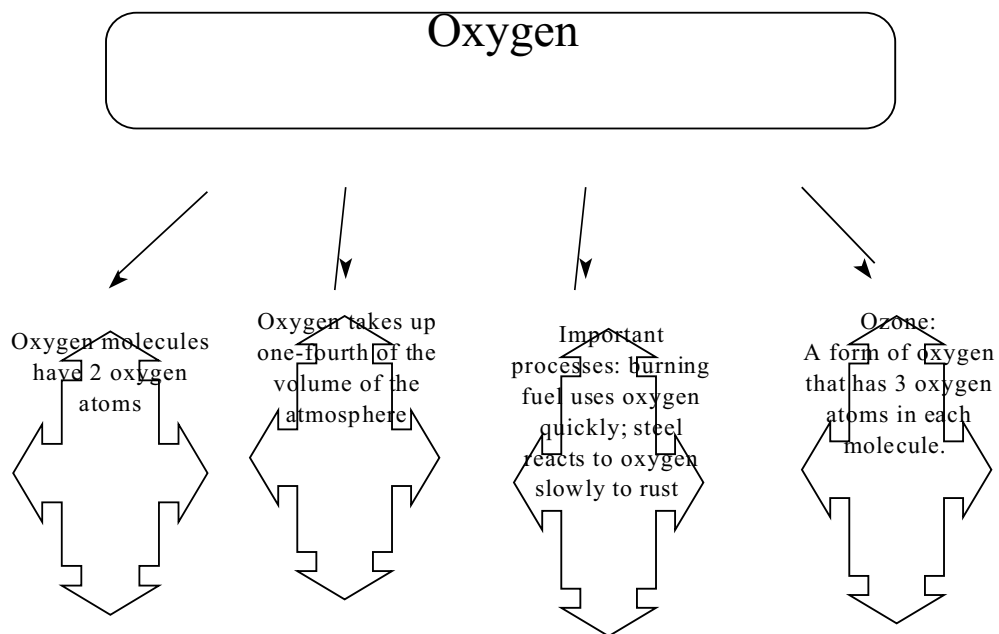
APPENDIX G

COMPLETED DESCRIPTION GRAPHIC ORGANIZER FOR

“OXYGEN” PASSAGE

## Appendix G

## Completed Description Graphic Organizer for "Oxygen" Passage



APPENDIX H  
INTERVIEW PROTOCOL

## Appendix H

## Interview Protocol

Name: \_\_\_\_\_ Date: \_\_\_\_\_

1. What did you think about this intervention?
2. How would you change it?
3. How do you think you performed before and after the intervention?
4. How would you describe the intervention process to a friend?
5. What did you get out of participating in this research?
6. Any other comments or suggestions?

APPENDIX I

PROCEDURAL RELIABILITY

## Appendix I

## Procedural Reliability

Student Name: \_\_\_\_\_ Date: \_\_\_\_\_  
 Start Time: \_\_\_\_\_ Stop Time: \_\_\_\_\_ Score: \_\_\_\_\_

## Session 1: Introduction to the Idea of Text Structure and Graphic Organizers

Text Structure

Explanation that authors organize material	Yes	No	Out of Order
Asks student to tell a narrative story-link text structure	Yes	No	Out of Order
Explanations that there are similar patterns in textbooks	Yes	No	Out of Order
Tells the student that author's purpose is to inform	Yes	No	Out of Order
Tells the student that knowing patterns can help reading	Yes	No	Out of Order

## Graphic Organizers

Shows student 5 blank organizers	Yes	No	Out of Order
Explains that they are visual displays of material	Yes	No	Out of Order
Asks the student to name two teachers at school	Yes	No	Out of Order
Has student hold the compare/contrast graphic organizer	Yes	No	Out of Order
Has student tell what is same/different about teachers	Yes	No	Out of Order
Fills in the organizer appropriately	Yes	No	Out of Order
Explains the process of filling it in thoroughly	Yes	No	Out of Order

**Session 2: Introduction to the 5 Text Patterns and Materials**

Reads over each pattern individually	Yes	No	Out of Order
Reads definitions, all signal words, and sample passages	Yes	No	Out of Order
Has student read back all of the information	Yes	No	Out of Order
Has student make a list of all 5 patterns	Yes	No	Out of Order
Completes appropriate graphic organizer for each pattern	Yes	No	Out of Order
Asks student to retell explanation in their own words	Yes	No	Out of Order
Tells student that 1 passage may contain several patterns	Yes	No	Out of Order

**Session 3: Modeling**

Read aloud a science passage, write down signal words, identify text pattern, identify appropriate graphic organizer	Yes	No	Out of Order
Encouraging student to ask questions	Yes	No	Out of Order
Answer reading comprehension questions using materials	Yes	No	Out of Order

**Session 4: Practice**

Provides 1 passage and all materials for practice	Yes	No	Out of Order
Reviews steps previously modeled	Yes	No	Out of Order
Instructs to read passage, use materials and answer questions	Yes	No	Out of Order
Provides input and redirection only as needed	Yes	No	Out of Order
Reviews answers and probes for understanding	Yes	No	Out of Order