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Effects on Reading Comprehension Using a Four Square Vocabulary Design

By

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A Graduate Field Experience

Submitted in Partial Fulfillment of the

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EFFECTS ON READING COMPREHENSION USING A FOUR SQUARE VOCABULARY
DESIGN
This Graduate Field Experience
has been approved for Renee Sue Moldenhauer
at Cardinal Stritch University by

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(Date)

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WOULD A FOUR SQUARE VOCABULARY DESIGN INTERVENTION STRATEGY, WHEN PRESENTED WITH DIFFICULT SCIENCE TEXT, IMPROVE STUDENT READING COMPREHENSION?

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ABSTRACT

The purpose of this study was to determine if utilizing a four square vocabulary box when presented with difficult science text would improve student reading comprehension. Three high school students who receive special education services participated in the eight week study. Participants received explicit instruction from the author on how to use a four square vocabulary box when reading expository text. In addition, participants were presented with an overview of lesson objectives, background knowledge was introduced, comprehension of text was assessed, and vocabulary was reviewed. Pretest and posttests were given to indicate if the use of a four square vocabulary box would increase student reading comprehension. Results indicated student reading levels did not increase. This study raises the question about ways to instruct students with disabilities on how to understand difficult vocabulary found in expository text and if more practice time is needed for students to improve reading comprehension.

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CHAPTER ONE

INTRODUCTION

If Hamlet is right and reading is just "words, words, words," then common sense suggests that a person who does not know words is not going to have much success (Alvermann, Gillis, & Phelps, 2013). Struggling readers often face challenges in comprehending text found in content area texts due to difficult vocabulary and possessing reading levels that are below their same age peers. As students navigate required text, they need to learn the meaning of many new words, and to the extent they can do this, they will be able to read (Alvermann, et. al., 2013). In content areas, words are labels for important concepts and can only be mastered through repeated experience through meaningful content (Alvermann, et. al., 2013).

Reading is the ability to comprehend language in written form that represents concepts all around us and is a means to communicate information and ideas. Skilled readers possess ability to comprehend different types of text, multiple-meaning words, voice in reading, slang, and grammatical structures; struggling readers do not possess such skills. In order to obtain skills, direct instruction is needed. Successful readers must demonstrate ability to decode, read fluently, understand vocabulary, and successfully comprehend printed word.

Reading can be taught at any age, but requires explicit teaching and implicit learning. It also requires practice. Educators embed teaching of reading skills in class lessons, allow students to practice using well thought out, designed activities. Teachers consider how to teach content reading in different disciplines. Meaningful content contains two types of words.

Duffy (2009) identified two types of vocabulary words, content words and function words. *Content words* are words that a reader can visualize or picture in their head (i.e. horse), while *function words* signal grammatical function (i.e., although) (Duffy, 2009). Both types of

vocabulary words are found in oral and written language. Readers learn *content words* through direct explanation and *function words* are learned through oral language experiences (Duffy, 2009). Struggling readers often are faced with barriers that prevent success.

Tatum (2000) identified three barriers struggling reader's exhibit which included fear or embarrassment, poor word attack skills, and limited vocabularies. In his study, Tatum (2006) offered a balanced program that included skill and strategy instruction. Students participated in paired reading selections and discussed each selection with a partner three times (Tatum, 2006). Following paired reading selections; Tatum (2006) discussed and modeled strategies in both reading and writing. Tatum (2006) provided students with experiences in reading fiction, non-fiction, and poetry.

Another barrier for struggling readers is lack of prior knowledge. It has been estimated that as much as 50 – 60% pf successful comprehension is related to background knowledge (Duffy, 2009). In order to create meaning from text, readers need to know something about the topic read prior to reading. Readers must also understand meaning of all words. Strategies and interventions have been developed to help struggling readers comprehend difficult text.

One way to help students comprehend difficult text is through teaching them first how to understand meaning of difficult vocabulary. In grades 3 – 9, the average schoolchild learns approximately 3,000 new words each year through twelfth grade, but the numbers are different for students from different backgrounds or having reading difficulties (Alvermann, et. al., 2013). The traditional approach of teaching meaning of vocabulary through memorization may work for some students, but struggling readers need more instruction. Struggling readers require exposure

to words through reading, conversation, and from rich language found in school, community, and

mass media (Alvermann, et. al., 2013).

A second way for students to understand meaning of difficulty vocabulary is through use

of context clues found in text. In content areas, vocabulary represents concepts, and learning

vocabulary means understanding concepts well enough to apply them in a meaningful way

(Alvermann, et. al., 2013). Educators need to learn how to bring meaning of difficult vocabulary

to struggling readers when expected to read difficult text.

Statement of the Problem

As students' progress through grade levels, texts become more specialized by disciplines

(Jetton & Shanahan, 2012). There are two reasons for this. The first is that words students know

and use on a daily basis may have multiple meaning in disciplinary texts (Jetton & Shanahan,

2012). Secondly, disciplinary texts contain words that are highly specialized or relevant to the

discipline (Jetton & Shanahan, 2012). When students come across text which is rich in

unfamiliar vocabulary, comprehension is compromised (Jetton & Shanahan, 2012). As special

education students progress through grade levels, level of reading material increases. The gap

between special education and general education increases. The Individuals with Disabilities Act

(IDEA) is a federal law that protects the rights of students with disabilities in an educational

setting. Each child student identified with a disability will receive free and appropriate education

in the least restrictive environment. Special education students are supported in classes' team

taught by a regular and special education teacher or individually by an educational assistant.

Expectations set by teachers for special education student participants are based on student

abilities and Individual Education Plan (IEP). The problem the researcher addressed during the

research was would comprehension of difficult vocabulary found in science text improve reading comprehension of high school special education students.

Purpose of the Study

The purpose of the study was to utilize the four square vocabulary design to give struggling readers in the study a strategy to use when reading science text. With understanding difficult vocabulary in science text, students could bring meaning to printed word, and comprehend text written above current reading level.

Rationale for the Study

Special education students in the researcher's pull-out Science and English classes were reading well below same age peers. When involved in regular education classes, they had difficulty reading text, comprehending, completing assignments, and often shut down. The general education setting did not provide the least restrictive environment for these students. Midwestern High School is unique; it is engaged in a curriculum initiative called Align-By-Design. Midwestern High School aligned its core academic courses to the College Readiness Standards. Results from required District, State Assessments, and teacher recommendation, students were placed in one of the four tiers core academic classes. Through this process, students can move to a different level of academic class based on growth on test scores and is ensured that the same content taught as peers and is covered by the end of the academic school year.

The tiered system included AP courses at the top rung, followed by general classes, prep classes, and pull-out classes. Special Education and General Education teachers' team taught prep classes in core academic areas. Special education teachers taught pull-out classes. Students

in pull-out classes have Individual Education Plans (IEP's). The researcher taught in both prep and pull-out classes, observed struggles students had in both environments. One of the biggest problems was reading narrative and expository text that was written as grade level or higher. The text included a lot of difficult vocabulary. When students skipped over the vocabulary word or took it out of the sentence, there were not enough words left for students to obtain meaning or understand topic concepts.

The researcher wanted to focus on vocabulary found in expository text. The researcher thought if students could understand difficult vocabulary in science text, students would understand sentences. If students understood the sentences read, meaning would be given to printed text. If meaning was given to what was read, would that improve individual reading levels? That was the rationale for the study.

Setting, Population, and Timeline

Midwestern High School, located northwest of Madison, Wisconsin, has 507 students in grades 9 – 12. Students from three smaller rural communities feed into the district. The majority of the students who attended Midwestern high school were Caucasian (95.7%). However the minorities of students with other ethnicities attending were 4.3% and included American Indian or Alaskan Native, Asian or Pacific Islander, African American, and Hispanic. Of these students, 13.4% were identified with a disability and possess Individual Education Plans (IEP's).

Through a curriculum initiative called Line-By Design, students were placed in core academic classes based on district and state testing, skill level, and teacher recommendation. Special education students in possession of IEP's struggle with core academic classes and are placed in "pull-out" classes for instruction. The problem that exists for special education students

in general education classes is expository and narrative text is rich in vocabulary and written above current reading levels.

The setting for the research project was one of the six special education classroom located in the west wing of Midwestern High School. The classroom is used for English and Science pull-out classes, Life Skills class, and Functional Reading class. A pull-out class is a class for students outside of the general education setting. Students in pull-out classes have Individual Education Plans (IEP's), received low scores on district and state tests, and have been recommended for a more specialized class that best meets individual needs through discussions at IEP meetings and teacher recommendation.

Three students participated in the 8 week study. Student #1 was a 16 year old male and a member of the freshman class. His primary disability was listed in his Individual Education Plan (IEP) as Autism. He participated in extra-curricular activities in band, high school musical, and Forensics. Based on scores on the Scholastic Reading Inventory (SRI), his score of 546 indicated that he was reading at grade level three. Grade nine SRI range level was 1000-1200. He also participated in pull-out English class.

Student #2 was a 16 year old female and a member of the sophomore class. Her primary disability was listed in her Individual Education Plan (IEP) as Specific Learning Disability. She participated in extra-curricular activities in Varsity Swim. Based on scores on the Scholastic Reading Inventory (SRI), her score of 459 indicated that she was reading at grade level two. Grade 10 SRI range level was 1025-1250. She also participated in pull-out English class.

Student #3 was a 17 year old female and a member of the junior class. Her primary disability was listed in her Individual Education Plan (IEP) as Intellectual Disability. She participated in extra-curricular activities in Track, Forensics, and high school musical. Based on

scores on the Scholastic Reading Inventory (SRI), her score of 832 indicated that she was reading at grade level six. Grade 11 SRI range level was 1050-1300. She participated in pull-out English class.

During March and April 2015, three high school students (grades 9 – 11), identified as receiving special education services and had Individual Education Plans (IEP's), participated in an eight-week intervention strategy study. Prior to introduction of the Four Square Vocabulary Design, students were assessed with two tools, Qualitative Reading Inventory – 5, (QRI -) and Scholastic Reading Inventory (SRI). The three attended pull-out Science class and met every other day for 85 minutes. Students in the study learned how to create a Four Square Vocabulary Design with vocabulary taken from science text. Students reviewed vocabulary words through activities prior to, during, and following reading instruction. Students practiced comprehension of vocabulary and text with assigned worksheets and lesson reviews. Students were reassessed with the Qualitative Reading Inventory – 5 (QRI – 5) after the eight week intervention. Definition of terms identified guide readers to understanding of unfamiliar terminolgy used in the study.

Definition of Terms

Terms used in the study and research paper are explained for the reader.

Align-by-Design: Align-by-Design is a curriculum initiative used at Midwestern High School. Align-By-Design is divided into four tiers with AP courses at the top, followed by general classes, prep classes, and pull-out classes for each core academic class. Students are placed in classes based on results from district and state tests, Individual Education Plans (IEP's), and teacher recommendations.

Prep classes: term used in Align-by-Design tier to describe classes' team taught by general education and special education teacher.

Qualitative Reading Inventory – 5 (QRI- 5): Inventory created by Leslie and Caldwell (2011) assesses students in Word List Identification, Concept Questions, Retell, and Comprehension Questions. Results indicate reading level.

Scholastic Reading Level (SRI): is a quick computer based assessment that identifies student reading grade level Lexile.

Chapter two is a literature review of twelve current studies based on improving student reading comprehension of struggling. Articles reviewed included use of technology, instructional adaptations, and acquisition of content vocabulary.

CHAPTER TWO

LITERATURE REVIEW

Working with students with disabilities can often be a challenge for general and special education teachers especially when students are reading far below their peers in core academic classes. Students, by fourth grade, have received instruction in how to read expository material to gain content information. High school students struggle with reading expository material to gain information and use valuable instructional time to learn how to understand expository text (Abadiano & Turner, 2002). Students struggle comprehending expository text because of densely packed written material, the assumption is that students have a vast amount of background knowledge (Abadiano & Turner, 2002). Text contains missing pieces where connections could be made and text contains too much irrelevant material (Abadiano & Turner, 2002). With average students struggling with expository text, this magnifies the problem for students with learning disabilities especially when the expectations are the same across all grade levels (Abadiano & Turner, 2002).

The goal of written language is communication of messages; if the reader is unable to understand the message, they are not reading (Duffy, 2009). Reading comprehension depends on prior knowledge or knowledge about the world (Duffy, 2009). When a student comes to a word in text that us unfamiliar or unknown, it means that the reader does not have background knowledge or has had less experience in that area (Duffy, 2009). So when a student is presented with text that is written above current ability level, the student may not possess the background knowledge or has had no experience in that area, and that is where meaning or comprehension breaks down.

In his work, Duffy (2009) suggested when given a rich language background at home, immersion in substantive subject-matter knowledge in school, and lots of experiences with new concepts and ideas, vocabulary often develops "naturally" with no intentional instruction. When those conditions are not present, teachers must provide more direct vocabulary instruction in order to develop student's vocabulary sufficiently (Duffy, 2009).

The purpose of this chapter was to explore current research and identify best practices educators can use with students identified with having a learning disability. The focus was print disability, and effects on students when reading expository text written above individual ability level.   The first part of chapter two describes five research studies done on computer-assisted instruction with students to promote comprehension of expository text. The second part of chapter two describes research done using teacher tools to increase student reading comprehension skills through instructional adaptations, inference strategy, and peer-mediated phonological skill and reading comprehension programs. And finally, the third part of chapter two closes with research studies that examined teaching vocabulary and the acquisition of content-vocabulary for students with learning disabilities. With the rise of technology used both in and outside of the classroom, effective teachers are finding ways to use technology to instruct students with learning disabilities.

Computer Assisted Instruction in Reading Comprehension

Special Education teachers have relied on technology during the last several decades to frontload information and provide additional practice opportunities to engage students with learning disabilities in comprehension of expository text (Jerome & Barbetta, 2005). One such program is Computer Assisted Instruction (CAI). Special education teachers who work with students with a wide range of learning abilities can use programs such as this to deliver new

instruction to students and provide individual practice opportunities. Programs such as CAI have

been instrumental in increasing student motivation, decreasing behaviors, and increasing time on

task. Jerome and Barbetta (2013) investigated the role of active student response as part of the

CAI program.

The researchers established two questions. First, they investigated the role of active

student response (ASR) of social studies facts acquired in the design of CAI. Second, the

researchers wanted to compare three types of responses: Clicking ASR (active responses with

computer mouse), Repeating-ASR (active oral response), Listening OT (on-task or passive

response), and the acquisition and maintenance of social studies facts when using a hyper-media

program. The researchers hypothesized that active responding (ASR) was related to greater

achievement. The dependent variable encompassed understanding the role of active student

response in the CAI program. The independent variable was having the students respond to 21

social studies facts verbally or through a computer prompt, written response, reading aloud, or

clicking a mouse to select an answer (Jerome & Barbetta, 2013).

Jerome and Barbetta (2013) conducted research in a private school setting for students

with learning disabilities in a large city located in the southeastern part of the United States. The

researchers chose five student participants, two female and three males, from fifth grade. This is

the only demographic information provided about the students. In order to participate in the

study, students were required to have basic computer skills and read at a first grade level or

higher. Full-scale IQ scores were determined by using the Wechsler's Intelligence Scale for

Children – Third Edition (WISC-3; Wechsler, 1991), and scores ranged from the lowest 76, to

the highest 109. Student reading levels were determined using the Wechsler's Individual

Achievement Test (WIAT; Wechsler, 1992), with scores ranging from first to seventh grade.

The researchers worked with each individually, for 20-25 minutes, in a small room setting. During each session, the student was presented with social studies lessons created by the researcher using Hyperstudio (Wagner, 1997). This type of software incorporated the use of sound, text, graphics, and animation to create lessons designed to meet the learning needs of the student (Jerome & Barbetta, 2005). With the CAI program, information was sent to each student by the teacher via the computer. Students responded to instructions given by the teacher and feedback was provided to each student. The researchers compared active student responses during CAI and initial performances.

The researchers designed the independent variable of the study to utilize 21 unfamiliar social studies facts and divided them into three conditions: Clicking-ASR (active student response with mouse), Repeating-ASR (active oral response), or Listening-OT (on-task or passive response). During Clicking-ASR, students responded with clicking the correct response when social studies facts were presented in printed format. Students listened to facts as they were presented on the screen. During Repeating-ASR, students were directed to respond by orally repeating facts printed on the card. During Listening-OT (on-task or passive response), each student was instructed to listen to a social studies fact that was printed on a card as it was being read aloud by the computer (Jerome & Barbetta, 2005).   During the course of the study, the student began with a concept lesson, which provided background information and an introduction of the week's lesson. Students interacted with the computer during the lesson with the option to have the computer read text to them. After completing the concept lesson, students were provided practice opportunities using the 21 unknown facts in one of three conditions: Clicking-ASR, Repeating-ASR, or Listening-OT.   During each practice session, facts were presented twice and students continued practicing until all three conditions were completed.

Students were assessed daily. Monday – Thursday students were assessed following the practice

session. Tuesday – Thursday, next- day tests were administered prior to the practice session. On

Friday, students were administered a pre-test for the following week and posttest to assess

student learning or maintenance of facts learned.

Data was collected and recorded using information gathered from same-day tests, next-

day tests, and from one and two-week maintenance tests. A second observer was assigned to

score a percentage of the same-day, next-day, and maintenance tests. In addition to scoring a

percentage of the tests, the second observer also collected data on treatment integrity to check for

reliability of the practice and test procedures.

Results of the three conditions indicated that all five students scored highest in the

Repeating-ASR, active oral response condition, followed by Clicking-ASR, active responses

with computer mouse, on four day testing opportunities. A total of 124 same-day tests during the

testing period indicated that students were most successful in 89 out of 124 opportunities in

Repeating-ASR. Repeating-ASR, Clicking-ASR were identical on 26 (14%) of opportunities,

and Listening-OT was highest on five (4%) opportunities. During weeks seven and eight of the

maintenance program, repeating instruction was highest on all conditions. When Jerome and

Barbetta (2013) collaborated the results of next-day testing, Repeating-ASR ranked the highest

condition for all five students. Analyzing the 124 testing opportunities for next-day test results,

Repeating-ASR displayed the highest scores on 81 (65%) of 124 opportunities, Clicking-ASR,

14 (11%), and Listening-OT 3 (3%). The researcher's evaluated information retained during

weeks seven and eight identified in their study as maintenance weeks. Week one maintenance

results indicated that five students were able to retain 91.6% of the facts with Repeating-ASR,

Clicking-ASR, 79.4%, and Listening-OT, 75.1%. The second week of maintenance indicated

retention at 93.2% Repeating-ASR, Clicking-ASR, 82.2%, and Listening-OT, 74.3%.

Jerome and Barbetta (2013) demonstrated success of CAI in learning and retention of

social studies facts by students identified with learning disabilities. All five students learned

information best using Repeating-ASR. Retention of facts after two weeks demonstrated strong

percentages, indicating that this type of learning was beneficial to the individual learning styles

of the students identified with learning disabilities. The work of Jerome and Barbetta (2013) is

important when working with students with learning disabilities. Results indicated that

technology can be powerful and an effective tool used in helping students comprehend social

studies facts/text.

In addition to using technology, it is imperative that teachers encourage students to

verbalize responses when working on the computer to enhance comprehension and retention of

information. Students demonstrated success because of continued practice and feedback on

multiple occasions. Over time, students were able to retell what they learned and grew confident

of their skills. Although, the research of Jerome and Barbetta (2013) specifically focused on

social studies content, it could be replicated using different content and different populations.

Two other researchers, Stetter and Hughes (2011) believed the use of the computer could help

improve reading skills of students.

Stetter and Hughes (2011) utilized the computer to promote comprehension in students

labeled with Learning Disabilities. Students with learning disabilities often struggle with and do

not possess an understanding or concept of the structure of narrative or expository text, often

holding back comprehension (Stetter and Hughes, 2011). When students are incapable of

learning and implementing reading comprehension, they struggle, and are unable to grasp new

information. Like Jerome and Barbetta (2013), Stetter and Hughes (2011) used Computer Assisted Instruction (CAI) in their study.

Stetter and Hughes (2011) sought to examine whether Computer Aided Instruction (CAI) could be effective in teaching a comprehension story mapping strategy to nine high school students with learning disabilities. From a multiple baseline single subject design, Stetter and Hughes (2011) proposed two questions, (1) Does using CAI that incorporates the use of a story map strategy help students with learning disabilities improve their comprehension of narrative text and (2) What are the perceptions of students with learning disabilities regarding participating in CAI in helping them develop their reading comprehension?

Participants were from a large urban high school in the United States with 90% of the students identified as being from a low socioeconomic background based on the number of students who received free and reduced lunch (Stetter and Hughes, 2011). Stetter and Hughes (2011) targeted students with learning disabilities to participate in the study. Twenty-nine students returned signed participation forms, and from the pool of candidates, nine students were randomly chosen. Seven 14 years old students participated in the study; four were male and three were female. Two15 year old participants were female. Six students had a Latino background and three students were African-American. Reading grade equivalents of participants ranged from 3.3 to 4.9 based on results from the Gates-MacGinitie reading comprehension test (Stetter and Hughes, 2011).

Stetter and Hughes (2011) used the reading component of the Gates-MacGinitie test, as a pre-test; an alternate form was used for the posttest assessment. Students participated in intervention, delayed intervention, and baseline groups where each component was modeled, review sessions occurred at the beginning of the next session, and students were able to make

corrections. Each day during the eight week period, participants read one of the 35 books provided for the study. As they navigated the material, students created story maps on the computer, and answered 20 multiple-choice questions.   During the study, all students were provided with the same material, and were able to complete the material at their own pace. The work of Stetter and Hughes (2011) showed gains made in seven of the nine students. Bhatti (2013) believed that the use of technology is viable helping students comprehend reading, which led him to compare teacher-led instruction and computer-assisted language learning.

A third study completed by Bhatti (2013) investigated two different styles of teaching; teacher led instruction and computer-assisted language learning (CALL) at the secondary level. The purpose was to determine which method was more effective in teaching, literal, inferential, and evaluative levels of reading skills (Bhatti 2013). Bhatti (2013) hypothesized that teaching reading through computer-assisted language learning (CALL) is more effective on the three levels of reading skills at secondary levels. A sub-hypothesis included three separate entities: (1) teaching reading through CALL is more effective at the literal level of reading, (2) teaching reading through CALL is more effective at the inferential level of reading skills, and (3) teaching reading through CALL is more effective at the evaluative level of reading skills (Bhatti, 2013).

Bhatti (2013) determined the dependent variable was the achievement scores of the control group and treatment group. The presence of or absence of CALL in the instructional environment was the independent variable (Bhatti, 2013). Each group, contained 30 male students, ages 15 – 17, was chosen randomly, and attended a public secondary school in Sindh, Pakistan.

Participants were given pre and post-tests that had questions designed to measure literal, inferential, and evaluative knowledge (Bhatti, 2013). Students in the experimental group had no

prior use of the computer, were instructed in using the CALL method with online instruction

including images, sounds, graphs, and animation (Bhatti 2013). The control group participated in

a traditional instructor-led class reading the same 24 lessons, but did not have the addition of

computer images, sounds, graphs, and animation (Bhatti 2013). Results of Bhatti's (2013)

yearlong study determined that student participants in both groups showed gains; students in the

experimental group improved 35% more than the control group (Bhatti, 2013). Taking a different

approach to the use of the computer for instruction, Gonzalez (2014) studied the effects of

embedded text-to-speech and vocabulary eBooks on reading comprehension.

In classrooms all around the country, educators spend time working on reading that

focuses on decoding and comprehension skills, but do not find much success (Gonzalez, 2014).

National statistics indicate 31% of the nation's fourth graders performed at or above proficiency

levels in reading with 36% scoring at or below the basic level (National Assessment of

Educational Progress [NAEP], 2005). When educators see statistics such as these, they ponder

success of students beyond graduation, if graduation is even a possibility and employability as

adults.   Gonzalez (2014) studied a group of students identified as having reading disabilities

using eBooks.

Gonzalez (2014) wanted to determine if there was a significant difference in oral retelling

and comprehension performance on multiple choice questions with students with reading

disabilities in third and fourth grade read eBooks, using three different formats. Participants were

tested in each area, but did no more than one type of book format per week. The formats used in

the study varied in the amount of support that was provided to participants. In Format 1, the

eBook read text to the student highlighting each individual word so that the student could follow

along as it was read. In Format 2, supports provided for students included vocabulary and

pronunciation allowing participants to click on select words in the text, and in Format 3, students read traditional print books with no supports (Gonzalez, 2014).

Seventeen third and fourth grade participants were from a suburban elementary school in a mid-Atlantic state. Each participant had been identified as having a severe reading disability. Among the pool of students chosen, six male and four females were from third grade and seven six males and one female were from fourth grade. Ethnicity of the students in third grade included three Hispanic and seven Caucasian. From fourth grade, one was Asian, one Hispanic, and five students were Caucasian. All seventeen participants were reading at least one year behind their same age peers, the majority reading between first and third grade (Gonzalez, 2014).

Two internet sources provided the eBooks used in the study and could be read through all three formats using multiple supports. Text used for the print books came from an on-line website, and printed to replicate a traditional print book. Participants read text at individual instructional level and were required to read three texts at each format, two expository and one narrative (Gonzalez 2014).

Gonzalez (2014) used two raters to independently score the participants three oral retellings from each format and found the average to obtain a mean score. Morrow's 10-point scale (Morrow, 1985) was the tool chosen to score narrative text; Expository Retelling Analysis Scale was used with expository text (Gonzalez, 2014; Morrow, 1985). Participants were also required to answer comprehension questions provided by the creator of the eBooks. Five to twelve questions were asked based on reading level of the participants. To obtain a score for each participant, results were averaged to provide a mean score.

Prior to reading, students were asked questions to prompt thinking about text before reading. Participants were instructed on how to turn pages, activate the mouse to click on

vocabulary and pronunciation supports in the format 2, and read independently without any

supports (Gonzalez, 2014). With traditional printed text, questions were provided prior to

reading. Retelling and multiple choice questions were read orally to each participant following

each reading.

In analyzing oral retell, greatest success was found when participants were provided with

full narration in format (1). Next, participant success was found when supports were provided

with vocabulary and select words in format (2). Participants were the least successful when no

supports were given in format (3). There was no significant difference in scores when

participants were asked multiple choice questions. Gonzalez (2014) study concluded that there

was not enough evidence to support the fact that there was a significant difference in oral

retelling and comprehension performance on multiple-choice questions when students in third

and fourth grade read eBooks under three different formats. Gonzalez (2014) found the study

valuable because it targeted a specific age and population of students, however, further study

using a larger population and single grade was recommended to gain more knowledge. EBooks

provided participants with learning disabilities an opportunity to use technology to read text.

With growth of technology in the classroom, other software has been developed to aid students

in reading and comprehending text.

With increased technology, text-reader software programs have been designed to read

text to students with learning disabilities. Prior to development of text-reader software, teachers

relied on tape recorders or assistants to read to students. With programs like Kurzweil 3000

(Williamson, Dunn, Hinshaw, and Nelson, 2008), teachers have the ability to scan different text

and tests, allowing students to independently work on the computer. Students are able to listen to

text, use dictionary tools for difficult or unfamiliar vocabulary, highlight, and post notes.

Williamson, Dunn, Hinshaw, and Nelson (2008) agree computer generated software is a valuable tool, but reading comprehension is more than reading words in text. Students who struggle with reading often have difficulty in identification of words and fluency. In the study, researchers examined whether students identified as having a reading disability could comprehend text at or above grade level when they used text-reader software with the addition of a self-questioning comprehension strategy to enhance comprehension (Williamson, et. al., 2008).

Students with reading disabilities benefit from text-reader software, but it is not always effective. Underlying deficits in language processing both contributes to decoding ability and to comprehending text as it is read to them, as well as limited lexicon, text structure knowledge, or cognitive strategies (Williamson, et. al., 2008). There is empirical evidence to support the addition of strategy instruction when students with reading disabilities are using text-reading software (Williamson, et. al., 2008). Comprehension strategy instruction includes pre-reading, during reading, and post reading activities designed to mimic the metacognitive and cognitive strategies used by good readers (Williamson, et. al., 2008).

The researchers believed that use of a self-questioning strategy would help students comprehend text and proposed to answer two questions:

a) what degree do older children with reading disabilities comprehend computer read text that is at or above their actual grade level;

b) will the comprehension of computer read text be enhanced if students with reading disabilities are taught and prompted to use self-questioning strategies (Williamson, et. al., 2008).

The study began with eight students. Based on initial probe scores, two students received mastery scores and were not included in the study (Williamson, et. al., 2008). The six who remained were white males entering grades 5 – 8, came from low-income to middle class

households, had demonstrated at least a 50% discrepancy between expected grade level and measures of reading fluency and comprehension, attended public and parochial schools, and were involved in summer reading clinics (Williamson, et. al., 2008).

Participants were recruited by principals and teachers, attended a summer reading clinic four days a week over a six week period, and met one-on-one with a tutor working on phonemic awareness, decoding, and comprehension instruction (Williamson, et. al., 2008). Following one-on-one tutorial sessions, participants were trained on how to use the Kurzweil 3000 program (Williamson, et. al., 2008). When researchers set up their baseline data, participants were asked to use the text-reader to read passages and complete multiple-choice questions and summary (Williamson, et. al., 2008). Expository passages chosen were above participants' current reading level, scanned into Kurzweil 3000, and set to read 150 words per minute (Williamson, et. al., 2008). As each sentence was read, words were highlighted. At the end of each sentence, participants were responsible for using the mouse to start reading the next sentence (Williamson, et. al., 2008). In the initial training phase, researchers introduced the FIST strategy; participants were prompted to create a predictive question (FI), write a summary using voice recognition, and tutors provided scaffolded instruction to guide participants in creating questions and scanning text to find answers (ST) in the text (Williamson, et. al., 2008). Once participants finished the reading passage, they were directed to answer seven multiple-choice questions designed by the authors (Williamson, et. al., 2008).

Williamson and her colleagues reported results in all areas of the study. First, use of the text-reader with expository text indicated it was helpful, but limited in benefit to participants (Williamson, et. al., 2008). With retelling, the participants were to use the FIST strategy to guide them in retelling what they read. Although a good idea, there was inconsistency in getting clear

recordings for all of the students. Results from the multiple-choice section following use of the

text-reader, reported students were able to answer less than 50% of the questions correctly

(Williamson, et. al., 2008). Finally, the concept of the study was good; suggestions were made

by Williamson and her colleagues to include using a larger study group (Williamson, et. al.,

2008).

Three separate studies showed a positive impact on student learning with the use of

technology (computer) for all ages and levels of learners regardless of experience using the

computer. The fourth and fifth studies utilized programs to read text for students with learning

disabilities. In an age where technology in the classroom is increasing, there still is a need for

providing instruction and adapting to meet needs of all learners. In addition to educators' use of

technology in the classroom, other avenues must be considered in helping students comprehend

expository text. Students who do not possess strong computer skills often benefit from

traditional strategies or instructional adaptations taught by teachers in the classroom.

Instructional Adaptations

Teachers understand that not all students will have success in the classroom using

technology, so they must look at various ways to present material to students that is not only

educational, but also engaging. It is important for teachers to understand the differences between

strategies and modifications. Strategies are tools students learn to use to help them with

comprehension. Modifications are ways in which assignments, quizzes, and tests are changed to

assess comprehension in a mode that fits the level of the learner. Adaptations for students can be

as simple as KWL or using a simple web for note-taking. A second way in preparing students

for higher level thinking, is instructing students on how to make inferences when reading text.

And finally, a third way to adapt instruction in classrooms is to engage peers to help students (Parker, 2006). In order to meet needs of all levels of learners, special educators often look beyond the use of the computer to provide general education teachers with effective strategies to use with students in the general education setting. One simple tool educators can use in the classroom with all students is the KWL.

Dynamics of general education classrooms have drastically changed over the years. The general education teacher and the special education teacher are responsible to identify instructional strategies for all levels of learners. Parker (2006) explored instructional strategies used by general education teachers with students diagnosed with learning disabilities. Parker (2006) believed teachers were using curriculum as the tool for instructing students with disabilities rather than determining how to teach /present material to students who struggle with learning. The purpose of the study was to first examine strategies teachers use in the classroom and support teachers with strategies that could be used in the classroom. Parker (2006) hypothesized that when special education and general education teachers collaborated on skills and strategies, struggling students would perform better in the general education setting.

Parker (2006) chose six middle school teachers from a suburban middle school to participate in the study. Teacher experience in the classroom ranged from 0.5 years to 13 years of teaching in a variety of subjects. Prior to the beginning of the study, teachers completed a five question survey about individual experiences, knowledge, strategy use, and strategies used on an on-going basis. The independent variable in the study was that K-W-L Strategy can cause a change in student's reading performance, but it is not possible that student reading performance (dependent variable) could cause a change in the K-W-L Strategy.

Teachers were taught how to use K-W-L, created by Ogle (1986), and a simple web, both designed to assist students with organization. With K-W-L, students identify and write information they know about the assigned topic of study in the "K" column, things they want to know about the topic in the "W" column, and following instruction, in the last column, they write what they have learned about the topic. Students assess what they have written; make generalizations about what they have learned, and seek to find more information if not all of their questions were answered. A simple web was a strategy Parker (2006) believed could be used by students with learning disabilities for organization of information learned. The simple web is a tool students' use to record information after learning about a topic or concept. Students create a web using circles. In the center circle, students write a key word. From that central point, students write notes that are relevant to the topic. When students have completed the web, they use the information and either verbalizes or write a response that summarizes what they have learned. The independent variable is the use of a web can help with student organization, but it is not possible that student organization causes a change in the web.

All six teachers were directed to use both of the strategies in the classroom during a four-week period. If the teachers had questions in regard to the strategies those questions were directed to the researcher. Following the four-week period, teachers completed a follow-up survey and offered personal opinions of the effectiveness of the strategies used.

The results of Parker (2006) study indicated that overall the teachers were successful using K-W-L and simple web in the classroom. When knowledge of specific strategies was rated, the mean was 2.6. Five of the six teachers rated their knowledge a two and one teacher indicated three (one being little knowledge and five – greatest knowledge). One educator, teaching a math class, indicated K-W-L was a strong tool to use in the classroom, stating

students did not hesitate to ask questions and did not forget what they wanted to ask because questions were written down. Another shared that average scores increased four points following the completion of a unit. Two of the six teachers found that students did well with strategies when they were modeled, but students struggled when they worked independently.

Results further indicated that strategies like K-W-L and simple web were useful tools for teachers to use with students and particularly with students with learning disabilities. Not only are they simple, easy to use, they afford students opportunity to have ownership in their work and work independently in the general education setting.

Both of Parker (2006) strategies indicated a means for students to comprehend difficult academic text. Teachers have been challenged with teaching students to go beyond text and use higher order thinking. Teachers have also been challenged with getting students to identify what the author wanted the student to learn or the message that the author wanted to convey. With using simple tools such as K-W-L and simple web, students with learning disabilities demonstrated that they can meet the challenges of comprehending difficult text. K-W-L and a simple web are tools that students can easily access when taking notes in the general education setting. They not only help with note-taking, but have also provided opportunities for students to write questions they want to ask to gather more information.   A second instructional adaptation that teaches students how to comprehend difficult text and use a higher order of thinking when reading text above ability level is the inference strategy.

Graduating from high school is not a simple task for some students. Twenty-six states now require students to take an exit exam prior to graduation (Fritschmann, Deschler, and Schumaker, 2006). Students were expected to respond to questions that ask them to use higher order thinking, which requires students to have strong comprehension skills and the ability to

make inferences and interpret text. The researchers expressed concern for students with

disabilities taking this type of test. Fritschmann, Deshler, and Schumaker (2006) explored the

effects of instruction using an inference strategy on reading comprehension skills of adolescents

with disabilities. Most students identified as having a learning disability at the middle school

level read two to three grade levels below their peers and do not make large gains in reading

ability in high school. While students with learning disabilities possess some skills necessary for

decoding, they struggle with the larger skills pertaining to comprehension and higher-order

thinking. The researchers established two research questions. First, (Fritschmann, et al., 2006)

wanted to develop and test the effects of an instructional program designed to teach an inference

strategy to secondary students with disabilities. The researchers also questioned the role seven

criteria played in successful reading comprehension for students identified with having a learning

disability. The seven criteria included explicit instruction in a multi-component inference reading

strategy by assessing students' knowledge of the strategy, use of the strategy, ability to answer

four different types of inference questions, assess students' scores on a standardized measure of

reading comprehension, reading and strategy instruction, and required instructional time with

students. The researchers hypothesized that students with disabilities can learn to use strategies

to answer a variety of inferential questions, which would result in improved reading and

improved scores on criterion-based and standardized measures of reading comprehension

(Fritschmann, et al., 2006). The participants were from an urban Midwestern community and

consisted of eight high school students, four boys and four girls. The mean age was 15.46 and

consisted of students with diverse ethnicities: one student was Multi-ethnic, one Latino, three

African-American, one American-Indian, and two Caucasian. Seven of the students were

identified as having a specific learning disability and one participant was diagnosed with a

cognitive disability. One student identified with a learning disability also had limited English

proficiency. Four of the students received free and reduced lunch; three received neither free,

nor reduced-cost lunch, and one was non-applicable. Student participants were directed to make

a commitment to the Inference Strategy prior to the start of the study.

Fritschmann (2006), the creator of the Inference Strategy, wrote the instructional

protocol, step-by-step instructions for each lesson, included two types of practice material as

well as the visuals used during instruction. The first type of practice material consisted of nine

short, one-paragraph passages and included two to four multiple choice questions related to the

content of the lesson presented. Students in the study used the material following lesson

instruction. The second type of practice material consisted of narrative passages written at the

fourth, sixth, and eighth grade level and was specifically designed to ensure initial student

success and gradually increase in difficulty.

Prior to the start of the intervention period, eight students completed a Reading

Satisfaction Survey. Students completed a minimum of three probe tests from a total of nine

strategy use tests and five-item criterion-based comprehension tests (Fritschmann, et al., 2006).

The first four students who completed three probes successfully were assigned to one of two

groups, cohort A, and began strategy instruction. The second group of four students, cohort B,

began the strategy instruction when baselines were stable.

During the five-step inference strategy, students were engaged with the text throughout

the 60 to 75 minute sessions.   Step one was the preview of the passage and questions, which

were factual or think-and-seek. The premise behind the Inference Strategy was to guide students

to independently create meaning from clues found in text. Students were provided with

questions that would guide them to identifying purpose, main idea/summarizing, predicting, and

clarifying. Fritchmann (2006) created four types of practice materials and criteria for each. In step two, students *noted what they knew* about the passage. When students reached step three, s/he was engaged in *finding clues* related to key questions. In step four, each student looked back at the passage to *explore more details*. When the student reached the fifth step, s/he was directed to "return to the question" to ensure that an answer had been marked.

Students began reading passages written at a fourth grade level. When able to obtain a score of 80% or higher on the Comprehension Test and 70% or higher on the Strategy Use Test, students were moved to the next level. The procedure continued until each student was able to reach mastery at the eighth grade level. When students completed the Instruction Strategy program and successfully mastered one eighth grade activity, they were administered a posttest which consisted of three - 400 word reading passages written at a ninth grade level. Following the reading of each passage, students were assessed using a five-question criterion-based comprehension test. To assess retention, the researchers added a maintenance component in which the students who participated in the study took two tests during the following year. The first test was administered eight months after the first group, Cohort A, began the program. The second posttest was administered to those students who were still in school one year after the posttest was given. Prior to the posttest, students were administered a 45 minute review of the Inference Strategy.

A fidelity checklist, which listed multiple teacher behaviors, ensured that the teacher adhered to the instructional sequence designed for each lesson. The scorer, listening to audio recordings of each lesson, scored zero points for behaviors omitted and one point for correct behavior. The teacher scored 98% on the behavior checklist, completing 86 of 88 behaviors listed.

In addition to the fidelity checklist, Fritchmann (2006) developed protocol for the seven criteria they wanted to examine. For the strategy use test, the researchers, (Fritchmann et. al., 2006) used a pool of ninth-grade-level narrative passages from the J*amestown Reader* which were randomly selected and sequenced. Narrative passages were chosen to fulfill English requirements. This was the level that students were expected to perform at in the general education setting. During the criterion-based comprehension test, following each passage read, students in the study were presented with five multiple choice questions that were written by Fritchmann (2006). The questions presented consisted of one factual and one non-factual question from each, identifying purpose, main idea/summarizing, predicting, and clarifying. Students received one point for each correct response with five total points assigned to each passage, 15 total points for probes. The Strategy Knowledge Test was the assessment created to assess students' understanding of the Inference Strategy and used as both pretest and posttest. Students responded to five short answer questions, were required to write a written explanation that listed of uses and steps of the INFER strategy. Researchers used two subtests, sentence completion and passage comprehension, of Group Reading Assessment and Diagnostic Evaluation (GRADE; Williams, 2001) prior to and after instruction for the standardized reading component test. Combined scores from form A and form B comprise the GRADE comprehension composite score. Students completed a ten question survey using a seven-point scoring system. Questions on the survey were presented to the students as pre and posttest measures of personal feelings toward reading and learning the inference strategy. The final criteria, time required for instruction, recorded the time that each student spent with the researcher and was documented in a journal.

The results of the researchers (Fritchmann et. al., 2006) study indicated that six of the eight students completed the Inference Strategy study; one student moved out of the district and a second student was removed because of absenteeism. Results of the study demonstrated that students were able to increase skills to a mastery level. Three sets of data were recorded. Baseline comprehension of questions answered was 31.74%, during instruction - 77.39%, and posttest - 82%. Strategy Use results indicated growth with baseline results 0%, during instruction – 66.39%, and posttest – 81.94%. Results of the first maintenance test; eight months following the Inference Strategy instruction in comprehension without review was 41%, in maintenance test two – 65%. Results of maintenance test one Strategy Use, eight months after completion of the program, without review was 19% and test two with review was 84%.

The researchers compared pre and posttest scores of the student Strategy Knowledge Test earned by eight of the students. All eight of the students received a score of zero on the pretest. Posttest results demonstrated a mean of 91.75, with the lowest score 80 recorded for two students and the highest score of 100 received by two students. Comprehension Standard scores for the eight students indicated a mean of 61.25 on the pretest and 88.63 on the posttest. Grade equivalent scores also increased from a mean grade level of 2.99 to the posttest mean grade level of 5.81.

Ultimately, the students demonstrated the ability to reach mastery level following the Inference Strategy instruction. Through instruction, students were able to answer inferential questions on criterion-based tests, and increased individual reading comprehension gains an average of 2.8 grade levels. In addition to the increase in comprehension gains, the instruction that the students in the study received increased the student's ability to answer inference questions. Student's posttest scores on GRADE were significantly higher than pretest scores.

The gains in this correlational study were large. Because the study was correlational, there were

no independent or dependent variables. Overall, the researchers determined the students in the

study had significant gains in all three of the outcomes. During the study, students were able to

gradually increase their reading skills to grade level. Participants felt more confident and

satisfied with their knowledge and ability at the end of the study then when they began.

Beginning students at the independent level and gradually building on skills learned increased

confidence as complexity of text increased. The results of Fritschmann, Deschler, and

Schumaker's (2006) study demonstrated that students with learning disabilities can learn and use

a strategy to successfully answer inference questions. Teaching students with learning

disabilities how to make inferences not only has a positive effect on student comprehension of

difficult text, but it also provides a tool for them to use when taking standardized tests

(Fritchmann, et al., 2006). The inference strategy is not designed to be a one time learning

strategy, but should be included multiple times throughout the curriculum to maintain skills and

afford students additional opportunity. In addition to using K-W-L, simple webs, and teacher

taught inference strategy, students with learning disabilities can also learn from peer modeled

programs.

        A fourth type of instructional adaptation that greatly differs from K-W-L, simple web,

and inference strategy, and used in the classroom is a peer-mediated approach to learning

phonological skills. This type of approach can be used as a supplement to other reading

programs. Calhoon (2005) explored the effects of a peer-mediated approach on teaching of

phonological skills and reading comprehension for middle school students identified with

reading disabilities. Calhoon (2005) established two research questions. First, Calhoon (2005)

wanted to determine the effects of combining Linguistic Skills Training (LST: Fuchs, Fuchs,

Phillips, Hamlett, and Karns, 1995) and Peer Assisted Learning Strategies (PALS: Fuchs. L.S., et al., 1995) with middle school students identified with a reading disability by using peers as tutors over whole-class remedial programming. Second, Calhoon (2005) sought to determine if the initial study was successful, could special education teachers implement LST and PALS in the special education classroom.

Calhoon (2005) chose four teachers, teaching in self-contained language arts classrooms for students with reading disabilities, to participate in the study in a rural southwestern school district. The teachers, licensed to teach K-8 general education classes, averaged three years of experience, were teaching with special education emergency licenses. In addition, before the start of the intervention period, the teachers attended a one-day workshop where they learned the skills needed for successful implementation of both programs. Research assistants provided further support during the 31-week program answering questions and offering corrective feedback.

Calhoon (2005) chose thirty-eight students, 25 boys and 13 girls, to participate in the study. Thirty-two students were from sixth grade, five from seventh grade, and one was from eighth grade. All of the students had programming provided in a resource classroom that included language arts programming more than 50% of the school day. In addition, all of the students were identified as having a reading disability, had reading goals listed in their IEP's, and were reading at least three grade levels below their same age peers.

Prior to the start of the 31-week intervention program, students were assessed in the area of reading with the Woodcock Johnson-III, (WJ-III; Schrank, McGrew, & Woodcock, 2001), a norm-referenced, diagnostic achievement test that consisted of four subtests. Students identify printed letters and words in Letter-Word Identification. Student ability to identify nonsense

words is measured in the Word-Attack subtest. Student reading rates are assessed with the

Reading Fluency subtest where students read a statement rapidly and respond with true or false.

And finally, students' understanding of Passage Comprehension was assessed using reading

passages from text. Following the intervention period, students were immediately reassessed

using the WJ-III.

The LST/PALS group included 12 boys and six girls, nine were Latino/a, seven were

Caucasian, and two were African American. The mean age of the group was 12.11. Although

LST was a peer mediated phonological program, each lesson began with teacher led scripted

lessons followed by teacher directed practice, and monitored peer tutoring opportunities. LST

participants used a signaling and coding system, taught to them prior to the study, and symbols to

represent linguistic skills. Student participants took learned codes to identify sounds of letters

and letter clusters, which enabled/guided them to recognize the seven basic rules of the LST

program. Students who learned LST focused on rime, phonetics, phonology, and morphology.

LST was implemented three days a week during the 31-week intervention period. Peer Assisted

Learning Strategies (PALS), was used by educators as a supplement to reading programs, and

students participated in three comprehension activities two to three times per week. Students

were also engaged in explicit activities designed to practice review, sequencing, summarization,

stating the main idea, and prediction.

Teachers taught LST using scripted teacher presentations, held practice sessions,

provided peer-mediated practice sheets, and gave teacher feedback three times per week. Upon

completion of training, PALS was taught to all students two days a week using teacher scripted

lessons, practice sessions, and teacher feedback opportunities, sessions lasting 40 minutes.

The second group (contrast treatment group) consisted of 13 boys and 7 girls. Sixteen of the students were Latino/a, and four were European. Students in the contrast treatment group received reading instruction using Saxon Phonics Intervention (Simmons, 2001)*,* designed for older students. Like LST, Saxon Phonics Intervention encompasses scripted lessons and opportunity for student practice. Implemented three days a week, students decode a total of 21 hours, 10 hours each with spelling and reading, five hours of reading fluency and vocabulary. Students in the contrast group also participated in the SRA Skill Acquisition program two days a week, which allowed for 34 additional hours of reading comprehension. During reading instruction, teachers used scripted lesson plans, flash cards, workbooks, and supplementary materials from the Saxon Phonics Intervention program three times a week, with sessions that were 40 minutes in duration. Students participated in the SRA Skill Acquisition. During the 31-week intervention period, the research assistants checked the fidelity of the programs using a score sheet and checklist.

Results of the study demonstrated greater growth in the areas of letter-word identification, passage comprehension, and word attack for students in the LST/PALS group. Student growth in the LST/PALS letter-word identification was 7.61 from pre to posttest compared to students in the contrast growth of 0.25. Passage Comprehension scores indicated a growth of 6.55 in the LST/PALS group and a decrease in score of -1.20 in the contrast group. Student participants in LST/PALS scores depicted greatest growth in word attack with 8.94; contrast group scores also indicated growth with a score of 3.30. The success of LST/PALS could be attributed to the size of each group, additional practice time with peers, and the immediate feedback that was provided by the teacher. There was no significant difference in reading fluency between both groups, LST/PALS -0.16 and the contrast group 0.65. Results

from the study indicate the importance of using peers in the learning environment, it may not be enough to close the reading gap between students receiving special education services and same age peers. Using peers to help students with learning phonological skills can be powerful in any education setting. Some students, however, are still struggling when they graduate and move on to post-secondary education facilities and are expected to understand text, especially expository text.

Since 1988, the number of students identified as having a learning disability attending a post-secondary education facility on a part-time or full-time basis has increased. Students with learning disabilities still struggle in the academic setting, getting poor grades, having low grade points, and even dropping out before graduating (Vogel & Adelman, 1992). Students who actively apply cognitive strategies, such as text-coding strategies, improve their reading comprehension (Bakken, Mastropieri, & Scruggs, 1997). Cognitive strategies used by students when reading narrative and expository text demand students to think about what they are reading when they are reading. Students who struggle with reading have difficulty thinking about text when they read because of difficulty experienced with vocabulary, concepts, and text-structure in narrative and expository text. Studies have been done on text-coding strategies for students in elementary, middle, and high schools, but not a lot of research exists on the use of text-coding strategies at the postsecondary level.

In the study completed by Bakken, Mastropieri, & Scruggs (2008), the effects of a text-code strategy on science text was studied to determine if this improved reading comprehension of postsecondary students. Forty postsecondary students with self-identified learning disabilities from a private postsecondary in a Midwestern state participated in the study (Bakken, Gaddy, & Fulk., 2008). Students volunteered to learn interventions that would help them improve reading

comprehension, supplied researchers with academic records, however, not formal records of LD diagnosis, and accommodations used in high school (Bakken, et. al., 2008).

Of the forty postsecondary students, twenty were randomly assigned to either a text-structure strategy condition or a traditional instruction condition (Bakken, et. al., 2008). Sixteen students were Caucasian American, three African American, and one Hispanic American The ten male and ten female participants had an average age of 19.30 (Bakken, et. al., 2008). The twenty students took the ACT test in high school, with the average score 15.25, reading test placement average score 13.05, math test placement average score 15.79, writing placement average score 17.68, and average GPA was 2.46 (Bakken, et. al., 2008).

The researchers of the study chose to use life and physical science text and created 150 word passages with an eighth-grade readability level measured using the Flesch-Kincaid Readability Formula software (Bakken, et. al., 2008). Each student was asked to complete a pretest and two retells consisting of an immediate test and delayed test (Bakken, et. al., 2008). Four scoring methods were chosen to code the data: text strict, (i.e., literal information) not test strict, test loose (i.e., inferential), and no test loose (Bakken, et. al., 2008).

Students were randomly chosen to be in one of the two testing situations, text-strategy or traditional over one school semester. All students took a pretest on the first day of testing. On day one and two, students received 30 minutes of condition-specific individual instruction and instruction on text-strategies focused on identifying the main idea and compare/contrast (Bakken, et. al., 2008). On day three, the students were tested. After the first three days, the students were given a one day break. On day five, a delayed test was given (Bakken, et. al., 2008). Student participants in the traditional instruction group focused on reading and answering questions based on text read.

Prior to beginning the study, two pilot studies were completed; the first tested validity of design, and the second gave students 3.5 minutes of study time. During the retell portion of the study, student's responses were written as well as tape recorded for accuracy. Scripts were created for the tester of all phases to ensure that all of the students received the same instruction (Bakken, et. al., 2008). Students in the instructional group were presented with a daily lesson, guided practice, retell and review; students in the traditional group learned about expository passages and worked on main idea, compare-contrast, and wrote responses to open-ended question (Bakken, et. al., 2008).

Results indicated that students in the text-structure strategy condition generally out performed student in the traditional condition on immediate and delayed tests, on compare/contrast text structures, reading comprehension, but not on main idea text strategy (Bakken, et. al., 2008).

Accountability in education emphasizes on the importance of choice and purpose for teaching instructional strategies used in today's classrooms (Keel, Slaton, & Blackhurst, 2001). Parker (2006) focused on simple tools for educators to use in the classroom and found both to be successful when students understood the purpose for using them. Fritchmann (2006) and her colleagues found that students with disabilities could learn how to use an inference strategy using social studies text. If students could be successful with social studies content, teachers may be able to combine this with other explicit forms of for reading comprehension (Fritschmann, et al., 2007). And finally, teachers can find success for student learning through the use of peer-mediation (Calhoon, 2005). Finally, Bakken, Gaddy, and Balk (2008) found that students at the postsecondary level can be successful when reading expository text when introduced to text-structure strategies. All four of the research teams presented instructional adaptations that

improved student comprehension. In addition to adapting instruction and teaching strategies necessary for students with learning disabilities to use when reading expository text, teachers must also provide a means for students to understand difficult vocabulary.

Content Vocabulary

More than ever, educators are held accountable for student success in the classroom. This holds true for special education teachers who seek effective and efficient instructional strategies for students with learning disabilities (Keel, Slaton, Blackhurst, 2001). Most research pertains to the disability itself and not much is written on specific academic interventions (Keel, et al., 2001). This section focused on three different studies; constant time delay used in the acquisition of content vocabulary, teaching spelling to students with learning disabilities, and focused vocabulary instruction. In the first study, Keel, Slaton, and Blackhurst (2001) sought to investigate two variables of Constant Time Delay, a response prompting procedure that has been found successful for students with disabilities. The researchers wanted to test the effectiveness of copying the visual model before responding between two groups of students and assess the effectiveness in promoting expressive word reading and spelling of observational words. The researchers hypothesized that teaching students in groups and writing the words would help students with learning disabilities achieve success through observational and incidental learning.

The Constant Time Delay (CTD) instructional strategy had the teacher providing a response prompt if the student waited for help in stating a correct answer. The teacher began by modeling the task prompt followed by immediate presentation of the response prompt, with no time delay between task presentation and controlling prompt. In later trials, the teacher added in a time-delay between task direction and controlling prompt. When a student responded with an

incorrect answer, the teacher immediately stated the correct answer. In addition, the teacher reinforced the answer before and after the prompt.

The researchers chose four special education teachers to participate in the study. The researcher trained each of the teachers on how to implement the program. Prior to implementation, teachers demonstrated at least 90% reliability of performance on each component of the testing procedure. During the course of the study, teachers were provided with a notebook and detailed scripts for each level, copies of stimulus sheets, and forms for collecting data. Testing was conducted in three resource classrooms, and one integrated regular education classroom at both the elementary and middle level. Students in the study worked in small group settings at a table with their backs to peers not participating in the study. Teachers explained the protocol for the study and did not need to include behavior management programs in any of the classrooms.

Fifteen students participated in the study and were from a mid-sized southeastern. Seven students had been identified as having a learning disability based on local and state guidelines. Four students were from three resource rooms and three students were from a non-graded, multi-age integrated primary regular education classroom. Prior to the study, reading instruction was provided for the seven students by their special education teacher or from a teacher in a resource room. The other eight students participated in general education classes and were not identified as having a disability. Twelve of the students were male and three were female. Twelve students were African-American and three were Caucasian.

The researcher was able to compare and study the effects of two independent variables (group versus individual written attentional response) by using an adapted alternating treatment design (AATD) on students' acquisition of their target words. All sets of words used were

equally difficult. Two sets of words were selected from a pool of words from reading, science, and social studies; the third set of words was used as a no-treatment comparison.

Timed probes were used to measure rate of correct and incorrect responses and fluency. To collect baseline data, the students were tested individually until they completed a minimum of three consecutive sessions or a stable trend had been established. Student responses were marked correct when the student correctly read or self-corrected the response; incorrect responses were responses in which the student said the word incorrectly, skipped the word, or stated they did not know the word.

Teachers were provided with five sets of word cards for each trial. Students wrote individual responses on a dry erase board provided by the teacher at each session. Students met each day and were assessed in a group of three to four students. One group was identified as "everyone writes" and in the second group, only the target student wrote. During the testing session, all students observed peers in the testing situation. Student's ability to read each word was assessed four times during the study, first as baseline data, twice during the study, and once during the maintenance phase at the end of the study.

To check for reliability and fidelity of the study, an observer was provided with a modified probe data form and checked her scoring form against the teachers form. The total number of agreements was calculated with the total number of agreements plus disagreements and multiplied by one hundred to get a percentage. During the study eight procedural and seven teacher behaviors were monitored.

The researchers determined that there was a variance in correct words across the four schools with correct words per minute. Fourteen of the students met or exceeded the accuracy and rate goals established for each word set. Although one student did not meet the rate goal,

there was an increase in growth from the initial baseline test. Data gathered from the observation

learning probe indicated a higher rate of correct words learned by peers in their respective

schools. The data from spelling compared the effects of "everybody writes" and one target

student writes, indicating more success in the "everybody writes" group, with 10 of 15 students

having slightly higher rates. Overall, the students were successful in learning to read and spell

words that were assigned to them. Students assigned to the "everybody writes" group

consistently performed higher in all testing situations. This indicated that this condition was

more effective in promoting levels of learning and was an effective and efficient method for

teaching students with learning disabilities. Keel, Slaton, and Blackhurst (2001) concluded that

student participants were successful in learning when presented with materials that required high

levels of engagement and were able to retell what they learned following the study (Keel, et al.,

2001). Ross and Stevens (2001), like Keel, Slaton, and Blackhurst (2001) study used Constant

Time Delay in their research. Unlike acquisition of content vocabulary, the focus of Ross and

Stevens (2003) study was teaching spelling.

         With the expectation that students with learning disabilities understand grade level

expository text, often two to three grade levels above individual reading levels, teachers must

find ways to help struggling learners comprehend difficult material. One method, Constant Time

Delay, was often used to teach facts and skills to students with disabilities ranging from severe to

mild. When using CTD in the classroom, teachers directed students to answer a fact or perform

a skill. If the student did not know the answer, the teacher provided the correct answer or

modeled the correct behavior, creating an error free learning environment. Students were

required to state the fact or demonstrate the skill that they were shown and when the student was

able to consistently answer or perform the task, the student successfully learned the skill or task.

Over time, the teacher began to scaffold learning and fade the prompts provided to the student.

Ross and Stevens (2003) evaluated the effectiveness of CTD, and used a five-second time

delay (CTD) program to teach students with mild disabilities spelling using words from a general

education social studies text. The researchers sought to discover a tool that could be used with

all levels of learners which would provide frontloading of information or teach students to read

or spell difficult vocabulary words prior to learning the concept in the general education

classroom. Consisting of three trials, (1) the stimulus, (2) the response, and (3) the feedback,

CTD can be used in conjunction of other procedures used in the classroom. In addition to CTD,

Ross and Stevens (2003) examined instructive feedback to assess if the information learned in

instructive feedback was learned at the same time when the targeted information is learned.

The study was conducted by a special education teacher in a resource room located in a

public elementary school with the assistance of two general education teachers. The three boys

chosen to participate in the study were Caucasian, had individual education plans (IEP), and

participated in special education classes at least one and a half hours a day. One student had had

been identified with multiple disabilities which included Attention Deficit Disorder and Learning

Disabilities. The second student was identified as having a Learning Disability and the third

student had been identified as Other Health Impairment. Two of the three students had prior

experience with CTD, the third no experience. As part of the IEP's, the students had written

language goals that included spelling. To participate in the program, the students were required

to possess adequate visual and auditory acuity, ability to copy words accurately, and the ability

to wait for a prompt (five seconds), and attend to the teacher for a minimum of 15 minutes.

The teacher worked with the students on an individual basis (probe and maintenance) and in small group settings for instruction. The special education teacher used index cards printed with the target word on the front and a meaningful sentence on the back during instruction. Students wrote responses on white and blue printed strips during probe sessions. Vocabulary words, that were going to be used in the following semester, were selected from a grade level social studies text. Twelve words were selected for each student from a bank of 75 words. During individual sessions, the teacher said the word, waited five seconds for the student to begin writing a response, and waited and additional 25 seconds for the student to complete the word. The words selected were individually chosen for each student based on words that each student had incorrect or could not complete within the given time frame. Once the words were chosen for each student, the words were divided into three groups with four words in each group. The commonality of the words chosen were same number of letters, chosen from the same grade level text, students had the ability to read the words independently, and the first letter of each word was not duplicated.

The primary dependent of the study was the written acquisition and maintenance of spelling responses on their individual list of words. Secondary measures included student generalization of targeted words, student's ability to learn the spelling of other student's words, and learning information from instructive feedback from the teacher.

The teacher scored the student responses as correct when the student was able to initiate writing of the word within the first five seconds and completing the entire word within 25 seconds. Incorrect responses were recorded when the student was able to initiate the word in the first five seconds, but was unable to write the word correctly or did not complete the word in 25 seconds. Incorrect words were presented at the subsequent trial. Once the students were able to

spell their words correctly, they met once a week with the special education teacher to work on maintaining the skills that they learned.

The school psychologist and occupational therapist collected dependent (student responses) and independent (procedural) data and shared responsibility of checking reliability. Data was collected at least once per condition per student during the study.

Results of the data indicated an increasing trend in the number of unprompted correct responses. The length of the study varied for each student depending on the length of time it took each to master each criterion, ranging from the lowest number of sessions to the highest number of sessions, 25. Errors, totaled for all three students were 36, equivalent to 3.3%. Student one had eight total errors, students two and three each had 12 errors, all of which occurred before the prompt. In addition, there were no errors following the prompt and no "no response" errors.

Ross and Stevens (2003) indicated that all three students were successful in using CTD as a procedure for spelling difficult words that would be introduced in a subsequent lesson. This procedure provided students with learning disabilities an opportunity to find success in the classroom. Students were able to work on spelling skills which did not take them out of the classroom for long periods of time. The number of words that students were expected to master was also realistic. Understanding difficult vocabulary prior to reading expository text benefits student in core academic classes when comprehending material that is above individual ability. The studies completed by both teams of researchers found CTD to improve acquisition of content vocabulary and also be successful in learning the spelling of difficult or unfamiliar social studies content. A third group of researchers, Horn and Feng (2012) believed that the key for

students to comprehend difficult content is to receive vocabulary instruction during their school day.

With passing No Child Left Behind Act in 2002, teachers found a change in their role due the need to be accountable for test scores produced by the students that they work with. With pressure instilled on teachers, instead of being able to teach students the skills needed to learn, they were forced to teach skills needed to pass the test. The problem therefore lay with vocabulary instruction and the importance it has with student's success in reading comprehension. Understanding vocabulary is essential in reading comprehension and when struggling students are unable to comprehend vocabulary, they do not possess higher level skills needed to comprehend or infer all types of text.

Horn and Feng (2012) believed in order for students to comprehend reading, vocabulary instruction needed to be taught using direct instruction; when students were expected to use context clues or other means to understand difficult vocabulary, they would skip the word and meaning was lost. The question presented for the study, "Do 7th graders who receive direct content vocabulary instruction prior to reading content text perform better than those students who are given context reading with no direct vocabulary instruction?" (Horn and Feng, 2012, p 7).

In the study, the students in the control took a pre-test of text vocabulary, were asked to read, and discussed meaning in small and whole-group settings. The second group of students received the same pretest, had strategy instruction throughout the reading passage; incorporated at the beginning, during, and at the end of the reading. Following the intervention period, participants in both groups were given a posttest and the researchers analyzed the scores.

The twenty-nine students in the two participating classrooms received literature focused

enrichment in their language arts class located in a middle school in a southeastern region. The

students come from diverse backgrounds, representing all ethnicities, except Native Americans.

They were from families with low to middle socioeconomic status (18% of the school

population). In this school of 1300 6th, 7th, and 8th grade students, 11% of the students have been

identified with a disability, and 1% of the population has been identified as English Language

Learners.

Fifty-nine students in Horn and Feng (2012) research included 28 females and 30 males

with an average age of 12 years, six months. 62% of the participants were Caucasian, 31%

African American, 5% Hispanic, and 2% Asian (Horn & Feng, 2012). None of the students in the

group were identified as receiving special education services or in the gifted program. There was

not a set method put in place as to which group would be the treatment group; the researchers

chose the group randomly.

To begin the study, student lexile reading scores were collected as the beginning level of

reading comprehension and a *t-test* was run to compare the scores of both groups, and indicated

no real difference in the abilities of the two groups. Pre-testing of the students began in February

and ran for a four week period ending in March. The students who participated in the control

group took the pre-test, completed the reading, and post-test in five days. Following the pretest,

the second group completed eight lessons that focused on vocabulary meaning, identifying

vocabulary in context, and story comprehension (Horn & Feng, 2012), and then completed the

post-test.

Results indicated that there was no significant increase in the scores of the group that

received intervention. It showed that the students in the second group received additional

instruction made more gains than the first group when the pre and post-test scores were compared. The gender scores in the two groups, the scores of male and female participants in group two were higher than those in group one. In explain their research, Horn and Feng (2012) documented that the results may have been different if it were done as a year-long study, rather than a four week period.

(Keel, Slaton, and Blackhurst, 2001) study and (Ross and Stevens, 2003) study incorporated the use of constant time delay, in the acquisition of content vocabulary and teaching spelling to students with learning disabilities. (Horn and Feng, 2012) study focused on vocabulary instruction. The researchers found that student participants were successful in learning when presented with materials that required high levels of engagement and were able to retell what they learned following the study. They also found that understanding difficult vocabulary prior to reading expository text benefited students in core academic classes when comprehending material was above individual ability. Understanding vocabulary was essential in reading comprehension and when struggling students were unable to comprehend vocabulary, they did not possess higher-level skills needed to comprehend or infer all types of text.

Conclusion

Chapter two presented a review of the literature on twelve current research and best practices used with struggling readers. Working with students who struggle with comprehension of text written above current reading ability challenges the educator and frustrates students. Whether teachers used technology, instructional adaptations, or interventions to aide in understanding content vocabulary, continued research is needed to help struggling readers.

The first five research articles reviewed were on the use of computer assisted instruction in reading comprehension (CAI). Five researchers utilized computer assisted instruction (CAI) in

reading comprehension. Research completed by Jerome and Barbetta (2005) demonstrated success in using computer assisted instruction (CAI) in student learning and retention of social studies facts. Stetter and Hughes (2011) found success with the use of computer aided instruction (CAI) in their research study where students utilized the computer to generate story maps. Bhatti (2013) used computer assisted instruction (CAI) as part of his research when he compared the use of CAI and teacher-led instruction. Bhatti discovered that students who used CAI improved 35% more than students who received instruction by a teacher. Gonzalez (2014) utilized computer aided instruction with (eBooks), analyzed three different formats that studied the amount of support provided and results indicated students were most successful when provided with full narration. Finally, Williamson, Dunn, Hinshaw, and Nelson (2008) studied the use of a self-questioning strategy with a text-reader program to increase reading comprehension. Results indicated that the text-reader program helped with comprehension of expository text, but limited benefit to the participants. All five research studies utilized the use of the computer as a means to improve reading comprehension. While the studies indicated growth in student performance, not all students possessed strong computer skills. Thus, teachers often have to rely on traditional instructional adaptations in the classroom.

Four researchers presented work on five traditional instructional adaptations used in the classroom. Parker (2006) presented two adaptations in his work. Parker (2006), studied the use of K-W-L and simple web strategies with middle school students.   The two strategies were used independently by students while engaged in learning activities. Parker's two strategies indicated a means for students with learning disabilities to comprehend difficult academic text. Fritchmann, Deschler, and Schumaker (2006) supported the importance of learning and utilizing an inference strategy for higher level thinking to meet the educational demands in the classroom.

Fritschmann et al., (2006) determined that students with learning disabilities had success in making inferences with difficult text. Calhoon (2005) utilized peers to guide students in developing phonological skills and reading comprehension. Results from Calhoon's (2005) study indicated the importance of using peers in the learning environment. Bakken, Mastropieri, and Scruggs (2008) studied a group of post-secondary students to determine is using text-coding improved reading comprehension of science text. Results of the study indicated student participants in the text-coding strategy outperformed the students who received traditional instruction. The five instructional adaptations provided success for the students through gains in independence in the classroom, confidence, and learned opportunities with peers. Traditional adaptations including K-W-L, simple webs, student driven instruction, and text-code strategy have positive effects on student growth, however educators also need to provide students with a means to understand difficult vocabulary.

The final three research articles focused on content vocabulary. The work of Keel, Slaton, Blackhurst (2001) and Ross and Stevens (2003) studied the effects of Constant Time Delay (CTD). (Keel et al., 2001) concluded that student participants were most successful in learning when presented with materials that required high levels of engagement and were able to retell what they learned following the study. Ross and Steven's (2003) objective was to discover a tool that could be used with all levels of learners which would provide frontloading of information or teach students to read or spell difficult vocabulary words prior to learning the concept in the general education classroom. Results of the research conducted with three students indicated that the students were successful in using CTD as a procedure for spelling difficult words that they would be introduced in a subsequent lesson. Finally, Horn and Feng (2012) believed that if students were taught how to understand difficult vocabulary prior to reading comprehension

would improve. Results from this indicated that there was not a significant difference. Working

with students with learning difficulties can be a challenge for teachers. When presented with

tools for computer assisted instruction, instructional adaptations, and content vocabulary, along

with opportunities to collaborate with specialists, all levels of learners can find success in the

classroom.

In conclusion, there are lots of research articles out there for educators to read on working

with struggling readers. Chapter two focused specifically on research designed on improving

reading comprehension of students identified as struggling readers. The twelve research articles

found in chapter two focused on the use of technology, traditional instructional adaptations, and

instructional strategies for understanding content vocabulary. Not all of the research presented

had positive results or outcomes, but research is needed to aide in improving reading levels of all

readers.

CHAPTER THREE

PROCEDURES FOR THE STUDY

Special education students participate in academic classes with their same age peers in schools like Lodi. Many enter academic classes with reading levels well below same-age peers, but are expected to understand difficult content. One challenge in an academic general education science class is reading and comprehending material presented. In science, vocabulary is technical and results in a telescoping effect in which students must remember an increasing information load as they read a textbook (Fang & Schleppegrell, 2010; Shannahan & Shannahan, 2008; Unsworth, 1999). Challenges for special education students with understanding difficult vocabulary in order to comprehend text in a science text prompted the study.

The purpose of this study was to determine if utilizing a four square vocabulary box when presented with difficult expository (science) text would improve student reading comprehension. Data was collected to explore the effect of the four square vocabulary instructional strategy used on reading comprehension of special education students in high school. This chapter includes description of the research site, sample population, and steps used to gather data. This chapter also included a description of the procedures and an explanation of how the data were analyzed.

Description of Sample Population

Three high school students, two female and one male participated in the study. All three students received science instruction outside of the general education setting in a Special Education pull-out program. Based on district and state test results, individual educational plan (IEP), and teacher recommendation, students are placed in a pull-out academic class. Taught by special education teachers, students in the class read material that mirrors topics their same age

peers are reading, paced based on learning style, and student needs. Strategies are introduced and practiced to aide in comprehension of text and concepts.

The two sixteen year old and one seventeen year old student participants have Individual Education Plans (IEP's), received support from special education teachers in the general education and pull-out instructional settings. Student #1 was a 16 year old male whose primary disability is Autism. All of his academic classes were taught in a special education instructional setting. At the time of the study, his current reading level based on the Scholastic Reading Inventory (SRI) was 546, well below the 1000 – 1200 range for students in grade 9. Student #1 participated in extra-curricular activities which included marching band, the school musical, and Forensics. He has a very kind heart, very helpful, and well liked. Student #2 is a 16 year old female whose primary disability is Specific Learning Disability. She participated in pull-out English and Science classes in a special education instructional setting. Math and Social Studies classes were with her same grade peers in the general education setting. At the time of the study, her current reading level based on the Scholastic Reading Inventory (SRI) was 459, well below the 1025 – 1250 range for students in grade 10. Student #2 participated as a member of the junior varsity swim team. Student #3 is a 17 year old female whose primary disability is Intellectual Disability. She participated in pull-out English and Science pull-out classes in a special education instructional setting. She participated in a math class with her same age peers. At the time of the study, her current reading level based on the Scholastic Reading Inventory (SRI) was 832, well below the 1050 – 1300 range for students in grade 11. Her extra-curricular activities included the school musical and she was a member of the track team.

The research project targeted special education students who participated in a pull-out Science class. Initially, four students were invited to participate in the study. One student did not

return the required participation form by the deadline, so was not included in the study. The three

Caucasian participants attend Midwestern High School, located in a rural area of the Midwestern

United States. The two females and one male student participate in pull-out English and Science

classes outside of the general education setting. All three students have been identified as

struggling learners, have Individual Education Plans (IEP's) and are placed in pull-out classes.

This rural Midwestern high school was located northwest of Madison, Wisconsin. This

community of over 3000 residents is in Columbia County and encompassed students from three

smaller rural communities that feed into the district. One community, located five miles south of

the high school is surrounded by large crop farming and dairy operations. Two manufacturing

facilities also employ the majority its residents. A second unincorporated community located in

the township is the eastern terminus for the Merrimac Ferry, on the Wisconsin River and is

known for outdoor recreation, its beautiful lake, water skiing, and fishing. The third feeder

school is a growing community of 823 residents located north of Madison. Many of the residents

farm or commute to work in Madison.

There are 507 students who attend Midwestern High School. The majority of the students

who attended the Midwestern high school were Caucasian (95.7%). However the minorities of

students with other ethnicities attending were 4.3%. The minority population consisted of

American Indian or Alaskan Native (.6%), Asian or Pacific Islander (1%), African American

(1.2%), and Hispanic (1.6%). Slightly over twenty percent of the students were from

economically disadvantaged homes, 13.4 % have disabilities, and small percentages (1.0 %) have

limited English (Table 1).

Table 1: Student Demographics

Student Diversity	Percent
Caucasian	95.7%
American Indian or Alaskan Native	0.6%
Asian or Pacific Islander	1.0%
African American	1.2%
Hispanic	1.6%
Economically Disadvantaged	20.1%
Students with Disabilities	13.4%
Limited English	1.0%

The thirty-nine staff members (17 male and 22 female) of the Midwestern High School were 100% Caucasian. Six of the 39 teachers were special education teachers. The school district employed one part-time physical therapist, one occupational therapist, and one speech therapist. The student/teacher ratio was 14.1.

Twenty-one percent of the students receive free and reduced lunch. The 2014 average test composite score for the ACT test listed Midwestern High School students at 23.4 compared with the state average at 22.3. The 2014 scores in English average 22.5 (state score average 21.4), 23.5 in math (state average 21.9), reading 23.7 (state average 22.3) and 23.1 in science (state average 22.2). Midwestern High School was ranked 88th in the state in 2015 and ranked better than 81.1% of high schools in Wisconsin. In 2015, the calculated Average Standard Score was 73 (Table 2).

Table 2: State ACT Assessment Comparison Composite Scores

State Assessment	Lodi Score	Compared to WI Schools
ACT-Composite Score (2014)	23.4	22.3
ACT – English (2014)	22.5	21.4
ACT – Math (2014)	23.5	21.9
ACT – Reading (2014)	23.7	22.3
ACT – Science (2014)	23.1	22.2
State Ranking (2015)	88th	>81.1% of WI high schools
Average Standard Score-2015	73	

"The mission of the School District of Midwestern High School, a strong partnership with families, communities, and educators to inspire students to become lifelong learners who seek new understanding and skill to assume the role of responsible and contributing members of society by creating a world-class, innovative learning environment that stimulates academic and personal excellence" (Midwestern high School, 2010).

Midwestern High School is engaged in a curriculum initiative called Align-By-Design. The high school has aligned its core academic courses to the College Readiness Standards (Appendix A). Individual test scores on Measure of Academic Performance (MAP) measured Reading and Math Scores for students in grade 9 in the Fall and Spring and assessed student growth. Career Interest Achievement Test (EXPLORE) given in 8th or 9th grade helped students plan classes in high school based on test scores received in English, Math, Reading, and Science. Students were informed on careers to be explored based on scores. State Assessments included ACT and ACT-ASPIRE). ACT-ASPIRE, taken by student in grades 9 – 10 was a computer based summative assessment of what students learned in the areas of English, Reading, Math, Science, and Writing. ACT ASPIRE also predicted how well a student will perfume when taking the ACT in grade 11. ACT (American College Testing), was a paper and pencil test given to 11th grade students in Reading, English, Math, Science, and Writing. Scored results helped students understand how to schedule courses and explore careers based on interests. ACT can be used for college admission, scholarships, and course placement. At Midwestern High School, students are placed in core academic classes based on skill level. Through this process, students can move to a different level of academic class and is ensured that the same content is covered by the end of the academic school year. The ACT tests include: Reading, Math, English, Science, and Writing. The ACT Plus Writing is a paper and pencil test.

Prior to the implementation of the intervention strategy, a typical class period for students in the pull-out Science classroom began with a warm-up activity that partnered with the lesson taught. Students were introduced to the vocabulary listed in the reading assignment. Followed by the lesson, discussion, a worksheet was assigned based on the reading and assessed comprehension of vocabulary and text.

Instruments Used in Data Collection

The Qualitative Reading Inventory – 5 (QRI – 5), (Leslie & Caldwell, 2011) was one of the assessment tools used for the research project. The Qualitative Reading Inventory – 5 (QRI – 5) is an informal reading inventory designed to provide information about (1) conditions under which students can identify words and comprehend text successfully and (2) conditions that appear to result in unsuccessful word identification or comprehension (Leslie & Caldwell, 2011). The QRI – informal assessment were administered individually to the three student participants to provide information about word identity and fluency as well as comprehension. The QRI – 5 (Leslie & Caldwell, 2011) was used to determine the highest instructional reading level of each student. The results were used to student growth at the end of the action research project.

A second tool used for collecting initial data was the Scholastic Reading Inventory. The Scholastic Reading Inventory is a computer-based assessment that provided a lexile score which indicated the reading level of each student participant. The three students read well below their peers based on the Scholastic Reading Inventory Lexile ranges and scores completed in January 2015. Based on the Scholastic Reading Inventory (SRI) Lexile levels, all three individual scores of 546, 459, and 832 are well below reading levels for grades 9 – 12, 1000 – 1300. The Scholastic Reading Inventory (SRI), a computer based assessment, allowed students to read different genre at various lexile levels. Following silent reading of the passage, students

responded to one question. Based on student response, the computer adjusted the level of lexile

passage. Reading continued until lexile level was reached and score was given.   Information on

individual participants in the study included gender; age, primary disability, and January 2015

Scholastic Reading Inventory (SRI) lexile score (Table 3). Scholastic Reading Inventory (SRI)

Year-end Proficiency lexile range indicated where student performance should be at the end of

the school year.

Table 3: Student Dynamics/Lexiles

Student	Gender/Age	Primary Disability	January 2015 Reading Lexile (SRI)
Student #1	Male/16 years	Autism	546
Student #2	Female/16 years	Specific Learning Disability	459
Student #3	Female/17 years	Intellectual Disability	832

*Year-end Proficiency Lexile Ranges – Scholastic Reading Inventory

Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	grade 8	Grade 9	Grade10	Grade11	Grade12
100-400	300-600	500-800	600-900	700-1000	800-1050	850-1100	900-1150	1000-1200	1025-1250	1050-1300	1050-1300
Source: Leslie & Caldwell (2011) Qualitative Reading Inventory – 5											

Informal checks, worksheets, and reviews were presented to the students during the eight-

week study. Informal checks included matching of vocabulary word and definition, looking at

pictures that students could match to the word and presented at the beginning of the session as

well as the end of the session if new words were introduced. Formal checks were given when the

students completed a lesson. Formal checks included matching; fill-in-the blank answers

provided with a word bank, and short answer. Formal checks were limited to ten questions.

Information gathered from the informal assessments indicated where the child was performing

that day and the formal assessments indicated the knowledge the student was able to retain over

time.

Description of Procedures Used

The Four Square Vocabulary Design intervention strategy was implemented in the mornings between 10:56am and 12:21pm for 16 sessions during March and April of 2015. The data collection occurred in five phases.

Phase one involved approval from the school. The initial meeting was between the researcher and high school principal. The meeting involved the description of my research project and the student population the researcher wanted to focus on. Following approval, the researcher mailed letters and consent forms were to the parents of the four students targeted for the intervention. One student did not return the required participation form by the deadline, so she was not included in the study.

The second phase happened during the spring semester of the 2014-2015 school year. The three participants were individually assessed using the QRI – 5 (Leslie & Caldwell, 2011) as a pretest. The assessment began with the implementation of the 20 word grade level reading lists from the QRI-5 (Leslie & Caldwell, 2011). The word list provided an estimate of the student's ability to identify words and the researcher a starting point to begin the expository reading passages. The passages in the pre assessment were designed to provide the highest reading level as well as the independent, instructional, and frustration reading levels (Leslie & Caldwell, 2011). Every passage included concept questions, retelling, and comprehension questions. Following each reading students had the opportunity to look-back in the text for information.

The researcher used a science text for the reading component of the intervention. Participants were prompted to read science text during the pre and posttest sessions. Prior to assessing instructional reading level, the researcher prompted each participant to read twenty word grade level reading lists from the QRI – 5 (Leslie & Caldwell, 2011). Results informed the

researcher the level where each student performed at an instructional level. The initial score from

the Scholastic Reading Inventory (SRI) and 20 word grade level reading list from the QRI-5

(Leslie & Caldwell, 2011) indicated where the researcher began assessing expository text

passages found in the QRI – 5 (Leslie & Caldwell, 2011). Prior to reading expository passages

from the QRI – 5, participants were prompted to answer four concept questions and make a

prediction on what the passage was about. Based on responses, the researcher was able to

determine each participant's familiarity of text. Students read the chosen expository text

passages which contained between 250 and 400 words. Following the reading, participants were

prompted to retell the passage read including main idea and details. Lastly, students were asked

to respond to four implicit and four explicit questions. Students who did not respond with a

correct answer were prompted to look back in the passage for the answer. Scores determined if

students read material at the independent, instructional, or frustration level. The researcher

continued to pre-test the students individually until they reached the highest reading instructional

level. The same procedure was completed after the research period concluded.

　　　　The researcher chose to work with the students in the Pull-out science class to test if

using a four-square vocabulary guide on difficult terms found in expository text (science) would

aid in increasing reading comprehension.

　　　　In phase three, the Four Square Vocabulary Design strategy was introduced in the Pull-

out Science class of special education students. The intervention instruction took place over an

eight-week period (16 sessions in March and April 2015) with students receiving 85 minutes of

intervention each session in the special education classroom. A sample copy of a visual

representation of the four-square vocabulary is in (Appendix B).

The Earth Science text, written at a fourth grade level was used during the intervention period. Each chapter divided into 5 or 6 lessons averaged 5 pages in length. Lessons began with an activity to build participant's background knowledge. Highlighted vocabulary words were introduced to help participants understand difficult words found in expository text prior to reading of a new section or lesson.

The Four Square Vocabulary Design was the strategy used during the eight-week intervention period. The Four Square Vocabulary design had the student write the word in one box, example from own life in second box, non-example from own life in third box, and definition in own words in fourth block. The vocabulary box was modified or condensed based on the number of vocabulary words introduced with each lesson, the amount of paper needed, and to meet individual needs of the students in the intervention. The modified design had information listed in one box and included vocabulary word, definition, picture of what it would look like, and a sentence with the vocabulary word in it. A sample copy of a modified design is in Appendix C.

Together with the researcher, the participants created a four-square vocabulary box for each word. Students transferred the definition in the blue box located on the side of each page of the text. A modification made was the addition of a fill-in-the definition added due to the processing time needed for two of the students. Upon completion of the written definition, students were prompted to think about a picture that would help them remember the definition. Following think time; the participants talked with each other and shared ideas for a picture. The participants drew their picture. Participants, along with the researcher came up with a sentence with the vocabulary word in it and then prompted by the researcher, wrote the sentence on their

worksheet. Initially, the researcher modeled the design, had samples for the participants, and as the sessions continued, the researcher backed off from the leading.

Phase four was implemented after completion of the vocabulary packet, the overview and objectives of the lesson were introduced. Necessary background information was introduced prior to reading. The three student participants and researcher met to do the readings together in a small group setting. Based on the concepts and words in the text, the researcher determined if the lesson reading would be student directed or lead by the researcher. Stopping points were built in to clarify student understanding. Dependent on the content, rereading passage and breaking into smaller segments were utilized. "W" questions were commonly used to clarify written text during and after reading. "W" words are the question words, who, what, where, when, why, and how used to clarify what was written. The researcher demonstrated to the participants how to incorporate a definition into the sentence for the vocabulary word. Participants were encouraged to ask questions for clarification as each passage was read. Based on the time it took the participants to read the entire lesson and comprehend the text, assignments were assigned that would enforce understanding. A sample copy of a worksheet is listed in Appendix D. If no assignment was given, the students ended the session with a review of the vocabulary words.

In general, the same format was followed at the beginning of each lesson. When it was not necessary to create the four-square vocabulary box, the researcher began the lesson with a review of the vocabulary words and comprehension questions that had students retell what they had read during the previous session. At the end of each lesson, students completed a ten question review which included vocabulary, multiple choice questions, and short answer (Appendix E).

Phase five was composed of the posttest administration after the eight week intervention using the Qualitative Reading Inventory, QRI – 5, (Leslie & Caldwell, 2011). The only posttest assessment used was the QRI – 5 (Leslie & Caldwell, 2011).

Description of Data Collection

To determine the effects of using the Four Square Vocabulary Design on reading comprehension of three special education high school in grades 9 – 11students, analysis of the QRI – 5 were made. The QRI – 5 assessment provided word list accuracy, oral reading fluency, retelling percentage, and comprehension score with and without look-backs (Leslie & Caldwell, 2011). In both the pre and post assessments, the initial step of the QRI – 5 is the Word List. Individually administered, each individual student read the 20 word list provided (Appendix F). Students read word lists until the highest instructional reading level was reached. The word list was used to indicate each student's level of reading and where each student began reading expository text.

Prior to being reading expository passages, students were asked to answer concept questions. Concept questions determined how familiar the student was with the passage that was going to be presented, with each question rated as 3-2-1-0. A number three indicated that the student was very familiar with the topic and zero indicated student was unfamiliar with the topic of concept question asked. As students read the expository text, miscues were marked for substitutions, insertions, omissions, and meaning-changing miscues were recorded by the researcher on examiner copy. The researcher used the information from the miscues to determine independent, instructional, or frustration levels.

The pre and post assessments of the QRI – 5 informal assessment provided passage retelling and comprehension scores. After the students read, it was removed and the students

were directed to retell what they had read. During retell, the examiner tallied information relayed

pertaining to setting/background, goal, events, and resolution. Students were given one

additional opportunity to add any other pertinent information about the passage. Information

gained from the retell indicated to the researcher what information the student recalled and areas

of difficulty, determining if the student comprehended the passage.

Finally, students were asked eight comprehension questions about the passage. Four were

explicit questions, meaning answers were directly found in the passage. The four implicit

questions had students infer an answer based on clues from the reading. During the pre and post

assessment, students were allowed to look-back in the passage for answers when responses were

at the frustration level. A sample of a QRI – 5 pre-assessment test including concept questions,

reading, and comprehension questions is located in Appendix G.

The researcher collected data on student four-square vocabulary designs and ensured

each student listed correct information for vocabulary words listed. If a component were missing

or incorrect, corrections were made with the student. Throughout the eight week intervention

period, informal checks, worksheets, and reviews were used to record and monitor student

progress. A student sample for an informal assessment is listed below in Table 4. The informal

assessment listed contained four vocabulary words and definitions introduced, read about, and

discussed in the last lesson. Informal assessment allowed the researcher to assess understanding

of the previous sessions vocabulary words prior to the beginning of a new lesson. Students were

given a pre-cut list of words and definitions in an envelope and were asked to match. Student

performance was assessed during matching activity.

Table 4: Informal Assessment – Chapter 3, Lesson 2: Components of an Ecosystem

Population	The process by which living things produce offspring.
Matter	A group of different species that live in the same area.
Community	A group of organisms of the same species that live in the same area.
Reproduction	Anything that has mass and takes up space.

Based on the results of the informal checklist, additional times were given to the understanding of the vocabulary words prior to the lesson. When the vocabulary word came appeared in the reading, students were asked what the sentence(s) meant. When the three students understood meaning, reading of the text continued.

Following the reading activity, students were given a worksheet to reinforce what was learned through reading the text. Each lesson's worksheet contained six fill-in-the blank statements with vocabulary listed in a word box. Four questions were short answer questions. Review sheets for each chapter contained vocabulary, multiple choice, and short answer questions. Sample worksheet and review sheets are listed in the Appendix. Reviews were created for students to reinforce learning. Modifications were made for students who had a difficult time reading independently. During the course of the eight week intervention, the students were able to complete six lessons.

Conclusion

This chapter was written to describe the research site and sample population, instrument used in the data collection, the procedures used to carry the project as well as an explanation of how the data were analyzed. In summary, the study took place in the small community located 23 miles northwest of Madison, Wisconsin.

Following the administration of the QRI – 5 (Caldwell & Leslie, 2011) and Scholastic Reading Inventory (SRI) pre-assessments, three students participated in an eight-week intervention in a pull-out Science class. The QRI – 5 (Caldwell & Leslie, 2011) twenty word lists were used to indicate each student's level of reading and starting point to where each student began reading expository text. The expository passage determined familiarity of topic, retell, and comprehension based on explicit and implicit questions. The Scholastic Reading Inventory was used to determine student reading level and determined the reading level to begin the QRI – 5 (Caldwell & Leslie, 2011). The data collection process was completed in five phases. The first phase included the initial approval from the school and parents of participants. Each student was individually assessed by the researcher who used the Scholastic Reading Inventory (SRI) and QRI – 5 (Caldwell & Leslie, 2011) until instructional reading level was reached during the second phase. The third phase included instruction of the four-square vocabulary design. The fourth phase included implementation of lesson vocabulary words, reading, stopping points for clarification, comprehension questions, and worksheets. Finally, phase five included retesting of students using the QRI – 5 (Caldwell & Leslie, 2011).

Students were instructed in how to design a four-square vocabulary box to aide in comprehension of difficult vocabulary found in science text. Each assessment began with an informal checklist of science text vocabulary words. After the reading of each lesson, students demonstrated comprehension through worksheets and review sheets. At the end of the eight weeks, students were reassessed with the QRI – 5 (Leslie & Caldwell, 2011) to assess if the use of the four-square vocabulary box when presented with difficult expository (science) text would improve student reading comprehension. The next chapter will present results of the study.

CHAPTER FOUR

RESULTS

The purpose of the research was to determine the effect of a four-square vocabulary design with expository science text would increase reading comprehension of special education students in grades 9 – 11. The researcher hypothesized that the four-square vocabulary design when presented with difficult expository science text would improve student reading comprehension. The null hypothesis states there was no significant difference in the vocabulary development of high school special education students. The research project took place at Midwestern High School during March and April 2015. Three special education students in grades 9 - 11 met with the researcher every other day for 85 minutes, a total of 20 sessions. Students utilized the four-square vocabulary design to understand difficult vocabulary and comprehend expository text (science) in a pull-out Science classroom. The reading vocabulary strategy of four square design gave students and researcher the opportunity to review difficult vocabulary found in science text, read text together, and apply strategies to comprehend difficult content. The researcher also modeled the vocabulary strategy and in turn the students identified the word, wrote a definition for the word, drew a picture that connected to meaning, and wrote a sentence with vocabulary word.

The Qualitative Reading Inventory, (QRI – 5) (Leslie & Caldwell, 2011) and the Scholastic Reading Inventory (SRI) were used to determine pre-test reading level of student participants. The Scholastic Reading Lexile score was used to determine the starting point for the Qualitative Reading Inventory QRI – 5 (Leslie & Caldwell, 2011) word reading list. Twenty word reading lists, concept questions, expository science passage retell, and implicit/explicit comprehension questions from the QRI – 5 (Leslie & Caldwell, 2011) were used in both pre and

post-test assessments. Data collected from the QRI – 5 at the completion of the intervention

determined student growth.

Section one of chapter 4 will present data from the Scholastic Reading Inventory. Section

two will present the pre-test data of three participants based on the QRI-5 Informal Reading

assessment. Section three will present the Four-Square Vocabulary Design Intervention strategy.

Finally, section four will focus on post-test data and analysis of pre and post-test assessments

gathered from the Qualitative Reading Inventory, QRI – 5, after the 8 week intervention period.

Scholastic Reading Inventory

In addition to the QRI – 5 (Leslie & Caldwell, 2011), the Scholastic Reading Inventory

was used during pre-assessment to determine level of reading. The computer-based assessment

was chosen as a quick assessment to guide the researcher to the level where to begin individual

word lists on the QRI – 5. Table 5 indicated the Scholastic Reading Inventory Lexile prior to the

eight week intervention period.

Table 5: Individual Lexile Levels -Pre-Test

Student	January 2015 Scholastic Reading Inventory (SRI) Lexile Level
Student #1	546
Student #2	459
Student #3	832

*Year End Proficiency Lexile Ranges – Scholastic Reading Inventory

Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
100-400	300-600	500-800	600-900	700-1000	800-1050	850-1100	900-1150	1000-1200	1025-1250	1050-1300	1050-1300
Source: Leslie & Caldwell (2011) Qualitative Reading Inventory – 5											

The three participants in grades 9 – 11 had Lexile scores that ranged from 459 – 832. The

2015 scores indicated that all three students were reading material well below same grade peers

range of 1000 – 1300. Based on Table 5, Student 1 Lexile score of 546 indicated a reading level

of Grade 3. Student 2 Lexile score was 459, which indicated a reading level of Grade 2 and

Student 3 Lexile score of 832 indicated a reading level of Grade 6. The Scholastic Reading

Inventory was not used for post-test assessment due to short time period between pre and post-

test. Instruction of the four-square design followed pre-assessment.

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Analysis of Pre Assessment Data

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The QRI-5 (Leslie and Caldwell, 2011) word list and expository text were used to

individually assess the three participants of the project. The highest reading level was identified

by using the word list to determine a beginning expository passage level. The student

participants read orally, were given opportunity to retell details, and answered questions about

the passage. The first phase of the QRI – 5 pretest was Word Identification.

<div align="center">

QRI-5 Pre-test Assessment Results

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Word Identification Results and Analysis – Pre Test. The 9th grade participant [student

#1], 10th grade participant [student #2], and 11th grade participant [student #3] began reading

QRI – (Leslie & Caldwell, 2011) twenty word lists orally until each reached instructional level.

The Word Identification list was used to determine the highest instructional reading level

students began reading expository passages. Word list instructional numbers indicated a

minimum of 14 words were needed to obtain instructional level. The general guidelines from the

QRI - 5 for percent of total accuracy indicated independent, instructional and frustration level of

the student reader for word list in Table 6.

Table 6: Percentage of Total Accuracy Guideline

Independent Level	18-20	90-100%
Instructional Level	14-17	70-85%
Frustration Level	below 14	below 70%
Source: Leslie & Caldwell (2011) Qualitative Reading Inventory - 5		

Accuracy Results and Analysis. Total Accuracy or correct word identification determined the independent instructional and frustration level of the reader. The total accuracy percentage was calculated by subtracting the number of miscues from the total number of words in the passage, then divide by the number of words in the passage. Student 1 scored at the highest instructional level on the level 5 word list with 15 words identified. Student 2 scored at the highest instructional level on the level 6 word list with 18 words identified. Student 3 scored at the highest instructional level on the level three word list with 14 words identified. Chart 1 showed highest number words identified of students 1, 2, and 3 based on instructional level achieved on QRI - word list.

Chart 1: Word List Identification Level Data Results and Analysis – Pre-Test
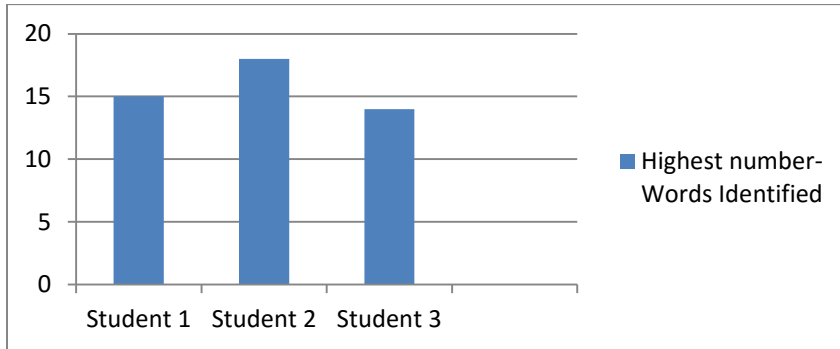
Equivalent beginning expository passage level reading was determined for each student with results from the QRI-5 word list (chart 2).

Chart 2: Equivalent Expository Reading Level and Analysis – Pre-Test
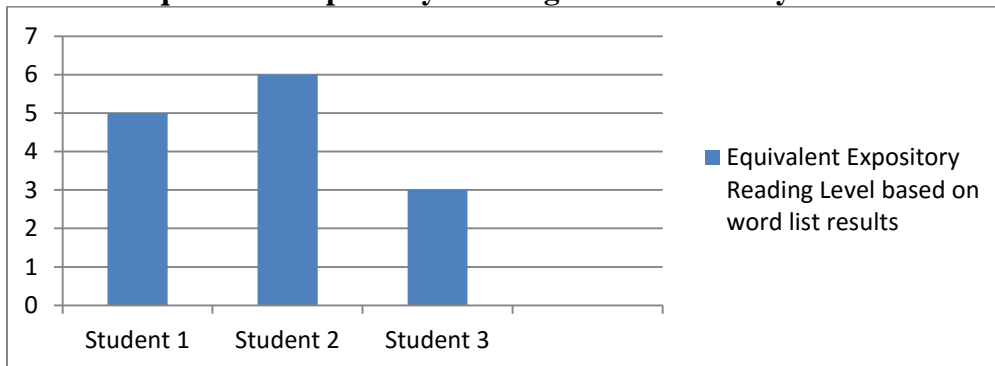
Equivalent Expository Reading Level Results and Analysis. Results indicate that equivalent expository level for students 1, 2, and 3 (chart 2) are well below same age peers. Students directed to read text above reading level displayed frustration. Unfamiliarity of topic and concept question challenged student comprehension prior to reading.

Expository Passage Concept Questions. Prior to oral reading of passages, students were prompted to answer three or four concept questions dependent on level of passage. The concept questions determined how familiar the students were with the topic of the passage. Caldwell and Leslie (2011) indicated that students who scored at least 55% of the points possible on the concepts task scores above 70% on comprehension questions on the related passage.

Chart 3 indicated familiarity of passages read during the pre-test assessment. The chart displayed data for each student from three pre-test assessments. Point values were assigned to student responses. Each question had a point value range of 0 to 3. A student score of 3 indicated student was able to provide a precise definition or definitional response to a phrase, or an answer to a question related to passage content (Leslie and Caldwell, 2011). A score of 2 indicated that the student was able to give an example of the concept (Leslie and Caldwell, 2011). A score of 1 indicated that the student was able to make a general association (Leslie and Caldwell, 2011). A score of 0 indicated the response was unconnected to topic; student gave no answer, or stated "I don't know" (Leslie and Caldwell, 2011). Concept questions had a value of 12 points. Chart 3 showed pre-test familiarity of topic prior to reading.

**Chart 3: Familiarity of Topic– Pre Test**
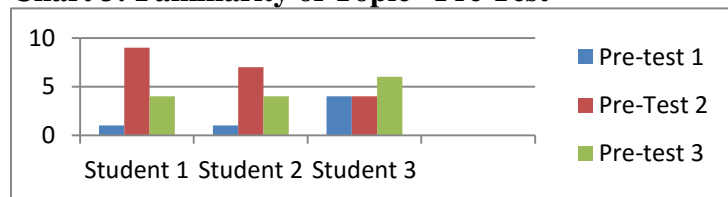
Based on 12 possible points, results of the pre-test concept questions indicated students one and two were familiar with the topic in one of the three passages asked to read. Student three received 6 or fewer points and was unfamiliar with all topics. Three pre-test concepts questions answered by Student #1 reflected scores of 1/12 (8%), 9/12 (75%), and 4/12 (33%), indicated student was familiar with one topic presented in passage reading. Three concept questions answered by Student #2 reflected scores of 1/12 (8%), 7/12 (58%), and 4/12 (33%), indicated student was familiar with one topic presented in passage reading. Three concept questions answered by Student #3 reflected scores of 4/12 (33%), 4/12 (33%), and 6/12 (50%), and indicated student was not familiar with any of the topic presented in passage reading.

Comprehension Assessment Data Results and Analysis. Based on results of concept questions asked prior to reading expository passages, two of the three students (Student #1 and Student #2) were familiar with topic of one of three passages assigned to read. Scores received from Student #3 indicated unfamiliarity with any of the three passages assigned to read. Unfamiliarity of passages assigned could result in difficulty with answering comprehension of passage reading.

Following the reading of word lists and concept questions, students were prompted to read expository passages. Based on scores from the word list, students orally read expository passages. Following each reading, students were individually directed to retell main idea and details from passage. The scoring of passage retell varied in point level based on level of reading. The number of details ranged from level one, 28 points to level six, 81 points. Student #1 read passages ranging from level five to level three. Passage Retell scores recorded from Student #1 were 8/81(9%), 8/29 (28%), and 18/57 (31%). Student # 2 read material from Upper Middle School level to level four. Passage Retell scores recorded from Student #2 were 2/62 (3%), 18/54

(33%), and 12/57 (21%). Student #3 read material from level three to level one. Passage Retell

scores recorded from Student #3 were 10/47 (21%), 7/42 (17%), and 10/28 (36%). Chart 4

indicated number of details each student was able to retell following pre-test assessment.

Chart 4: Retell of Passage – Pre-Test
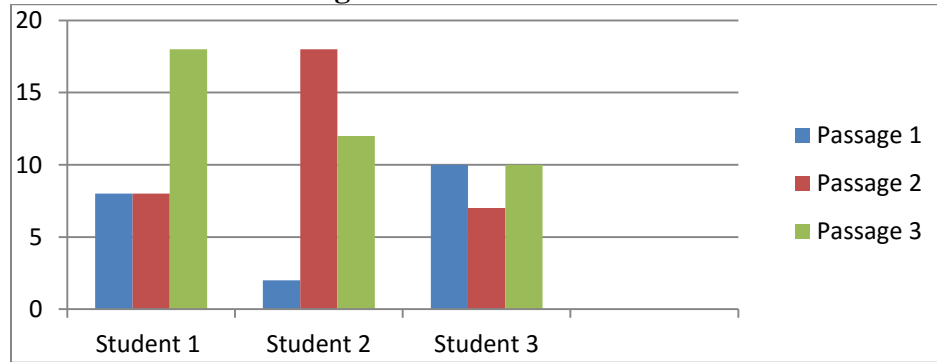
Comprehension Results and Analysis. Student scores were calculated based on the

number of ideas recalled after the passage reading. As students retold details from

setting/background, goal, events, main ideas, the researcher tallied student responses on pre-

designed Retell Score Sheet. Additional ideas and inferences students made were also included

in retell count. Total Retell detail passages points ranged from 28 (100%) in level one to

81(100%) in level six. Results from student data indicated that students had difficulty retelling

information and details in passages read. After retell, students were presented with explicit and

implicit comprehension questions.

Each expository passage contained 6 to 8 comprehension questions composed of implicit

and explicit questions. The number of implicit and explicit questions with level of passages

ranged from 3 to 4 questions. Explicit questions were questions in which students would find the

answer in the passage. Implicit questions asked students to infer the answer. The comprehension

questions were score as right or wrong and partial answers did not count. With look-backs,

students were given opportunity to add information to wrong answers. Table 7 represents

Comprehension Question Guideline with and without look-backs.

Table 7: Comprehension Question Guideline

Without Look-Backs (Total of both Explicit and Implicit)
Independent –   8 correct
Instructional – 6-7 correct
Frustration –   0-5 correct
With Look-Backs (Total of both Explicit and Implicit)
Independent-   8 correct
Instructional – 6-7 correct
Frustration –   0-5 correct
Source : Leslie & Caldwell (2011) Qualitative Reading Inventory - 5

Students were prompted to answer comprehension questions without looking back in text.

Student responses were recorded on the researcher question sheet. With responses less than 6

correct or frustration level, students were prompted to look back in the passage for more

information.

Student #1 (Table 8) began reading pretest passages at level 5 based on level of word

identification and equivalent expository reading level (Chart 1). Student #1 instructional reading

level at level 3 without look-backs was (explicit – 2, implicit – 4) and independent level with

look-backs (explicit - 4, implicit – 4). Student 1 scored 75% at the instructional level.

Table 8: Pre and Post-Test Comprehension Scores (Student 1)

Student ID	Pre-Test Level Reading	Pre-Test Comprehension Questions	Post-Test Level Reading	Post-Test Comprehension Questions
	Initial Wordlist/ Test	**Comprehension Questions**	**Test**	**Comprehension Questions**
#1	5th grade 18/20=90% Independent Level 5 Test *Farming on the Great Plains*	Without lookbacks Explicit 1 Implicit 0 **Frustration** With lookbacks Explicit 3 Implicit 2 **Frustration**	Level 5 *The Octopus* Level 4 *Early Railroads*	Without lookbacks Explicit 2 Implicit 0 **Frustration** With lookbacks Explicit 2 Implicit **Frustration** Without lookbacks Explicit 2 Implicit 0 **Frustration** With lookbacks Explicit 3 Implicit 3 **Instructional**
	Level 4 Test *The Busy Beaver*	Without lookbacks Explicit 1 Implicit 3 **Frustration** With lookbacks Explicit 4 Implicit 3 **Instructional**	Level 3 *Cats: Lions and Tigers in Your House"*	Without lookbacks Explicit 2 Implicit 4 **Instructional** With lookbacks Explicit 4 Implicit 3 **Instructional**
	Level 3 *Where Do People Live*	Without lookbacks Explicit 2 Implicit 4 Instructional With lookbacks Explicit 4 Implicit 4 Independent	Level 2 *Whales & Fish*	Without lookbacks Explicit 4 Implicit 2 **Instructional**

Pre-test Instructional Level – responses in red   Posttest Instructional Level – response in blue

Student #2 (Table 9) began reading pretest passages at level 6 based on level of word identification and equivalent expository reading level (Chart 1). Student #2 instructional reading level was at level 6 with look-backs (explicit – 4, implicit – 2). Student #2 was at frustration level with-out look backs at level 6 (explicit - 1, implicit – 1). Student #2 struggled with answering question without look-backs and was at frustration level for levels 3-6. Student #2 was at instructional level for levels 3-6 with look-backs. Student 2 scored 75% at the instructional reading level.

Table 9: Pre and Post-Test Individual Comprehension Scores (Student 2)

Student ID	Pre-Test Level Reading	Pre-Test Comprehension Questions	Post-Test Level Reading	Post-Test Comprehension Questions
Student ID	Initial Wordlist/ Test	Comprehension Questions	Test	Comprehension Questions
	Upper Middle 8/20 Frustration 6th grade 18/20 Independent Level 6 *Temperature & Humidity*	Without lookbacks Explicit 1 Implicit 1 **Frustration** With lookbacks Explicit 4 Implicit 2 **Instructional**	Level 4 Test *The Busy Beaver*	Without lookbacks Explicit 3 Implicit 3 **Instructional** With lookbacks Explicit 4 Implicit 4 **Independent**
	Level 5 *The Octopus*	Without lookbacks Explicit 3 Implicit 2 **Frustration** With lookbacks Explicit 4 Implicit 2 **Instructional**	Level 5 Test *Farming on the Great Plains*	Without lookbacks Explicit 3 Implicit 3 **Instructional** With lookbacks Explicit 4 Implicit 4 **Independent**
	Level 4 *Plant Structures for Survival*	Without lookbacks Explicit 1 Implicit 1 **Frustration** With lookbacks Explicit 3 Implicit 3 **Instructional**	Level 6 *Clouds and Precipitation* Upper Middle School *Immigration – Part 1*	Without lookbacks Explicit 3 Implicit 3 **Instructional** With lookbacks Explicit 4 Implicit 4 **Independent** Without lookbacks Explicit 1 Implicit 0 **Frustration** With lookbacks Explicit 1 Implicit 1 **Frustration**

Pre-test Instructional Level – responses in red   Posttest Instructional Level – response in blue

Student #3 (Table 10) began reading pretest passages at level 3 based on level of word identification and equivalent expository reading level (Chart 1). Student #3 independent reading level was at level 3 with look-backs (explicit – 2, implicit – 4). Student #3 frustration reading level was at level 3 without look-backs (explicit 1, implicit 4). Student 3 scored 75% at the instructional reading level.

Table 10: Pre and Post-Test Individual Comprehension Scores (Student 3)

Student ID	Pre-Test Level Reading	Pre-Test Comprehension Questions	Post-Test Level Reading	Post-Test Comprehension Questions
Student ID	☐ **Initial word Lists/Test**	**Comprehension Questions**	**Test**	**Comprehension Questions**
#3	*Level 3* *14/20* *Instructional* *Level 2* *18/20* *Independent* *Level 3* *Cats: Lions and Tigers in your Home*	*Without lookbacks* *Explicit 1* *Implicit 4* ***Frustration*** *With lookbacks* *Explicit 4* *Implicit4* ***Independent***	*Level 2* *Whales and Fish*	*Without lookbacks* *Explicit 3* *Implicit 2* ***Frustration***
	Level 2 *Seasons*	Without lookbacks Explicit 2 Implicit 2 **Frustration**	Level 3 *Where Do People Live*	Without lookbacks Explicit 2 Implicit 4 **Instructional** With lookbacks Explicit 4 Implicit 4 **Independent**
	Level 1 *The Brain and the Five Senses*	Without lookbacks Explicit 3 Implicit 3 **Independent**	Level 4 *The Busy Beaver*	Without lookbacks Explicit 2 Implicit 2 **Frustration** With lookbacks Explicit 4 Implicit 4 **Independent**

Pre-test Instructional Level – responses in red   Posttest Instructional Level – response in blue

Instructional Reading Level Data Results and Analysis. Based on the level of word

identification (chart 1), equivalent expository reading level (chart 2) and reading comprehension

table the highest reading level of the student on the QRI – 5 pretest for Student 1 was level 3.

The highest reading level for Student #2 was level 6. The highest reading level for Student #3

was level 3. Following individual pretests, results from data indicated all three students struggled

with comprehension questions when directed to respond without looking back in text. Student #1

was the only student who demonstrated instructional level comprehension of text without look-

backs at level 3.

In summary, data from the QRI – 5 provided researcher a pre-passage reading level

obtained from the word identification list. Data derived from the pre-test concept questions

indicated student familiarity of expository passages prior to reading. Retell documentation

indicated what students remembered in areas of setting/background, goal, events, and main idea.

Finally, data from comprehension questions indicated level of understanding of explicit and

implicit questions. Information gathered provided great insight prior to the introduction of the

Four Square Vocabulary Design.

Four Square Vocabulary Design Strategy

The students used *Environmental Science* textbook during the eight week intervention

strategy period. Written at a readability level of 4.0 and aligned with national standards, students

were familiar with layout of chapter (Braun & St. Antoine, 2007). Chapters were organized and

written using simple language, vocabulary was identified by bold print, and definitions were

included on side bars of text pages (Braun, & St. Antoine, 2007). Direct vocabulary instruction

was introduced in the Teacher's Edition and reinforced in context throughout (Braun & St.

Antoine, 2007).

During the eight-week intervention period, students were presented Chapter 3, *How

Living Things Interact.* Chapter 3 was divided into six lessons. Each chapter began with an

introduction to chapter, described chapter content, looked at a visual of how chapter was organized, and goals for learning.

The researcher described the purpose of the four square vocabulary design when reading science text. Students learned how the four-square vocabulary design sheets were going to be used with lessons. The researcher shared the list of vocabulary words listed in lesson one of the chapter. The four-square vocabulary design was projected on the white board in the classroom for the three students. Students were given step-by step instruction and researcher modeled how to create a four-square vocabulary design sheet. Questions were directed during modeled instruction. Researcher scheduled how students would learn the strategy. Every two week the researcher reduced the amount of time she directed work with the vocabulary design. The two-week time for each step was chosen because students met every other day. It included five sessions of practice.

During week one and week two, vocabulary words were modeled by the teacher. Students struggled with understanding what was needed in each box, so modifications were made to meet student needs. Researcher walked around room and observed student work; assistance was provided when needed. During reading of daily lesson, bolded vocabulary was highlighted. Meaning of word was discussed and researcher demonstrated how meaning could be inserted into the sentence.

During week three and four, when students needed to create a vocabulary design for the lesson, the teacher provided guided practice. During guided practice, the researcher reminded students what was needed in each box, students told her what to write. Examples could be written on the white board or newspaper print that could be hung on classroom wall. Researcher was slowly working toward student independence using four-square vocabulary design.

During week five and six, researcher directed creating vocabulary design with paired practice. Because there were only three students in the study, researcher worked with one student. This allowed researcher opportunity to assess individual skill level. Each session during paired practice, the researcher worked with a different student.

During the last two weeks of the intervention period, weeks seven and eight, the teacher had independent practice for students. By week seven, all students understood the four-square vocabulary design. What caused the greatest challenge was how to fill it in. Students were not very confident of individual skills.

Throughout the eight-week strategy intervention period, understanding vocabulary in science text was the main focus. Warm-up activities provided students with opportunities to review the words. The students liked matching definition with words and pulling a vocabulary word out of a fish bowl and drawing a picture that reminded them of the word, similar to Pictionary.

One to two sections of a lesson were read during each session. The researcher focused on vocabulary, comprehension of text, modeled what she was thinking, and asked "W" questions, who, what, when, where, why, and how. Researcher wanted students to practice thinking about text and meaning during each lesson. Worksheets and reviews were given to practice skills. If time allowed, students reviewed key vocabulary at the end of the session though "exit" slips. Students may be asked what a word means, what it looks like, or something they learned about the vocabulary word in class. Exit activities were sometimes difficult. Students who process information slower, needed more time to process. Others quickly wrote something down so they could leave. During the eight-week strategy intervention period researcher collected worksheets and reviews to check for understanding, but did not use the information gathered in the research

report. When concepts were difficult to understand on assigned work, students and researcher worked through the sheet together.

At the conclusion of the eight week intervention, the researcher re-administered the Qualitative Reading Inventory, QRI-5, (Leslie & Caldwell, 2011) and reassessed reading levels.

Pre and Post Assessment Comparative Analysis

The post-test was used to assess individual growth of three participants following the eight-week intervention period using the Four Square Vocabulary Design. Each chart and table demonstrates a comparative subtest analysis. Chart 5 shows word identification comparative analysis. Chart 6 shows Concept questions comparative analysis. Chart 7 shows concept questions comparative analysis. Finally, chart 8 shows retell of passage comparative analysis.

QRI-5 Post-Test Assessment Results

The Qualitative Reading Inventory, QRI – 5, post- assessment was used to document growth based on the Four Square Vocabulary Design Strategy intervention. A comparative analysis of the QRI – pre-test and post-test are presented.

Word Identification Comparative Analysis. The results of the word identification pre and post-tests (chart 5) indicated after the 20 session intervention period word identification for Student #1 did not show any growth or increase from pre-test (15) to post-test (15). There was a one point decrease in score for Student 2 of pre-test (18) to post-test (17). However, Student #3 read one more word at the instructional level on the word list (pre-test 14, post-test 15). This indicated an increase of one point from pre-test (14) to post-test (15).

Chart 5: Word List Identification Level Comparative Analysis – Pre and Post-Test
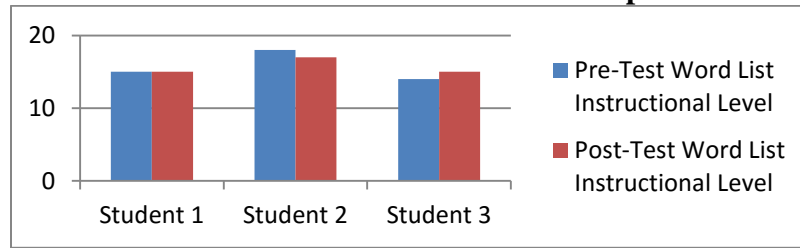
Collectively, the pre-test mean score for word identification was 16 and the post-test

score for word identification was 16. The average Word Identification did not increase or

decrease. This is a 0% change in scores. In comparison to individual scores to mean scores of

pre-test, Student #1score of 15 was 1 point below the mean score of. Student #2 score of 18 was

2 points above the mean score of 16. Finally, student #3 score of 14 was 2 points below the mean

score.

In comparison to individual scores of mean scores of post-test, Student #1 score of 15

was 1 point below the mean score of 16. Student #2 score of 17 was 1 point above the mean

score of 16. Student #3 score of 15 was -2 points below the mean score of 16. Results indicated

that the variance in -1 to +2 points above or below the mean of 16. Pre and post-test scores of

Student #1 and #3 had scores below the mean of 16, indicating a decrease. Student #2 had both

scores above the mean of 16, indicating an increase. The median scores of the Word

Identification level pre-test (15) and the post-test (15) indicate no increase or decrease. This is a

0% change in scores.

Concept Questions Comparative Analysis. Concept questions asked during pre-test and

post-test session's determined prior knowledge of topic presented. During post-test assessment,

students were asked concept questions when presented with new expository reading passages.

Results of post-test assessment are found in Table 6.

Chart 6: Concept Questions – Post-Test
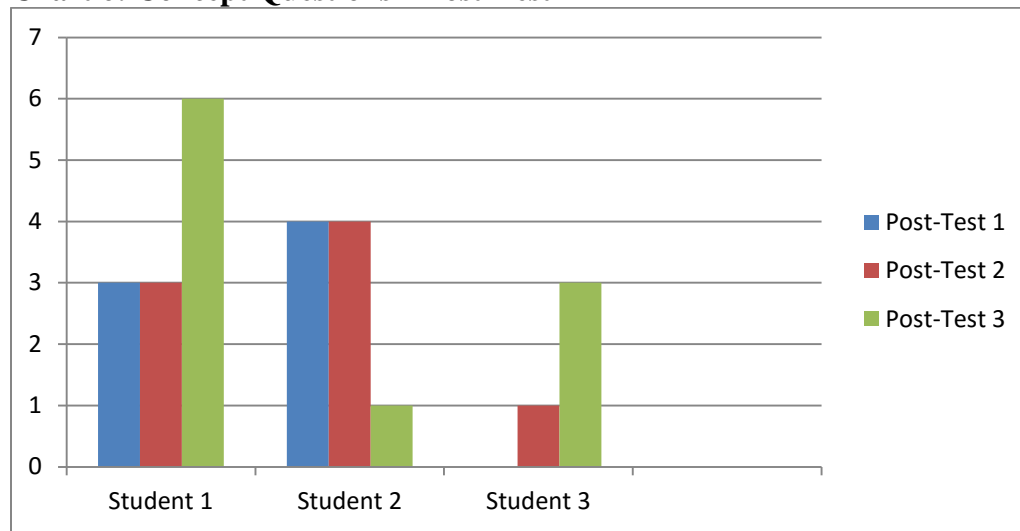
Based on individual student results listed in chart 6, all three students were unfamiliar with all of the passages required to read during post-test assessment. Comparison of Concept Questions from pre and post-tests (chart 7) indicated after the 20 session intervention period, students possessed less knowledge of topics asked to read during post-assessment.

Chart 7: Concept Questions Comparative Analysis – Pre and Post-Test
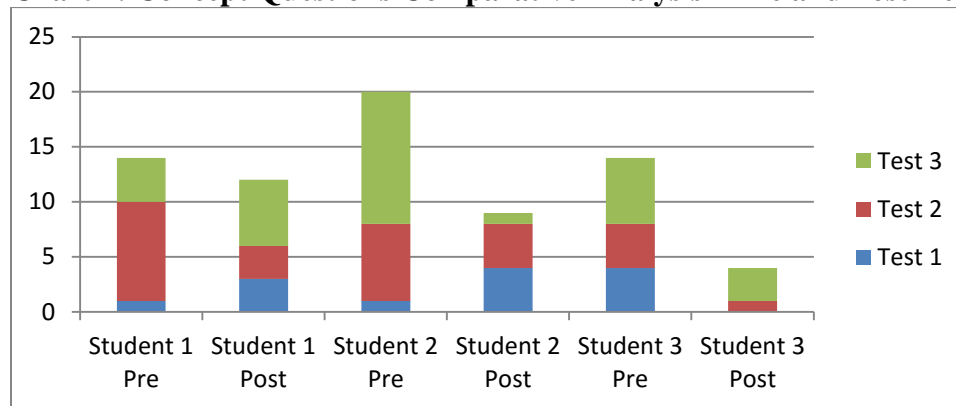
Comprehension Questions Comparative Analysis - Pre and Post-Test. Based on a twelve point scale, and individual comparison of pre-test concept questions, indicated Student #1 reflected scores of 1/12 (8%), 9/12 (75%), and 4/12 (33%), indicated student was familiar with

one topic presented in passage reading. Three concept questions answered by Student #2 reflected scores of 1/12 (8%), 7/12 (58%), and 4/12 (33%), indicated student was familiar with one topic presented in passage reading. Three concept questions answered by Student #3 reflected scores of 4/12 (33%), 4/12 (33%), and 6/12 (50%), and indicated student was not familiar with any of the topic presented in passage reading. Analyzing pre-test scores, the mean score was 5 is equivalent to 44%. The median pre-test score was 4.

Individual comparison of post-test concept questions, indicated Student #1 reflected scores of 3/12 (25%), 3/12 (25%), and 6/12 (50%), indicated student was not familiar with topics presented in post passage reading. Concept questions answered by Student #2 reflected scores of 4/12 (33%), 4/12 (33%), and 1/12 (8%), indicated student was not familiar with topics presented in post passage reading. Concept questions answered by Student #3 reflected scores of 0/12 (0%), 1/12 (8%), and 3/12 (25%), and indicated student was not familiar with any of the topic presented in passage reading. Analyzing post-test scores, the mean score was 3, is equivalent to 23%. The median pre-test score was 3. From the comparison of pre and post-test assessment, the researcher determined that all three students were presented with material in which they did not possess significant background knowledge. Following word identification level and concept question post-test assessment, students were prompted to individually read the leveled passages.

The concept questions scores decreased from pre-test (42%) to post-test (25%) and the average concept question decreased by 2 points. This shows that the average scores decreased slightly. The median score of the pre-test (4) and the post-test (3) decreased by 1 point. The standard deviation for word identification for Word Identification is higher for the pre-test (2.23) than the post-test (1.73), which indicated that the scores are closer around from the means. The introduction of the strategy decreased mean scores.

Passage Retelling Comparative Analysis. After the student completed the required expository reading passage, students were directed to retell details from setting/background, goal, events, and main ideas. The researcher tallied student responses on pre-designed Retell Score Sheet. Additional ideas and inferences students made were also included in retell count.

Scoring of passage retell varied in point level based on each leveled reading. The number of details retold from pre-test data ranged from level one, 42 points to level six, 81 points. Student #1 read passages ranging from level five to level three. Passage Retell scores recorded from Student #1 were 8/81(10%), 8/29 (27%), and 18/57 (32%). Student # 2 read material from level six to level four. Passage Retell scores recorded from Student #2 were 12/57 (21%), 18/54 (33%), and 2/62 (3%). Student #3 read material from level four to level two. Passage Retell scores recorded from Student #3 were 10/47 (%), 7/42(16%), and 10/28 (36%). All three students shared greater than 10 details in at least two passages.

The number of details retold from post-test data ranged from level one, 47 points to level six, 89 points. Student #1 read passages ranging from level five to level three. Passage Retell scores recorded from Student #1 were 13/57(23%), 7/47 (15%), and 17/49 (35%). Student # 2 read material from level six to level four. Passage Retell scores recorded from Student #2 were 12/57 (21%), 7/81 (9%), and 18/89 (20%). Student #3 read material from level four to level two. Passage Retell scores recorded from Student #3 were 11/49 (22%), 13/51(25%), and 8/49 (16%). All three students shared greater than 10 details in at least two passages. Chart 8 listed comparative analysis of pre and post-test assessment of retell of passages.

Chart 8: Retell of Passage Comparative Analysis
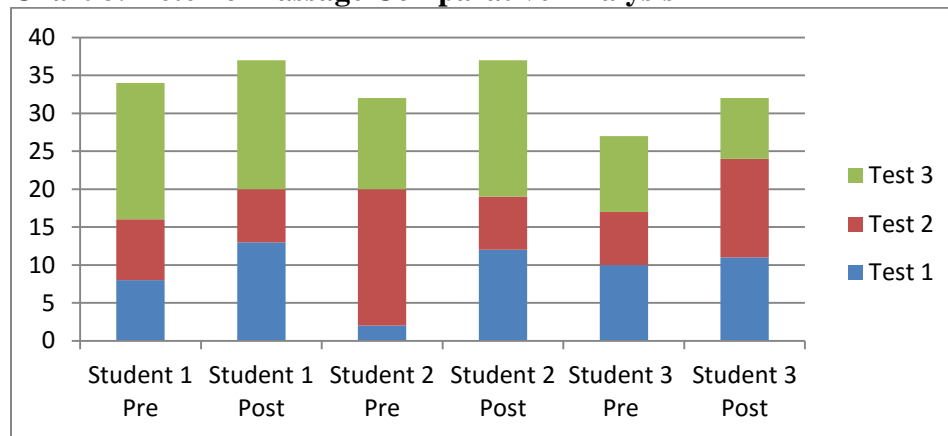
Retell of Passage Comparative Analysis. Pre-assessment data scores from nine passage reading indicated students retold 2 – 18 details. Median score was 10. Individual pretest scores 2, 7, 8, 8, 10, 10, 12, 18, 18 combined to total 93 details recalled. Average mean was 10.3 or 10.

Post-test assessment data scores from nine passage readings indicated students retold 7 – 18. The median score was 12. Individual scores of 13, 7, 17, 7,12,18,11, 13, and 8 combined to total 106 details. Average mean was11.7 or 12. Data indicated all three students struggled with retell of passages in in pre and post-test assessments. There was no increase or decrease in total number of details retold in pre and post-test assessment, There was a mean increase of 2 in the post test. The final post-test assessments were explicit and implicit comprehension questions The Retell of Passage Scores increased from pre-test (20%) to post-test (23%). The average concept question increased by 2 points; this shows the average scores increased slightly. The median scores of the pre-test (10) and post-test (12) increased by (.83) of a point. The standard deviation for Retell of Passage is higher for the pre-test (4.89) than the post-test (3.74), which indicated that the scores are closer around from the means. The introduction of the strategy decreased means scores.

Comprehensive Question Comparative Analysis. Students were assessed reading explicit and implicit comprehension questions from expository text. Three expository text passages were found at each level so students did not read same material during pre and post-test assessment. Pretest information found in Tables 8 – 10 indicated detailed results from all passage comprehension questions.

Pre-test scoring of comprehension questions was based on total correct of explicit and implicit questions asked for individual students (Table 11). At level 4 and without look-backs, Student #1 answered 4/8 (50%) indicating frustration level. At level 4 with look-backs, Student #1 answered 7/8 (88%) indicating instructional level. At level 6 and without look-backs, Student #2 answered 2/8 (25%) indicating frustration level. At level six with look-backs, Student #2 answered 6/8 (75%) indicating instructional level. At level three and without look-backs, Student #3 answered 5/8 (63%) indicating frustration level. At level three with look-backs, Student #3 answered 8/8 (100%) indicating independent level.

Post-test scoring of comprehension questions was based on total correct of explicit and implicit questions asked for individual students (Table 11). At level 4 and without look-backs, Student #1 answered 2/8 (25%) indicating frustration level. At level 4 with look-backs, Student #1 answered 6/8 (75%) indicating instructional level. At level 6 and without look-backs, Student #2 answered 6/8 (85%) indicating instructional level. At level six with look-backs, Student #2 answered 7/8 (88%) indicating instructional level. At level three and without look-backs, Student #3 answered 6/8 (75%) indicating instructional level. At level three with look-backs, Student #3 answered 8/8 (100%) indicating independent level. Data in Table 11 compared highest instructional level students obtained from pre and post-test assessments with and without look-backs. A score total of 6-7 obtained indicates instructional level (Table 7).

Table 11: Pretest and Posttest Growth in Grade Level

Participant Number	Pretest		Posttest	
#1 (Level 4)	**Without Lookbacks**		**Without Lookbacks**	
	Explicit - 1	Implicit - 3	Explicit -2	Implicit - 0
	With Lookbacks		**With Lookbacks**	
	Explicit - 4	Implicit - 3	Explicit – 3	Implicit - 3
#2 (Level 6)	**Without Lookbacks**		**Without Lookbacks**	
	Explicit - 1	Implicit -1	Explicit -3	Implicit - 3
	With Lookbacks		**With Lookbacks**	
	Explicit - 4	Implicit - 2	Explicit – 4	Implicit - 3
#3 (Level 3)	**Without Lookbacks**		**Without Lookbacks**	
	Explicit - 1	Implicit - 4	Explicit -2	Implicit - 4
	With Lookbacks		**With Lookbacks**	
	Explicit - 4	Implicit - 4	Explicit – 4	Implicit - 4

Frustration = green   Instructional = blue   Independent = red

Pre-test assessment data scores from individual leveled reading passages indicated students scored 32/48 points with explicit and implicit questions. Median score was 5.5. Individual pretest scores 2, 4, 5, 6, 7, 8 combined to total 32 explicit/implicit questions answered correctly. Average mean was 5, frustration level.

Post-test assessment data scores from individual leveled reading passages indicated students scored 35/48 points with explicit and implicit questions. Median score was 6. Individual pretest scores 2, 6, 6, 6, 7, 8 combined to total 32 explicit/implicit questions answered correctly. Average mean was 6, instructional level.

Instructional Reading Level Comparative Analysis. Pre-test scores indicated student #1 was unable to comprehend expository text at the instructional level without look-backs at level 4. Student #1 demonstrated ability to comprehend text at instructional level with look-backs at level 4 and scored 7 by answering 4 explicit and 3 implicit questions. Pre-test scores indicated student #2 was unable to comprehend expository text at the instructional level without look-backs at level 6. Student #2 demonstrated ability to comprehend text at instructional level with look-backs at level and scored 6 by answering 4 explicit and implicit questions. Pre-test scores

indicated student #3 was unable to comprehend expository text at the instructional level without look-backs at level 3. Student #3 demonstrated ability to comprehend text at independent level with look-backs at level 3 and scored 8 by answering 4 explicit and 4 implicit questions.

Post-test scores indicated student #1 was unable to comprehend expository text at the instructional level without look-backs at level 4. Student #1 demonstrated ability to comprehend text at instructional level with look-backs at level 4 and scored 6 by answering 3 explicit and 3 implicit questions. Post-test scores indicated student #2 was able to comprehend expository text at the instructional level without look-backs at level 6. Student #2 demonstrated ability to comprehend text at instructional level with look-backs at level 6 and scored 7 by answering 4 explicit and 3 implicit questions. Post-test scores indicated student #3 was able to comprehend expository text at the instructional level without look-backs at level 3. Student #3 demonstrated ability to comprehend text at independent level with look-backs at level 3 and scored 6 by answering 4 explicit and 4 implicit questions.

Student #1 did not show improvement of reading level after the 8 week Four-Square Vocabulary Design Intervention at level 4. When pre and post-test responses without look-backs were compared, student #1 had four correct pre-assessment responses and 2 correct post-test responses. With look-backs, Student #1 had 7 pre-assessment responses and 6 correct post-test responses. Correct responses decreased between pre and post-test assessment for Student #1.

Student #2 did not show improvement of reading level after the 8 week Four-Square Vocabulary Design Intervention at level 6. When pre and post-test responses without look-backs were compared, student #2 had 2 correct pre-assessment responses and 6 correct post-test responses. With look-backs, Student #2 had 6 pre-assessment responses and 7 correct post-test responses. Correct responses increased between pre and post-test assessment for Student #2.

Student #3 did not show improvement of reading level after the 8 week Four-Square Vocabulary Design Intervention at level 3. When pre and post-test responses without look-backs were compared, student #2 had 5 correct pre-assessment responses and 6 correct post-test responses. With look-backs, Student #3 had 8 pre-assessment responses and 8 correct post-test responses. Correct responses increased between pre and post-test assessment for Student #3.

Data indicated all three students struggled with concept questions in pre and post-test assessments. There was an increase in total number of explicit and implicit questions answered in pre and post-test assessment. There was a mean increase of 1 in the post test. Comprehension Question Scores increased from pre-test (67%) to post-test (73%). The median scores of the pre-test (5.5) and post-test (6) increased by (.92) of a point. The standard deviation for Comprehension is lower pre-test (o.81) than post-test (0.84), which indicated that the scores are farther from the means. The introduction of the strategy decreased means scores.

Data indicated no growth in reading level for each participant after the 8 week strategy instruction period. The researcher observed a decrease in pre and post-test scores for Student #1 with and without look-backs. Reading level did not change for Students #2 and #3. The researcher observed an increase in both pre and post-test scores with and without look-backs indicating student responded better to compression questions at the end of the intervention.

Conclusion

The purpose of the study was to assess if using a Four-Square Vocabulary Design Intervention Strategy would improve reading comprehension of special education students when presented with expository text. The presentation of data was collected in four sections. Section #1 provided information on the Scholastic Reading Inventory (SRI). The computer based inventory gave the researcher a Lexile score used to determine the starting point for each student

on the Qualitative Reading Inventory (QRI-5). Section two focused on Pre-assessment data

obtained from the Qualitative Reading Inventory (QRI-5). Data was collected from individual

assessments on word list identification, concept questions, retell, and explicit and implicit

comprehension questions. Student reading level was achieved when responses to questions were

at instructional level. Section three focused on the Four-Square Vocabulary Design Intervention

Strategy. During the 8 week intervention, the researcher instructed and modeled how to create a

four-square vocabulary design sheet. The researcher guided students through each lesson,

rereading, modeling, and asking pertinent comprehension questions. Students practiced and

reinforced skills through creation of four-square vocabulary design, warm-up activities, post

lesson activities, and lesson reviews. Section 4, brought all data collected from pre and post

assessments and researcher reported findings based on that data. Next, chapter 5 will provide a

discussion of the results related to the review of the literature, strengths and limitations of the

study as well as recommendations for future research.

CHAPTER FIVE

FINDINGS AND IMPLICATIONS

Special education students struggle in content area classes when presented with text that is written above current reading level. One reason special education students struggle in math, social studies, or science is text is written in a distant or uninviting tone, is complex, impersonal, and in formal academic language (Buehl, 2011). Academic language is more difficult than informal language found in narrative structures (Buehl, 2011). When reading text in one of those domains, readers must learn to read and think like a mathematician, historian, or scientist. For special education students, this is difficult. A second reason special education students struggle is vocabulary in academic text. Many of the words are difficult to pronounce and context clues in sentences do not help with understanding word meaning. The researcher chose to use a strategy to understand vocabulary in expository science text as the topic for research.

Instructional strategies are tied to curriculum, desired students outcome, and classroom assessments (Jetton & Shanahan, 2012). Strategies are used and taught based on student needs, interests, and to enhance learning (Jetton & Shanahan, 2012). Strategies are used in reading and writing to help students understand a process or procedure when they are struggling or meaning breaks down. Because vocabulary knowledge is critical to reading comprehension, it is important that those working with readers help foster their development of a large word bank and effective vocabulary learning strategies. There are several explicit (intentional, planned instruction) and implicit (spontaneous instruction as a student comers to new words in a text) that adults can employ with readers of any age.

Once teachers have identified specific student's needs, they research to find a strategy that will be explicitly taught. In the classroom setting, teachers first explain what the strategy is

and how it will be used. Next, the teacher models the strategy for the student. Student are given opportunities to practice the strategy with guidance from the teacher. Over time, the teacher backs away and students become independent with the strategy.

The instructional strategy used in this study to improve reading comprehension of expository science text was the Four-Square Vocabulary Design Strategy. As the title implies, the four-square method involves a student drawing a box and dividing that box into four, even square. The first square should be labeled (at the top) "vocabulary word, the next square "definition", the third square "drawing", and finally, the fourth square is labeled "sentence.

This technique was used for the most difficult science words. Student only use this method on three or four words per chapter list. This method is used sparingly because student will tire and create sloppy work if they are to create fifty-four squares for their list for their list of fifty words. This strategy was used to reinforcement and to shake up the traditional modes of teaching vocabulary.

This study examined the effect of a vocabulary strategy to improve student comprehension. The hypothesis for the study was the four-square vocabulary design, when presented with difficult expository science text, would improve student reading comprehension. The null hypothesis states there was no significant difference in the vocabulary development of high school special education students. Next, presented are the results of this study.

The purpose of this action research was to determine if using a vocabulary strategy in science text would improve reading comprehension of high school special education students in a Midwestern high school. This chapter will synthesize the results of the QRI – 5 from the study, connections to research, strengths and limitations, and recommendations for future research.

Explanations of Results

Three students participated in a pull-out Science class outside of the general education setting. Current expository science text used in class contained difficult vocabulary words and concepts. The researcher identified importance of vocabulary instruction when lessons were presented.

Every other day for eight weeks, students met with researcher during 85-minute sessions. Session consisted of instruction of how to use the Four-Square Vocabulary Design Intervention strategy with difficult science vocabulary. After the initial session, the researcher assessed the use of the Four-Square Vocabulary Design. Two of the students demonstrated difficulty with pace of writing task. All three struggled with independently creating examples and non-examples. Two modified versions were created; the only difference included fill-in-the blank opportunity. Observations from the second session determined that the modified vocabulary designs better met the needs of the students. Understanding vocabulary was only the first component of comprehending science text. The second was reading lesson text.

Researcher modeled reading of text for students. Breaks were incorporated in reading to demonstrate how the meaning of the vocabulary word could be inserted in the sentence and done this way, the sentence was easy to read and comprehend. Breaks were also incorporated throughout the lesson to check understanding using who, what, when, where, why, and how questions. Researcher wanted students to think about the reading as they navigated text.

Upon completion of text reading/lesson, researcher informally assessed student comprehension through discussion of material read. Students practiced understanding of text through warm-up activities, review of vocabulary words, lesson worksheets, and lesson reviews. A formal schedule was not set at the beginning of the research project in regard to what was to

be completed each day. The researcher continued to assess student needs and navigated through each lesson incorporating four-square vocabulary design. A general schedule looked like this: creation of Four-Square vocabulary Design, warm-up activity, and lesson read with discussion questions asked throughout, review of lesson, and practice opportunities with worksheets and reviews.

Expository Passages. Students were presented expository passages from the QRI-5 (Leslie & Caldwell, 2011). Tested individually, each student began reading passages at the level determined by the word identification list. Expository passages were used to determine student's frustration, instructional, or independent comprehension level, assess ability to read expository text, to comprehend in different modes, and ability to locate missing or incorrect material with look-backs (Leslie & Caldwell, 2011).

The analysis of the QRI – (Leslie & Caldwell, 2011) subtests determined if the use of the four square vocabulary design improved reading level of special education students. The null hypothesis states there was no significant difference in the vocabulary development of high school special education students. The subtests were word identification, concept questions, retell, and comprehension. Here are the results of the analysis.

Word Identification Level. Results from the Qualitative Reading Inventory – 5 (QRI - 5), pre and post-test assessments of word identification after the eight week intervention period, indicated that Student # 1 did not increase or decrease in number of words (15) recognized at level five. Student #2 identified one less word after the eight week intervention period (pre-test 17, post-test 16) at level six. Student #3 identified one more word after the eight week intervention period (pre-test 14, post-test 15). Researcher found it interesting that one student had an increase in score, one had a decrease in score, and one score stayed the same from pre and

post-test. It is the opinion of the researcher that if the focus was on phonetics, the outcome would

be different in word identification level. The researcher assessed that the ability to read more or

less words may have affected the project. The project was based on understanding meaning of

vocabulary found in expository text, but if words were not identified correctly, students could

perceive the word to be a different word and have different meaning. The finding from the QRI –

5 (Leslie & Caldwell, 2011) indicated identification of words was difficult.

Concept Questions. Concept questions were asked prior to reading expository leveled

passages in the Qualitative Reading Inventory – 5, (QRI – 5) before the intervention period

began and at the end of the eight week intervention strategy. Concept questions indicated

familiarity of passages prior to reading. Concept questions were asked to students individually

based on results from word list identification assessment.

Results from the Qualitative Reading Inventory – 5 (QRI -5), pre and post-test

assessments of concept questions after the eight week intervention period, indicated that Student

1 was familiar with one topic prior to reading during pre-assessment. Student #1 scored 9/12

points, (75%), which indicated familiarity. Student #1 scored 6/12, (50%) on post-test

assessment of concept questions, indicating unfamiliarity of topic.

Student #1 was familiar with one topic prior to reading during pre-assessment.

Student #1 scored 6/12 points, (50%), which indicated somewhat familiarity of topic. Student #2

scored 7/12, 58% on post-test assessment of concept questions, indicating familiarity of topic.

Finally, Student # 3 score of 6/12 (50%) indicated somewhat familiar with topic prior to reading

during pre-assessment. Student #3 scored 9/12 points, (75%), which indicated familiarity.

Student #3 scored 3/12, (25%) on post-test assessment of concept questions, indicating

unfamiliarity of topic.

Results of the pre and post-test concept questions indicated that all three students were presented with reading passages in which they did not possess significant background knowledge. Students were instructed to read expository text leveled passages and began at the level at which each student reached instructional level with word identification. What this meant for the project was that students were not familiar with the content in the passages they were given to read. The researcher assessed the importance of introducing background knowledge prior to reading content that is unfamiliar. The *Environmental Science* text that was used in the study provided the researcher with background information that was shared at the beginning of each lesson during the study. Although background knowledge was presented to the students during the eight week study, background information isn't in the Qualitative Reading Inventory. The researcher concluded that background knowledge is important in reading comprehension.

Reading Comprehension

In addition to using the QRI -5 to assess word identification and concept questions in expository passages, it was used to determine reading comprehension levels. The reading comprehension levels were retelling passages and comprehension with and without look-backs.

Retelling Passage. Students were prompted to orally read expository passages. Retell of passage followed individual readings. The scoring of passage retell varied based on level of reading. Number of details ranged from lowest 28 at level one to highest, 81, at level six. As students shared details, the researcher tallied responses on the retell sheet. Student #1 pre assessment passages were level three to five. Range of retail responses were 8 (9%) to 18 (31%). Student #2 pre assessment passages were Upper Middle School to Level Four. Range of responses were 2 (3%) to 18 (33%). Student #3 assessment passages were level three to level one. Range of responses were 7 (17%) to 10 (36%).

Followed by the eight week intervention, Student #1 post-test retell passages were from level five to three. Range of responses were 7 (15%) to 17 (35%). Student #2 post-test passages were from level six to level four. Range of responses were 7 (9%) to 18 (20%). Student #3 post-test retell passages were from level four to level two. Range of responses were 11(22%) to 13(25%). All three students were able to share at least 10 details in from one passage read from setting/background, goal, events, details, and main ideas. Number of details shared indicated all three students struggled with retell of passage. What this means for the project was the importance of working with students to think about reading when they are reading especially when it is difficult text or text that is unfamiliar. This could easily be done with asking "W" questions, who, what, when, where, why, and how, or use of text code strategy. I think that the four-square vocabulary design did not affect reading comprehension. While it may have helped with understanding meaning of difficult vocabulary, it did not improve student ability to retell what was read.

Comprehension with and without Look-Backs. Each student began passage readings determined by word list identification. Following each passage reading, students answered explicit and implicit questions without look-backs. Based on responses, students were directed to look back in the passage to find more information to answer questions students struggled with. Student #1 pre-test comprehension without look-backs (explicit – 2, implicit – 4, 75%) and post-test without look-backs (explicit – 2, implicit – 4, 75%), showed no change in pre and post-test without look-backs.

Student #2 pre-test comprehension without look-backs (explicit – 1, implicit – 1, 25%) and post-test without look-backs (explicit 3, implicit – 3, 75%), showed growth, (+ 2 explicit and + 2 implicit, 50%) in answering questions without look-backs after the eight week period.

Student #3 pre-test without look-backs (explicit – 1, implicit – 4, 63%) and post-test without look-backs (explicit – 2, implicit – 4, 75%), showed growth (+ 1 explicit, 25%) in answering questions with without look-backs after the eight week period.

None of the students increased reading level following the eight week intervention period. Without look-backs, there was no change between pre and post-test assessment for student #1. Student # 2 increased the number of explicit and implicit answers without look-backs after the eight week intervention. Finally, student # 3 increased explicit questions by one and decreased implicit questions by three from pre to post-test assessment. What this means for the project is students struggled slightly without look-backs. The four-square vocabulary design used during the study did not improve the comprehension of the three students.

Student # 1 pre-test with look-backs (explicit - 4, implicit – 4, 100%) and post-test with look-backs (explicit – 4, implicit 3, 75%), showed that student # 1 struggled with implicit questions during the post-test assessment (-1, 25%).

Student # 2 pre-test with look-backs (explicit – 4, implicit – 2, 75%) and post-test with look-backs (explicit – 4, implicit – 4, 100%), showed growth in ability to infer questions with look-backs (+ 2, 50%), from pre to post-test assessment.

Student # 3 pre-test with look-backs (explicit – 4, implicit – 4) and post-test with look-backs (explicit – 4, implicit – 4, 100%), showed no change in growth with look-backs from pre to post-test assessment.

None of the three students increased reading level following the eight week intervention period. All three students struggled with implicit questions which had them infer answer. After the eight week intervention period, there was no increase in reading level in the three students. The researcher did observe that all three increased scores in comprehension of expository and

implicit questions after the eight week intervention period. What this means for the project is that

the students increased ability to utilize the text to look and find answers to explicit questions.

Two of the three students were able to infer more information after the eight week period.

Although, all three showed growth in comprehension with and without look-backs, level of

comprehension did not increase. The four-square vocabulary design did not have an effect on

reading comprehension.

After analyzing the QRI – 5 pre and post-test assessment for comprehension with and

without look-backs, the four-square vocabulary design did not support the strategy used during

the eight week period. While the intervention strategy did not increase the reading level of the

three students, it may have added to the increase in ability to answer explicit and implicit

questions with and without look-backs. Overall, the researcher felt the use of the QRI – 5 did not

have a positive effect on the reading comprehension of the three students. Some growth was

indicated in comprehension with and without look-backs, but it was not significant.

Connections to Research

Involved in teaching special education students in pull-out classes in English and Science

on a daily basis, the researcher wanted to find a strategy that would improve reading

comprehension of expository text. Prior to beginning the research project, the researcher read

studies that focused on improving student reading through technology, instructional adaptations,

and content vocabulary. After assessing individual skills, cost, and time needed to learn the

strategy, the researcher chose a research project that included a simple instructional adaptation,

the Four-Square Vocabulary Design. This strategy did not directly mirror any of the studies read

and or reflected in chapter 2 Literature Review, but focused on vocabulary, reading, and

comprehension through use of technology, instructional adaptations, and content vocabulary.

The researcher chose to focus on content vocabulary and comprehension. This was similar to the study completed by Horn and Feng (2012). Like the researcher, Horn and Feng (2012) used direct instruction in the classroom and engaged students in understanding meaning of vocabulary, identifying meaning in context, and story comprehension. Before onset of intervention, lexiles were gathered to determine level of reading. During intervention, students were provided with direct instruction.

In addition to direct instruction offered by Horn and Feng (2012) and the researcher, Bhatti (2013) compared direct instruction versus computer-assisted technology in responding to literal, inferential, and evaluative questions. The studies varied from 4 weeks to one year in length. In the studies done by Horn and Feng (2012) and the researcher, there was little change in performance at the end of the study. Bhatti's (2013) study lasted one year and showed a different outcome. Students who utilized computer instruction improved 35% more than those with direct instruction. The researcher came to two conclusions. The first, the length of time may have a positive effect on results. And secondly, technology with multiple modalities can affect learning in a positive way. Reading level was used to identify student level of reading prior to the intervention period.

The researcher based results of the four-square vocabulary design intervention strategy on pre and post-tests using the Qualitative Reading Inventory, QRI – 5, (Leslie & Caldwell, 2011) to assess level of reading at the instructional level. Jerome and Barbetta (2013) individually tested students using parts of the Wechsler Individual Achievement Test before beginning the study using computer assisted technology. And Calhoun (2005) utilized the Woodcock-Johnson – III to assess reading of participants before engagement of a peer-mediated

approach to phonological skills and reading comprehension with middle school students. Some researchers chose to measure growth through student response time.

Two of the studies related to response time utilizing timed probes to assess responses, fluency, and writing words. Constant Time Delay, used in the study published by Keel, Slaton, and Blackhurst (2001) had timed probes for acquisition of content vocabulary and teaching spelling. Ross and Stevens (2003) also used Constant Time Delay to teach spelling of spelling words found in grade level social studies text. While the studies of Keel, Slaton, and Blackhurst (2001) and Ross and Stevens (2003) were directly related to one another, the researcher's connection was through correct/incorrect responses and fluency. The research concluded that both are important in comprehension of expository text. In addition to direct or indirect instruction, level of student reading (determined by pre-tests), and response time, a fourth connection of the study to literature review is through strategies used to improve reading comprehension.

In order to comprehend text, readers must possess the ability to understand difficult vocabulary, comprehend through self- questions, text code strategy, retell, and infer meaning. The researcher's work did not mirror the strategies listed above in the study, but utilized many during direct instruction of lessons during the intervention period. Readers must make meaning of difficult vocabulary words in order to comprehend text, which was the focus of using the four-square design. It takes more to comprehend text than vocabulary. It takes self-questioning (Williamson, Dunn, Hinshaw, and Nelson, 2008) and text-coding Bakken, Mastroppieri, and Scruggs (2008) when navigating expository text. This includes making predictions, connections, and asking "W" questions, who, what, when, where, why, and how when reading. Story mapping (Stetter and Hughes, 2011) and use of tools such as K-W-L and simple web (Parker, 2006) helps

students organize text, remember details, and is a means to record information that can be used at a later time. At the completion of a reading passage, students should be able to retell details (Gonzalez, 2014) of what they have read which prompts them to think about reading as they are reading. With all of these strategies practiced and in place, it is important to "think outside of the box", a higher order of thinking, which is achieved through creating meaning from clues, known as an inference strategy (Fritschmann, Deschler, and Schumaker, 2006). Each one of the research articles read in chapter 2 was not replicated in the researchers study, but invaluable components were used before, during, and after the four week study.

The author hypothesized that utilizing a four square vocabulary box when presented with difficult expository (science) text would improve student reading comprehension following instruction. When data was analyzed, the researcher concluded after the eight week intervention, pre and posttest scores, reading comprehension did not increase with the use of a four-square vocabulary design. The researcher noted that even though the reading levels did not increase, students showed improvement in comprehension questions.

One reason for no improvement could have been that even though the instructor attempted to increase comprehension through teaching and reinforcing vocabulary in expository text, unfamiliarity of subject and background knowledge could have affected student comprehension. A second reason is that while the researcher focused on vocabulary, additional strategies were not incorporated to aid in understanding meaning found in complex sentences that contained difficult or unfamiliar vocabulary. Finally, the researcher believed that given more time, student reading levels could have increased, even slightly. Even though the results of the study were not what the researcher wanted, there were some strengths and limitations to the study.

Strengths and Limitations

The strengths of the study were in the area of assessment tools, instructional strategy, and text. The first strength of the study was the assessment tools used before and after the intervention strategy. The first tool used was the Scholastic Reading Inventory (SRI). The sole purpose of the SRI was to get a quick lexile level of reading. This computer based assessment can be completed in twenty minutes. The results determined where the researcher would begin the word identification list in the Qualitative Reading Inventory – 5, QRI – 5, (Leslie & Caldwell, 2011). The QRI – 5 is nationally recognized and it is a reliable assessment used in other research studies. The strength of the QRI – 5 (Leslie & Caldwell, 2011) is that it has expository and narrative passages written from the pre-primer level to high school. The QRI - 5 tested multiple modalities, word identification, concept questions, retell, and comprehension questions. The researcher used all of the areas to identify instructional reading level of all three participants. Another strength of the QRI – 5 were the number of narrative and expository tests written at each level. The researcher did not have to have a student do a repeat reading during post-test. A second strength of this study was the Four-Square Vocabulary Design Intervention Strategy. The design allowed the students to create a definition of the word, draw a picture that depicted the word, and create a sentence that contains the meaning of the word. Put in simple terms, this helped students understand meaning when reading lesson text. A third strength of the study was the text. The *Environmental Science* text was written at a fourth grade reading level which was close to the instructional level of the three participants. Two read at level three and one read at level four. Vocabulary words were in bold print with definitions at the side of the page. Background knowledge was provided at the beginning of each lesson. Reading chapter

lessons were 4 – 6 pages in length. Worksheets and reviews provided practice for concepts

learned. In addition to strengths, there were limitations.

The limitations were the number of participants in the study group, the number of

sessions, and length of study time. One limitation could have been the small size of testing group

or population of student participants. In assessing results, more students involved in the study,

may have changed the end result. All three students in the study receive support through the

special education department and have Individual Education Plans (IEP's). The researcher

wonders if using ask-risk students or general education students would change outcome of

results. Further research into results used with larger groups would need to be determined before

coming to a concise conclusion. A second limitation could have been the length of time for each

session. The 85 minute period of time was too long some days. The ability to stay focused and

on-task for the entire block challenged some of the students. The total number of days met

during the eight week sessions were 20, with the sessions scheduled every other day because of

student school schedules. Recall or retaining concepts were difficult when the intervention

period met every other day. A third limitation was the length of the study. The length of the

study was too short, eight weeks. More time to learn and practice a new skill or strategy is

beneficial for struggling readers.   While there limitations to the study, findings of the study

suggest that more research is necessary to best determine if the four-square vocabulary design

will increase reading comprehension of special education students.

Recommendations for Future Research

Future researchers should consider the following recommendation in order to increase the

effectiveness of the Four-Square Vocabulary Design Intervention strategy on reading

comprehension of high school special education students.

1. Procedural changes to improve results of the study are: choose students with similar reading levels, meet every day during the research period.

2. Instructional changes would include selection of shorter passage at instructional reading level, create chart of activities and follow same procedure every day and extend intervention/research time for longer than eight weeks.

3. Prior to the initiation, the study should explore additional strategies in the area of content vocabulary in order to select the most effective strategy to aid students with comprehension of expository text.

4. Classroom teachers need to find a study/strategy that fits the needs of students and incorporate it into the classroom. Horn and Feng (2012) concluded in order for students to comprehend reading; vocabulary instruction needs to be taught using direct instruction, and students will use context clues to understand difficult vocabulary.

5. Complete the study with a larger population of students, students of different ethnicities, students supported through Individual Education Plans (IEPs); at-risk students, and students who do not have

6. Further research assessment tools, programs, and lessons in order to measure and give the researcher the best picture of student performance.

Conclusion

The main purpose of reading instruction is for students to become fluent and proficient in reading comprehension. The same instruction is for all students with and without special education needs. Comprehension is composed of word identification, fluency, retell, and understanding meaning in print. When students are able to pronounce, and know the meaning of a word, readers begin to make a connection to text. Students with special needs may not have

developed the basic skills in letter-sound relationship, decoding, structural analysis, and strategies to use context clues to understand meaning of print. Special education students struggle with fluency and because they may be choppy readers, pause to sound out unfamiliar words, and by the time the sentence has been read, they forgot what was read. Students without special education needs may struggle in these areas also, but interventions and strategies and practice time often produce results quicker.

To increase student's abilities in reading, teachers must be able to recognize needs of students. Students must be able to learn, retain, and possess skills and strategies when learning to read. Three categories, vocabulary and comprehension strategies, skills and strategies for identifying (or decoding) words, and skills and strategies for how to read fluently are needed to be a successful reader (Duffy, 2009). Understanding these three categories will help increase student reading ability.

First of all, it is important to understand vocabulary and reading comprehension strategies. Comprehension is the essence of reading because the goal of written language is communication of messages (Duffy, 2009). If one does not understand the printed word, there is already a breakdown in comprehension and communication. A breakdown also occurs when students do not possess significant background knowledge of text. Therefore, it is important for teachers to provide background knowledge when introducing topics that students are unfamiliar with. Understanding vocabulary in written passages in imperative to reading comprehension, so it needs to be introduced before the passage is read. During instruction or independent reading, there need to be stopping points to discuss what has been read. Students should think about reading while they read, make predictions, connections, and ask questions to gain further knowledge. Word recognition is also a factor in increasing student's reading abilities.

Word recognition is the skill of remembering words Duffy, 2009). The skill of remembering words comes through repetition, practice, and exposure to text. When a struggling reader comes to a word they do not know, they must possess the tools to sound it out. The first way to do this is to be knowledgeable of the sounds found in the alphabet. A second way is to be able to become familiar with word patterns and figure out that word families contain the same word pattern and one letter added or removed can change the word. This also helps with sounding out multisyllabic words. When students are able to successfully pronounce words, then they are on the way to becoming a fluent reader and comprehending text.

Finally, when all of the pieces come together, students will be able to read text smoothly, with appropriate phrasing, and intonation (Duffy, 2009). Fluency is like the icing on the cake, it bridges comprehension and word recognition (Duffy, 2009). When struggling readers cannot read a word and have to pause to sound it out, this breaks the flow, and affects fluency. Readers can practice fluency by reading passages that contain familiar words. Teachers will increase student's abilities in reading through assessments, understanding vocabulary and comprehension, word recognition, and fluency.

References

Abadiano, H.R., & Turner, J. (2002). Reading expository text: The challenges of students with

learning disabilities. *New England Reading Association Journal,* 38(2), 49 – 55.

Alvermann, D.E., Gillis, V.R., & Phelps, S.E. (2013). *Content area reading and literacy.*

Succeeding in today's classroom. Boston: Pearson.

Bakken, J.P., Gaddy, S.A., & Fulk, B.M. (2008). The effects of teaching text-structure strategies

to postsecondary students with learning disabilities to improve their reading

comprehension on expository science text passages. *Journal of Postsecondary Education*

and Disability. 20(2), 100 – 119.

Bakken, J.P., Mastropieri, M.A., & Scruggs, T.E. (1997). Reading comprehension of expository

science material and student with learning disabilities: A comparison of strategies.

Journal of Special Education. 31(3), 300 – 324.

Bhatti, T.M. (2013). Teaching reading through computer-assisted language learning. *The*

Electronic Journal for English as a Second Language, 17 (2), 1 – 11.

Buehl, D. (2011). *Developing readers in the academic disciplines*. Newark, DE: International

Reading Association.

Calhoon, M.B. (2005). Effects of a peer-mediated phonological reading comprehension

program on reading skill acquisition for middle school students with reading

disabilities. *Journal of Learning Disabilities,* 38(5), 424-433.

Duffy, G.C. (2009). *Explaining Reading: a resource for teaching concepts, skills, and strategies*.

The Guilford Press. New York.

Fang, Z. & Schleppegrell, M.I. (2010). Disciplinary literacies across content areas: Supporting

secondary reading through functional language analysis. *Journal of Adolescent & Adult*

Literacy, 53, 587 – 597.

Fritchmann, N.S., Deschler, D., D., & Schumaker, J. B. (2007). The effects of instruction in an

inference strategy on the reading comprehension skills of adolescents with disabilities.

Learning Disabilities Quarterly, 30(4), 245- 262.

Horn, M., & Feng, J. (2012). Effects of focused vocabulary instruction on 7th graders' reading

Comprehension. *2012 ChineseAmerican Educational Research and Development*

Association Annual International Conference. Vancover, British Columbia, Canada.

Gonzalez, M. (2014). The effect of embedded text-to-speech and vocabulary eBook scaffolds on

the comprehension of students with reading disabilities. *International Journal of Special*

Education, 29(3). 111–121.

Jetton, T. L., & Shanahan, C. (2012). *Adolescent literacy in the academic disciplines: general*

principles and practical strategies. New York: The Guilford Press.

Jerome, A., & Barbetta, P. M. (2005). The effect of active student responding during computer –

assisted instruction on social studies learning by students with learning disabilities.

Journal of Special Education Technology, 20(3), 13-23.

Keel, M.C., Slaton, D. B., & Blackhurst, A. E. (2001). Acquisition of content area vocabulary

for students with learning disabilities. *Education & Treatment of Children,* 24(1), 46 –71.

Leslie, L., & Caldwell, J. S. (2011). *Qualatative reading inventory - 5*. Boston: Pearson.

Morrow, L.M. (1985). Retelling stories: A strategy for improving young children's

comprehension, concept of story structure, and oral language complexity. *Elementary*

School Journal, 85(5), 646-661.

National Center for Education Statistics, (2005). National assessment of educational progress.

Washington DC: U.S. Department of Education.

Ogle, D.S. (1986). K-W-L group instructional strategy. In A.S. Palinscar, D.S. Ogle, B.F. Jones, & E.F. Carr (Eds.), *Teaching reading as thinking* (Teleconference Resource Guide, pp 111 – 17). Alexandria, VA: Association for Supervision and Curriculum Development.

Parker, B. (2006). Instructional adaptations for students with learning disabilities: An action research project. *Intervention in School and Clinic,* 42(1), 56-58.

Ross, A. H., & Stevens, K. B. (2003). Teaching spelling of social studies content vocabulary prior to using vocabulary in the inclusive learning environment; an examination of constant time delay, observational learning, and instructive feedback. *Journal of Behavioral Education,* Volume 12, Number 4: 287-309.

Shannahan, T., & Shannahan, C. (2008). Teaching Disciplinary literacy to adolescents: Rethinking content area literacy. *Harvard Educational Review;* 78, 40 – 59.

Schrank, F. A., McGrew, K. S., & Woodcock, R. W. (2001). *Technical abstract* (Assessment service bulletin No 2). Itasca, IL; Riverside.

Simmons, L. (2001). *Saxon phonics intervention.* Norman, OK. Saxon.

Stetter, M.E., & Hughes, M.T. (2011). Computer assisted instruction to promote comprehension in students with learning disabilities. *International Journal of Special Education,* 26 (1), 88-100.

Sweet, A. P., & Snow, C. E. (2003). *Rethinking reading comprehension*. New York. The Guilford Press.

Unsworth, L. (1999). Developing critical understanding of the specialized language of school Science and history texts: A functional grammatical perspective. *Journal of Adolescent & Adult Literacy*, 42, 508 – 521.

Williamson, G.M., Dunn, M., Hinshaw, R., & Nelson, J. M. (2008). The impact of self-questioning strategy use on the text-reader assisted comprehension of students with reading disabilities. *International Journal of Special Education,* 23(1), 123 – 135.

Appendices

Appendix A

FOUR SQUARE VOCABULARY DESIGN BOX

WORD	**EXAMPLE** **FROM OWN LIFE**
NONEXAMPLE **FROM OWN LIFE**	**DEFINITION** **IN OWN WORDS**

Appendix B

MODIFIED FOUR SQUARE VOCABULARY DESIGN BOX

prey: a consumer that is eaten by another organism. (p 106)

The animal that a _____ eats is called a _____ .

predation: a _____ in which _____ species eats another _____.(p 106)

This kind of _____ between _____ is called predation.

boom-bust-cycle: a _____ in which predators increase as _____ increases, and predators _____ as prey decreases. (p 107)

Many _____ go through boom-bust cycles.

camouflage: colors, patterns, or _____ that help _____ hide in their surroundings. (p 107)

One way _____ protect themselves is with _____.

Appendix C

STUDENT WORKSHEET

Relationships Within Ecosystems

Directions. Choose the term from the Word Bank that completes each sentence correctly. Write the answer on the line.

Word Bank					
camouflage	mimicry	predation	competition	niche	prey

1. In _____, one organism hunts and feeds on another system.

2. Some species use _____ - colors, patterns, or behaviors – to prevent being eaten.

3. The animal that a predator feeds on is called its _____.

4. A _____ is the role an organism plays in its ecosystem.

5. When two species try to use the same resource, _____ occurs.

6. Some species use _____ to look like or act like a more dangerous species.

Directions Answer each question on the lines. Use complete sentences.
7. How does competition affect a community?

   _____

   _____

8. How are organism's habitat and niche related?

   _____

   _____

9. Name two ways prey protect themselves from predators.

   _____

   _____

Appendix D

STUDENT REVIEW SHEET

Lesson 5 REVIEW   Name_____

Using the word box below, write the word or words that complete each sentence correctly.

boom-bust cycle	camouflage	niche	predator

1. The unique role that an organism plays in its environment is called its
   _____.
2. In a _____, the numbers of predators and prey rise and fall depending on each other.
3. An animal that actively hunts and kills it prey is called _____.
4. A caterpillar disguised as a bird dropping is an example of
   _____.

Write the letter of the answer that completes each sentence correctly.

5. A snake feeding on a mouse and a frog eating a fly are two examples of
   A. Competition   B. predation
6. The _____ of a species can be called it address in an ecosystem.
   B. habitat   C. niche

Answer the questions below using a complete sentence. (p 108)

7. Describe what warning coloration is.

   _____
   _____
   _____

8. How are predator and prey populations linked? (p 107 – 108)

   _____
   _____
   _____

Appendix E

QUALTATIVE READING INVENTORY-5

WORD LIST

Examiner Word Lists

Sixth

	Identified Automatically	Identified
1. sewed		
2. controlled		
3. championships		
4. possessions		
5. moisture		
6. memories		
7. abolish		
8. pyramids		
9. emerge		
10. temperature		
11. humidity		
12. insistent		
13. irrigated		
14. thrived		
15. slavery		
16. evaporate		
17. classified		
18. preserved		
19. fashioned		
20. courageous		

Total Correct Automatic _____ /20 = _____%
Total Correct Identified _____ /20 = _____%
Total Number Correct _____ /20 = _____%

Upper Middle School

	Identified Automatically	Identified
1. businesswoman		
2. settlement		
3. infrared		
4. fusion		
5. nebula		
6. emulate		
7. articulate		
8. encyclopedia		
9. persecution		
10. inevitable		
11. gravity		
12. nuclear		
13. assimilate		
14. riffling		
15. helium		
16. migration		
17. immigrants		
18. miserable		
19. berths		
20. oppressed		

Total Correct Automatic _____ /20 = _____%
Total Correct Identified _____ /20 = _____%
Total Number Correct _____ /20 = _____%

LEVELS		
Independent	Instructional	Frustration
18–20	14–17	below 14
90–100%	70–85%	below 70%

Appendix F

QUALTATIVE READING INVENTORY-5

EXPOSITORY PASSAGE – Level Four [Concept Questions]

Level: Four

Expository

Concept Questions:

What is a beaver?

_____

_____

_____ (3-2-1-0)

What are dams built by beavers?

_____

_____

_____ (3-2-1-0)

What are problems caused by beavers?

_____

_____

_____ (3-2-1-0)

How do beavers protect their young?

_____

_____

_____ (3-2-1-0)

Score: _____ /12= _____ %

_____ FAM _____ UNFAM

Prediction:

_____

_____)

"The Busy Beaver"

Have you ever heard someone say "busy as a beaver"? Beavers are very busy animals and they are master builders. This furry animal spends its life working and building. As soon as a beaver leaves its family, it has much work to do.

First, the beaver must build a dam. It uses sticks, leaves, and mud to block a stream. The beaver uses its two front teeth to get the sticks. The animal uses its large flat tail to pack mud into place. A pond forms behind the dam. The beaver spends most of its life near this pond.

In the middle of the beaver's pond is a large mound. This mound of mud and twigs is the beaver's lodge or house. The beaver's family is safe in the lodge because it is well hidden. The doorway to the lodge is under the water. After the lodge is built, the beaver still cannot rest. More trees must be cut down to be used as food for the coming winter. Sometimes there will be no more trees around the pond. Then the beaver has to find trees elsewhere. These trees will have to be carried to the pond. The beaver might build canals leading deep into the forest.

All this work changes the land. As trees are cut down, birds, squirrels, and other animals may have to find new homes. Animals that feed on trees lose their food supply. The pond behind the dam floods part of the ground. Animals that used to live there have to move. However, the new environment becomes a home for different kinds of birds, fish, and plants. All this happens because of the very busy beaver. (281 words)

Appendix G

QUALTATIVE READING INVENTORY-5

EXPOSITORY PASSAGE – Level Four [Passage Retell]

Level: Four

Number of Total Miscues
(Total Accuracy): _____

Number of Meaning-Change Miscues
(Total Acceptability): _____

Total Accuracy		Total Acceptability
0–7 miscues _____ Independent	_____	0–7 miscues
8–29 miscues _____ Instructional	_____	8–15 miscues
30+ miscues _____ Frustration	_____	16+ miscues

Rate: $281 \times 60 = 16,860/\_\_\_\_$ seconds = _____ WPM

Correct WPM: $(281 - \_\_\_\_$ errors$) \times 60 =$
_____ / _____ seconds = _____ CWPM

Retelling Scoring Sheet for "The Busy Beaver"

Main Idea

____ Have you heard
____ "busy as a beaver"?
____ Beavers are animals
____ busy animals
____ and builders
____ master builders.

Details

____ As soon as a beaver leaves its family,
____ it has much work to do.
____ The beaver builds a dam.
____ It uses sticks,
____ leaves,
____ and mud
____ to block a stream.
____ The beaver uses its teeth
____ its front teeth
____ to get sticks.
____ The animal uses its tail
____ to pack mud.
____ A pond forms
____ behind the dam.

____ The beaver spends its life
____ near the pond.
____ The beaver's home is a mound
____ in the pond.
____ The family is safe
____ because the lodge is well hidden.
____ The doorway
____ to the lodge
____ is under the water.
____ Trees are cut down
____ to be used as food
____ for the winter.
____ Sometimes there will be no trees
____ around the pond.
____ The beaver has to find trees
____ and carry them
____ to the pond.
____ The beaver might build canals.

Main Idea

____ This changes the land.

Details

____ As trees are cut,
____ birds,
____ squirrels,
____ and animals have to find new homes.
____ Animals lose their food supply.
____ The pond floods the land.
____ Animals have to move.
____ A new environment becomes home
____ for different birds
____ and fish.

49 Ideas

Number of ideas recalled _____

Other ideas recalled, including inferences:

Appendix H

QUALTATIVE READING INVENTORY-5

EXPOSITORY PASSAGE – Level Four [Comprehension Questions]

Level: Four

Questions for "The Busy Beaver"

1. What is the passage mainly about?
   Implicit: how a beaver keeps busy; *or* what a beaver does

2. According to the passage, what are the beaver's front teeth used for?
   Explicit: to get the sticks

3. Describe the beaver's tail.
   Explicit: large and flat

4. Why does the beaver build a dam?
   Implicit: to make a pond; *or* to make a place for his lodge

5. What is the beaver's lodge or house made of?
   Explicit: mud and sticks

6. Why is the doorway to the beaver's house under the water?
   Implicit: it is safer and more hidden; *or* so enemies can't get in

7. What does the beaver eat during the winter?
   Explicit: trees

8. Why might some people dislike beavers?
   Implicit: they change the land by flooding; they drive out animals; *or* they cut down too many trees

Without Look-Backs

Number Correct Explicit: _____

Number Correct Implicit: _____

Total: _____

_____ Independent: 8 correct

_____ Instructional: 6–7 correct

_____ Frustration: 0–5 correct

With Look-Backs

Number Correct Explicit: _____

Number Correct Implicit: _____

Total: _____

_____ Independent: 8 correct

_____ Instructional: 6–7 correct

_____ Frustration: 0–5 correct