HIGH SCHOOL READERS: A PROFILE OF ABOVE AVERAGE READERS AND READERS WITH LEARNING DISABILITIES READING EXPOSITORY TEXT

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ABSTRACT

HIGH SCHOOL READERS: A PROFILE OF ABOVE AVERAGE READERS AND READERS WITH LEARNING DISABILITIES READING EXPOSITORY TEXT

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High school students are challenged to meet higher standards in order to ensure that they are prepared to face the literacy demands of our twenty-first century society (Beaufort, 2009; A. S. Erickson, Kleinhammer-Tramill, & Thurlow, 2007; Vernon, Baytops, McMahon, Padden, & Walther-Thomas, 2003). This study examined both above average high school readers and high school readers with learning disabilities in order to better understand the impact of twelve years of formal education on reading skills and strategy use while reading expository text. Specifically, this study examined how the readers employed strategies related to knowledge construction, monitoring, and evaluating while reading using verbal protocol analysis. Additionally, students' self-perceptions of reading strategy use and comprehension was assessed through the use of survey, objective assessment and written retelling. Thirteen students with learning disabilities and twelve students with above average reading skills participated in this study.

This study suggests that above average readers and students with learning disabilities do share some characteristics. Both groups of students used rereading and paraphrasing as their primary mode of knowledge construction. Additionally, both groups self-reported similar reading strategies as useful. However, the above average readers used the strategies more effectively and self-reported using reading strategies with more frequency. This study suggests that students with learning disabilities may benefit from continued instruction at the secondary level in effective strategy use.

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To Chris

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Introduction

Problem Statement

High school students today are faced with many literacy demands in their lives. Through policy initiatives such as No Child Left Behind, reports of failing schools and dropping graduation rates, the public has demanded both tougher standards and more stringent assessments of students to ensure that they are able to engage in twenty-first century learning and society (A. S. Erickson, et al., 2007; C. B. Swanson, 2008; *Time to act: An agenda for advancing adolescent literacy for college and career success*, 2009; Umpstead, 2008; Vernon, et al., 2003). Additionally, technology changes in society have created an environment where most jobs require a high level of literacy skills, and students are using technology more than ever before to communicate both formally and informally (Beaufort, 2009; Schmar-Dobler, 2003).

Almost half of high school students today must pass high school exit exams in order to graduate with a typical academic diploma (Warren, Jenkins, & Kulick, 2006). Besides the exit exam, high school requirements for graduation have increased (Teitelbaum, 2003). Due to the increase in curriculum requirements for high school students coupled with the wide use of exit exams, more students with disabilities are being educated in the general education classroom (Rea, McLaughlin, & Walther-Thomas, 2002). Partially due to the demands on teachers to teach the content necessary for students to pass high stakes assessments such as exit exams, most high school classes still use a teacher centered, text based format for instruction which requires students to have a high level of independent literacy skills such as being able to read, think and write critically (Jetton & Alexander, 2004).

As students leave high school and enter college, post-secondary training, the military, or the workforce, they are expected to have and use a cadre of literacy skills (Beaufort, 2009; Kaestle, Campbell, Finn, Johnson, & Mickulecky, 2001). Technology has changed the job landscape in terms of literacy skills for many workers, with traditional blue collar workers required to use technology and literacy skills to input data, keep records, read computer screens, and write documents (Beaufort, 2009). Indeed, students need to go beyond the ability to read the words on a page and need to be able to interact with text by applying prior knowledge, asking questions, making predictions and understanding the significance of the text (Conley, 2008; Pressley, 2004). This type of reading allows students to use their literacy skills outside of school and puts and emphasis on comprehension over content or word level skills.

Adolescents spend most of their time in high school in content area classes where the focus of their education is on content areas such as math, science, history, and English, often literature (Heller & Greenleaf, 2007). Very little time is devoted to explicitly teaching students how to read at critically higher levels due to a number of institutional constraints such as the departmental structure of the high school into content areas, the structure of textbooks, lack of screening and assessment tools aimed at adolescent readers and the relatively small amount of federal funding available for adolescent reading (*From No Child Left Behind to every child a graduate*, 2008; Shanahan & Shanahan, 2008). Inside and outside of school, students are expected to perform literacy tasks that require them to read, write and think critically on multiple topics and in multiple settings (Heller & Greenleaf, 2007).

Purpose of Study

Ironically, while the playing field has changed dramatically for adolescents, the focus on literacy research, policy and instruction has been on early childhood literacy (*From No Child*

Left Behind to every child a graduate, 2008; Heller & Greenleaf, 2007; Shanahan & Shanahan, 2008; *Time to act: An agenda for advancing adolescent literacy for college and career success*, 2009). The hope that early literacy competence would translate to competent literacy skills in adolescents has not panned out as evidenced by the flat literacy scores for adolescents over the past thirty years (*From No Child Left Behind to every child a graduate*, 2008; Shanahan & Shanahan, 2008). With the growing demands placed on adolescents today on multiple fronts, and with these students poised to be the workforce of tomorrow, understanding how twelve years of formal literacy instruction has manifested itself is an important endeavor.

While two-thirds of adolescent students are not proficient readers, at least a quarter of adolescents are proficient readers. These proficient eleventh and twelfth-grade students represent a group of high school readers who can offer a glimpse of what they have learned over their school years as well as the skills that they are taking with them into the worlds of work and post-secondary education. Proficient high school readers can give educators an idea of the cognitive processes and approach to reading that they use to construct meaning, monitor and evaluate text.

While proficient high school readers can provide information on how they effectively process text while reading, many students lack the skills necessary to perform reading tasks effectively and by examining their reading, one can begin to understand how the reading process breaks down or where further instruction is needed. High school students who are poor readers can illuminate a different path of reading than the proficient high school reader.

Examining both the proficient high school reader and the high school reader with learning disabilities will allow researchers to fill in the gaps about what high school reading looks like at the level before entering post-secondary training or the work force. This information will allow educators to examine the profile of proficient high school readers in relation to less

skilled readers on multiple levels. Perhaps proficient high school readers and less skilled readers employ similar approaches, but to different depths and qualities. By examining both proficient high school readers and less skilled high school readers, instructional tools that focus on the gaps identified can be created, whether those instructional tools are new strategies or more in depth instruction on how to use existing strategies. Additionally, these profiles will assist in partially understanding the developmental path to skilled reading. The purpose of this study is to examine the reading processes demonstrated by high school readers as they engage in reading expository text.

Organization of the Study

The organization of the remainder of the study is as follows:

Chapter two: Literature review.

The literature review examines the historical and current policies that have influenced literacy education in the United States, along with the current literacy demands placed on secondary students in the form of high stakes assessment, high school standards, and post-secondary expectations. The literature review develops a line of reasoning that argues for a deeper understanding of the strategies and processes that the adolescent reader, especially with learning disabilities, employs when reading expository, academic text.

Chapter three: Methods.

Chapter three outlines the methods used in this study. The chapter begins with a description of the participants in terms of demographics and recruitment. The chapter then outlines the data sources used in this study. Finally, the chapter outlines both the procedures used and the coding of the data sources.

Chapter four: Quantitative.

Chapter four focuses on group comparisons between the above average readers and readers with learning disabilities as they read expository text. Group comparisons are presented in multiple measures including the types of processes the readers demonstrated while reading expository text, as well as measures of the depth and breadth of those processes, such as length of events, verbalizations, and miscues. Additionally, two measures of comprehension related to the article are examined, a multiple-choice comprehension assessment and a written retelling of the passage. Finally, group comparisons of the *Metacognitive Awareness of Reading Strategies Inventory,* which highlights students' self-perception of the processes they use while reading expository are presented (Mokhtari & Reichard, 2002).

Chapter five: Qualitative.

Chapter five examines the data on an individual level and highlights profiles of individual students. Three profiles of knowledge construction are presented. One profile is a single use strategy profile, which profiles one student from each group who uses predominately one strategy while engaged in knowledge construction. The second profile highlights a patterned approach to knowledge construction. The final profile demonstrates a multiple approach use to knowledge construction. In addition to the reading profiles, measures of comprehension and self-perceptions of reading strategy use are discussed.

Chapter six: Discussion

Chapter six will discusses the main research question along with the sub-questions. Implications of the research as well as limitations and future areas of research are also discussed.

Chapter Two

Literature Review

Overview

The purpose of this chapter is to provide a substantive review of key literatures related to understanding how secondary students with and without learning disabilities comprehend informational text. The chapter builds an argument for increasing our understanding of how secondary students comprehend informational text, given the significant shifts in society, policy, theory, and advances in the tools to understand the cognitive processes of readers. The first section of the literature review examines historical and current mandates and policies that influence literacy instruction at the secondary level with particular focus on comprehension, expository text and postsecondary requirements for both the workplace and education. The chapter then examines several literacy theories that have been used to understand reading comprehension, including the cognitive perspective that highlights components of comprehension such as word recognition, vocabulary, fluency, prior knowledge and metacognition. The third section of the review then examines reading comprehension as it relates to secondary students who have learning disabilities. Finally, reading comprehension is situated in the framework of three processes; knowledge construction, monitoring, and evaluation which provide the structure for examining high school reading processes.

Historical Perspective

In order to gain perspective on reading comprehension for adolescents in the current school climate, it is prudent to examine the policies that have shaped reading over

the past fifteen years; namely Goals 2000: Educate America Act (P.L. 103-227), the National Reading Panel (National Institute of Child Health and Human Development, 2000)and the No Child Left Behind (NCLB) Act (P.L. 107-110).

Goals 2000.

While the Goals 2000: Educate America Act did not directly address reading instruction and literacy; it did impact the trajectory of reading instruction through its emphasis on standards-based reform and high student expectations. The focus of Goals 2000 legislation was on results through the use of standards-based reforms aimed at defining what all students should learn and assessing their skill at achieving the goals ("Goals 2000: Reforming Education to Improve Student Achievement," 1998; Stallings, 2002). One straightforward measure of student learning is standardized testing. Standardized testing also allows for easy reporting of scores and achievement, unlike assessments in the vein of student portfolios or classroom-based performance assessments (Pearson, 2000). Under Goals 2000, states had much latitude to set the content standards and assessments; however, they had to adhere to accountability standards, and thus utilized and developed standardized assessment tools to measure student progress. While this strong alignment between the curriculum and the tests was designed to determine student progress, it actually challenged innovative teaching and learning including comprehension and whole language instruction ("Goals 2000: Reforming Education to Improve Student Achievement," 1998; Pearson, 2000; Shepard, 2000). Quality reading instruction that incorporates a focus on comprehension and not just the reading of words is comprised of a variety of instructional techniques that include both the teaching of skills and literature (RAND Reading Study Group, 2004).

National Reading Panel.

Following the Goals 2000 act, Congress requested a national panel be formed to assess the teaching of reading from a research based perspective, thus in 1997, The National Reading Panel was established (National Institute of Child Health and Human Development, 2000). The National Reading Panel was subsequently convened of a group of volunteers, which included reading researchers, representatives from colleges of education, reading teachers, educational administrators and teachers. The panel was charged with determining effective, research-based approaches to teaching children to read. The panel set out to evaluate experimental and quasi-experimental research relevant to topics that were central to teaching children to read. The panel found about 100,000 studies on reading published since 1966. Due to the overwhelming amount of information the panel created subgroups of major topics to make the task more manageable. The subgroups included the following: alphabetic; which included phonemic awareness and phonics, fluency, comprehension (which included vocabulary, text comprehension instruction, teacher preparation and comprehension strategies), teacher education, reading instruction and finally computer technology and reading instruction. All of the studies that the NRP reviewed met the following standards: (1) they were published in refereed journals that focused on preschool through grade twelve reading development, and, (2) they used experimental or quasi-experimental designs with either multiple baseline or control group methods.

The findings of the National Reading Panel (NRP) by subgroup are as follows. Under the subgroup Alphabetic, the NRP found that teaching phonetic awareness contributed to success in reading and spelling if taught in a systematic and explicit manner (National

Reading Panel, 2000). However, phonemic awareness instruction cannot be a complete reading program; it is better thought of as a foundational component of a broader reading program. The NRP also examined systematic phonics instruction under the subgroup of Alphabetic. The panel found systematic phonics instruction to be effective between kindergarten and sixth grade and with disabled readers. This instruction was able to increase students' abilities to read and spell in general. However, there is no "one size fits all" phonics instruction. Once a student has mastered phonetic skill and can apply and use it for reading and spelling, the child does not need the same instruction or intensity of instruction of a child who has not mastered the phonics skills.

Fluency was also examined as a subgroup and was defined as the ability to read with oral speed, accuracy and expression (National Reading Panel, 2000). The panel found that guided oral reading had a positive impact on word recognition, fluency, and comprehension across many grade levels. The panel also examined studies on independent silent reading and found that while it sounds intuitively good to increase the amount of time a student read independently, they found no evidence to support increased reading skills. The panel was careful to note that their findings did not suggest that independent silent reading was detrimental; just that there was not enough evidence to make a causal claim that independent silent reading increased reading skill.

The Comprehension subgroup included vocabulary instruction, text comprehension and teacher preparation and comprehension strategies instruction. The NRP found that vocabulary instruction increased comprehension but only if done to match the reading ability of the student (National Reading Panel, 2000). However, there is little known about best methods for vocabulary instruction. In reference to teaching comprehension, similar

findings emerged; teaching multiple means of comprehension techniques is helpful, but there is little research to support which strategies are most effective and for which types of text. With regard to teacher preparation and comprehension strategy instruction, the panel found that teaching strategies is complex and requires extensive teacher use and preparation. Additionally, many questions arose in relation to how to most effectively teach teachers to instruct comprehension strategy use, at what age is strategy use most effectively taught, and can comprehension strategy use be taught in the content areas?

Another subgroup of the NRP included teacher education and reading instruction (National Reading Panel, 2000). This subgroup lacked large numbers of experimental studies and only half the studies measured student and teacher outcomes. Overall, this subgroup produced more questions than answers. Some of the panel's questions included determining the correct mix of pre-service and in-service professional development, length of professional development, and how to support teachers for long term sustainability of professional development.

The final subgroup studied by the NRP included computer technology and reading instruction (National Reading Panel, 2000). Due to the fact that using computer technology to teach reading is a new field, there were only 21 studies for the panel to examine. The panel suggests that using technology for reading instruction is a viable option that requires further exploration. They also suggest that the use of hypertext and word processors may support the teaching of reading. The use of hypertext allows students to retrieve additional information while they are reading and while it is not considered reading instruction, it may help students' ability to comprehend. Likewise, word processors are not reading

instructional tools, but may facilitate good reading because it fosters connectivity between reading and writing.

The National Reading Panel (NRP) report and its recommendations for reading instruction influenced the teaching and instruction adopted by many schools from kindergarten through twelfth-grade, and it was an influential force behind the national Reading First initiative (Allington, 2005). Additionally, the NRP report was founded on a research-based premise and pushed forward the federal agenda for research-based instruction (Shanahan, 2003). The NRP report was meant to inform policy makers, parents, and educators about the best evidence-based practices for reading instruction; its purpose was not to endorse various commercial programs, find the silver bullet for reading instruction, or be completely exhaustive (Shanahan, 2003). Indeed, there is no silver bullet of reading instruction; good reading instruction is done by good teachers with a wide range of instructional practices geared toward individual students (Allington, 2005; Pressley, 2006; Pressley, et al., 2001; Shanahan, 2003).

No Child Left Behind.

The No Child Left Behind (NCLB) Act of 2002 was a reauthorization of the Elementary and Secondary Education Act and represented a new level of involvement in education for the federal government (Davenport & Jones, 2005; Hardman & Dawson, 2008; McGuinn, 2005; Stallings, 2002; Umpstead, 2008). With the Goals 2000 legislation of 1994, the standards and accountability movement began to take shape, but the NCLB act shifted the standards approach to education from the states to the federal government and included a more systematic set of accountability principles (Hardman & Dawson, 2008; McGuinn, 2005). The NCLB act set out specific goals that the states had to meet in order to

receive funding and forsake sanctions. Essentially, NCLB called for the states to hire highly qualified teachers, set and reach high academic standards, assess student progress toward the academic standards, and report data on student progress or face sanctions (Umpstead, 2008).

Specifically, NCLB allowed states to set their own standards in math, reading, and science, but the schools had to report students' achievement disaggregated into categories (McGuinn, 2005). Student data had to be disaggregated by racial and ethnic groups, socioeconomic groups, students with disabilities, and students with Limited English Proficiency (McGuinn, 2005). Additionally, in order to determine the effectiveness of the state standards, the National Assessment of Educational Progress (NAEP) had to be given in grades four and eight to a sample of students to assess math and reading (McGuinn, 2005). NCLB also created new federal programs to address evidence-based instruction including the Reading First initiative and Mathematics and Science Partnerships (McGuinn, 2005). NCLB created an educational system with a strong focus on accountability and evidence-based instruction that was tied to school funding; this allowed the federal government to have an unprecedented influence on the nation's education agenda (Davenport & Jones, 2005; McGuinn, 2005). NCLB also placed special education students and other disadvantaged groups of students in the spotlight in terms of accountability.

The Reading First initiative is the arm of NCLB that addresses scientific, evidence-based reading instruction. Reading First used information and recommendations from the National Reading Panel report to create reading programs that were based in phonics (Stevens, 2003). According to the United States Department of Education website, the goal of Reading First is to put, "proven methods of early reading instruction in classrooms"

("Reading First," 2008). The website further defines proven methods as “scientifically based reading research” which will “ensure that all children learn to read well by the end of third grade” (U.S. Department of Education, 2008). The focus on early literacy with a hope that it would have a “vaccination” effect on adolescent literacy skills never came to fruition for adolescent readers based on their relatively flat reading scores over the past thirty years and the rising literacy scores for elementary children (Shanahan & Shanahan, 2008 , p. 43).

No Child Left Behind and special education.

The No Child Left Behind Act (NCLB) brought special education into the arena of standards-driven education reform that had been dominating education policy in the United States since the release of *A Nation At Risk* in 1983 (Hardman & Dawson, 2008). Requiring all students with disabilities to meet the same bar of achievement as general education students seemed intuitively against the idea of individualized instruction. Some schools and states were concerned that students with disabilities had high failure rates because they were not exposed to the general education curriculum because the schools deemed that the general education curriculum was not appropriate for students with disabilities (Katsiyannis, Zhang, Ryan, & Jones, 2007). However, the Individuals with Disabilities Education Act (IDEA) of 1997 and 2004, both include statements about the benefits of high expectations, access to the general education curriculum and in 2004, access to the general education curriculum in the general education setting (Hardman & Dawson, 2008). Hence, the 2004 reauthorization of IDEA required states to establish goals for students with disabilities in alignment with their Adequate Yearly Progress (AYP) goals as well as address graduation rates and dropout rates for students with disabilities (2007).

Furthermore, IDEA required that all students with disabilities be included in all state and district assessment (in accordance with NCLB) with appropriate accommodations or alternative assessments as addressed in each student's Individualized Education Plan (IEP) (Katsiyannis, et al, 2007). This alignment between NCLB and IDEA solidified special education's place in the standards-driven, accountability movement in education in the United States.

The standards-driven system of accountability has produced some positive outcomes for students with disabilities. According to Katsiyannis, Zhang, Ryan and Jones (2007) more students are participating in high-stakes testing and their performance on these tests is increasing. Likewise, Nagle, Yunker, and Malmgren (2006) found that state assessment participation afforded students with disabilities new opportunities. Additionally, more special education teachers are engaged in training on standards and assessment (Kaysiyannis, et al, 2007). While the Individual Education Plan (IEP) has often been seen as a "compliance paper" versus an "accountability tool," Ysseldyke et al, (2004) report that IEP teams can use the document as a tool to make decisions about high-stakes testing and the standards that need to be addressed. The key to success for students with disabilities in the general education curriculum and on high-stakes testing is the planning, accommodations, and instruction that must come first. Ysseldyke et al. (2004) further asserts that assessments foster better communication between the school and parents in regards to students' skills, accommodations and the options that are available to students. Likewise Voltz and Fore (2006) do concede that one benefit of the standards-based reform is that that teachers who may have previously written off students as unable to achieve at a standards-based level will now be forced to at least attempt to instruct students at a higher

level and school administrations will be forced to be accountable for the achievement of all students. Hence, with increased communication, planning, and instruction in the general education curriculum along with more training for teachers, students with disabilities can achieve on high-stakes assessments.

However, there are still multiple concerns about the link between assessment and learning for students with disabilities and how the standards-based reforms will affect students with disabilities in terms of both school completion and appropriate curriculum attainment (Hardman & Dawson, 2008; Katsiyannis, et al., 2007; Nagle, Yunker, & Malmgren, 2006; Voltz & Fore, 2006; Ysseldyke, et al., 2004). While there is no doubt that standards-driven accountability has changed education, there is still a lack of consensus on whether the accountability movement enhances student learning (Nagel et al, 2006). Hardman and Dawson (2008) assert that the standards movement is influenced by a constructivist approach to instruction whereby teachers guide and students are active and self-regulated. This runs counter to the explicit skill-based instruction favored in special education and it is questioned whether special education students who are not inherently self-directed will be able to integrate skills in a general education setting with a constructivist approach to instruction (Hardman & Dawson, 2008). A potential answer to this instructional question is a shared ownership between special and general education, however there is not evidence that the divide between special education and general education has been closed (Nagel et al, 2006).

The standards-based accountability movement has given rise to individual accountability in the form of grade-level and graduation completion exams (Katsiyannis, et al., 2007). Additionally, some fear that high stakes tests may cause low performing students

to be "pushed out" in order to raise the test scores of the school as a whole (Sunderman, Kim, & Orfield, 2005). While Katsiyannis et al. (2007) report that high school graduation rates for students with disabilities rose between 1996 and 2000 and dropout rates decreased during that time, that was well before NCLB act of 2001 was beginning to influence policy implementation. Indeed, Swanson (2008) reports that the average nationwide graduation rate is around 70%, however, in urban areas it is closer to 50% and for the subgroups of African-Americans and Latinos even lower. With anecdotal evidence of students being pushed out or counseled into getting General Equivalence Degrees (GED) and falling graduation rates, meeting the unique needs of at-risk and special education students in the general education setting should be a major concern for the standards-based accountability system (Sunderman, et al., 2005).

This retrospective clearly shows that the trajectory of reading initiatives has been moving toward a standards-based, evidence-based instructional model with a focus on early intervention and prevention. The Reading First initiative clearly states that their goal is to have all children reading well by the third grade, which is a laudable goal. However, reading is a life long quest and good third grade reading is an important first step, but reading, writing and critical thinking should be important goals throughout a child's education. As the National Assessment of Education Program (NAEP) has demonstrated by examining reading through the grades, reading should be a priority for all students at all grade levels.

National Assessment of Education Program.

The National Assessment of Education Program (NAEP) has assessed reading abilities of students in the fourth, eighth and twelfth-grades in both public and private

schools since 1992 (Livingston, 2008). Students are rated as "Basic" which means partial mastery of skills, "Proficient" which means that they have demonstrated competency, and "Advanced" which means superior performance (Livingston, 2008). Additionally, when students are not able to meet the Basic level, they are labeled as "below basic" (Livingston, 2008). Overall, the 2007 trend of the NAEP assessments show that fourth and eighth-graders national averages were higher in 2007 over 1992 by four and two points respectively (Livingston, 2008).

While the NAEP testing seems straightforward and shows small improvements in reading since 1992, the NAEP and literacy testing in general has proven controversial (Davenport & Jones, 2005). NAEP was in existence long before NCLB was enacted; its first administration was in 1969 (Hombo, 2003). NAEP reports national trends and does not report regional or individual data, making the NAEP essentially a low-stakes assessment. However, the NAEP is one of the only national standardized measures, and hence, it has increasingly been seen as a key part of the nation's reporting system. The NCLB act, Reading First and popular media have all focused on the NAEP findings, thereby elevating the importance of the assessment as being increasingly high-stakes (Hombo, 2003). Along with the high stakes testing come concerns over teaching to the test or test anxiety (Hombo, 2003). Additionally, there has been some concern over the discrepancy between NAEP scores and the scores of students on state assessment standards (Cavanagh, 2007; Davenport & Jones, 2005; Hombo, 2003). States are allowed to chose or create their own assessments in reading (and other subjects) to determine the percentage of students who are proficient, however; those test often do not line up neatly with the results of the NAEP (Cavanagh, 2007; Davenport & Jones, 2005). This chasm between the tests is often used

when criticizing both the efficacy of the NCLB act and the states' ability to choose fair and equitable assessments (Davenport & Jones, 2005). All in all, both NAEP and the Program for International Student Assessment (PISA) show that only 30% of U.S. students are proficient readers; defined as able to both understand and read the text. This statistic has remained relatively constant at a national level for thirty years (Davenport & Jones, 2005)

The NAEP demonstrates some growth in the fourth-grade reading scores but stagnant results in the eighth and twelfth-grade reading scores have been reported since the 1970's (Christenbury, Bomer, & Smagorinsky, 2009; Heller & Greenleaf, 2007). Indeed, the NAEP data has been integral in highlighting the importance of early intervention and prevention efforts, such as Reading First. However, this emphasis on early intervention and prevention may have shifted attention away from secondary comprehension. Given the stagnant reading levels demonstrated by secondary students, a focus on secondary readers is warranted. Struggling middle and high school readers may be able to read the words on the page, but they struggle to comprehend, think critically, follow instructions and draw conclusions; all skills essential for both workplace and postsecondary educational pursuits (Christenbury, et al.). The NAEP data demonstrates the need for continued literacy instruction for adolescents, which moves beyond reading words and towards critical thinking, writing and understanding of text.

Policy Influence on Secondary Students

The following section will discuss the importance of literacy instruction in light of the policies and trends that affect secondary students. Increasingly, high schools have mandated criteria for graduation and diploma granting that have upped the ante for many high school students (A. S. Erickson, et al., 2007). Additionally, more students with

disabilities are educated within the general education setting in order to comply with Least Restrictive Environment (LRE) mandate of the Individuals with Disabilities Education Act (IDEA) and the No Child Left Behind Act's (NCLB) highly qualified teachers mandate. Finally, I will examine the intersection of literacy and the twenty-fist century workplace, postsecondary education and emerging technologies.

High school mandates.

Since the 1980's and especially in the wake of the report, *A Nation at Risk*, which called for higher academic standards to bolster American youth's competitiveness in the world market, graduation requirements and high stakes testing has been on the rise in United States high schools (A. S. Erickson, et al., 2007; Vernon, et al., 2003). By 2006, twenty-three states had passed laws requiring high school completion exit exams (Warren, et al., 2006). High school exit examinations are coupled with increased graduation requirements and higher academic standards (Teitelbaum, 2003). While this movement to place more stringent requirements on secondary students through mandatory exit exams, higher standards, and more graduation requirements was done to improve achievement, the current National Assessment of Education Program (NAEP) data show a flat growth in the area of literacy for both eighth and twelfth graders with only one-third of those students reading at a proficient or above proficient level (Heller & Greenleaf, 2007).

Passing high stakes tests and mandatory exit exams in order to earn a high school diploma is an important milestone for students because a high school diploma is still a requirement for such things as college admissions, entry into the military, employment and eligibility for government financial aide (A. S. Erickson, et al., 2007). Due to students' inability to pass mandatory exit exams, many states are offering alternative diplomas,

especially to students with disabilities (A. S. Erickson, et al.; Katsiyannis, et al., 2007). While the use of high stakes testing to determine eligibility for graduation has been legally questioned, the courts have upheld schools' rights to institute such policies as long as students are given enough time to prepare, are tested on material that they are taught, and are given reasonable accommodations (O'Neill, 2001). Students with disabilities perform poorer on exit exams than students in the general population, for example, 74% of students with learning disabilities failed Indiana's graduation exit exam in 2000 (A. S. Erickson, et al., 2007, p. 118). Thus, many of the negative consequences associated with not having a standard high school diploma will affect theses students for a lifetime (Erickson, et al, 2007).

One way to address this intersection of higher standards and lower or flat achievement for high school students may lie in the areas of instruction and literacy. A study of social studies teachers in Mississippi found that teachers report that they spend more time doing teacher centered practices such as lecture, multiple choice questions and use of the textbook, and fostering procedural, organization and review skills when faced with teaching for achievement on high stakes tests (Volger, 2005). Conversely, teachers reported using fewer strategies focused on teaching students such skills as higher order thinking (Volger). This is in contrast to what Heller and Greenleaf (2007) assert is needed in order to improve student achievement in the middle and high school years. Indeed, Heller and Greenleaf call for more comprehension and higher order thinking in all content areas with recognition that each content area will need to develop its unique vocabulary and skill set.

Least Restrictive Environment and Individuals with Disabilities Act.

The concept of Least Restrictive Environment (LRE) can be traced to the 1960's and is based on the constitutional principles of due process, equal protection and liberty (S. J. Taylor, 2004). Least Restrictive Environment advocates for community-based and school-based placements for persons with disabilities along a continuum of settings from least restrictive, typically an individual home or general education setting to most restrictive, typically an institutional or special school setting. The concept of LRE became rooted in special education when it was written into the Education for All Handicapped Children Act (PL 94-142) of 1975 (Taylor, 2004).

Due to the low academic performance of students with disabilities coupled with more students identified as disabled and demands for social equity, more students with disabilities are being educated in the general education setting (Rea, et al., 2002). For example, during the 1995-96, school year, 45.3% of students with disabilities spent 80% or more of their day in the general education setting, however, during the 2004-2005, school year, 52.1% of students with disabilities spent 80% or more of their day in general education ("Contexts of Elementary and Seconday Education," 2006).

However, the question remains whether this trend toward placement in the general education classrooms is raising the academic performance of students with disabilities. Fore et al, (2008) assert that there is not a general consensus on whether general education placement is better academically for students with learning disabilities. However, Rea et al (2002) found in their examination of a small suburban school that students with learning disabilities included in language arts, math, science and social studies earned higher course grades and achieved comparable scores on state tests as their pull out counterparts. It is theorized that students can achieve with the standard school curriculum with support in

the general education classrooms, however this was a relatively small sample (Rea et al, 2002).

The bottom line is that more students with disabilities are receiving their education in the general education setting. Consequently, more students have access to the general education curriculum and due to the Annual Yearly Progress mandates of No Child Left Behind, more students with disabilities are participating in high stakes tests (Steele, 2007). In order to determine how students are fairing, it is imperative to examine both the graduation rates for students with disabilities along with the post-secondary outcomes for students with disabilities.

Graduation Rates and Post-secondary Outcomes

Despite the mandatory exit exams, more rigorous academic standards in math and science and more access to the general education curriculum, all aimed at increasing high school student achievement, many students are failing to obtain high school diplomas (C. B. Swanson, 2008). The importance of a high school diploma is reflected in the harmful life outcomes associated with high school dropouts especially for high school dropouts from minority groups and special education.

Dropping out of school for students with disabilities is associated with many negative outcomes for the students. According to the second wave of the National Longitudinal Transition Study (NLTS-2) high school drop outs are 18% less likely than high school completers to enroll in two to four year colleges when cognitive abilities and achievement are controlled for in the analysis (Wagner, Newman, Cameto, Lavine, & Garza, 2006, p. 11). Dropouts are more likely to work more hours, live independently and support children and less likely to have a driver's license, register to vote, or have a checking

account (Wagner et al, 2006, p. 11). Additionally, a third of all dropouts with disabilities have spent a night in jail, which is a three-fold increase over student with disabilities who complete high school (Wagner et al, 2006, p. 11). High school completion affords students with disabilities additional school and work opportunities after secondary school.

However, the reality for up to half of all urban youth, including students with disabilities, is that a high school diploma is out of reach (C. B. Swanson, 2008). Overall, it is estimated that only 70% of the students in the United States complete high school (C. B. Swanson, 2008). Additionally, the NLTS-2 reports that youth with disabilities from low income households, defined as below $25,000 per year income, have a 64 percent high school completion rate versus an 82 percent high school completion rate of students from households above the $50,000 annual income mark (Wagner, et al., 2006, p. 6). Furthermore, the NLTS-2 found that white students with disabilities scored higher (7 to 13 points) on all academic subtests than African-American students with disabilities, Hispanic students with disabilities or students with disabilities from other ethnicities (Wagner, et al, 2006, p. 5). While there is an achievement difference related to race/ethnicity, there is no significant difference between high school completion rates for students with disabilities from different racial and ethnic backgrounds (Wagner et al, 2006, p. 6). Students with sensory impairments (visual and hearing) have the highest rates of high school completion at 95 and 90 percent respectively, students with autism and orthopedic impairments completed school at a rate of 85 percent while students with learning disabilities, mental impairment, traumatic brain injury and speech and other health impairments complete high school between 72 and 79 percent of the time, only students with emotional impairments have lower rates of high school completion at 56 percent (Wagner et al, 2006,

p. 6). Students with multiple disabilities tend to stay in school until the age of 21, however they are the least likely to obtain a high school diploma (Wagner et al, 2006, p. 13).

These alarming statistics highlight an emerging crisis in the United States. It is hoped that our public education system will afford students educational opportunities in their youth that will allow them to pursue higher education, vocational training or work upon completion, however with sinking graduation rates, that realization is not a reality for many students (C. B. Swanson, 2008). Additionally, it is not a reality for the neediest of students; students in urban settings and many students with disabilities (C. B. Swanson, 2008; Wagner, et al., 2006). The lack of a high school diploma reduces students' opportunities in the areas of post-secondary education and work.

Post-secondary requirements.

The twenty-first century has brought numerous changes in education, technology and the workplace. Our society is becoming evermore dependent on new digital literacies to find information, create information and communicate (Kim & Kamil, 2004; Rhodes & Robnolt, 2009). Indeed, 94% of twelve to seventeen year olds who have access to the Internet, report using the Internet for school work with 41% reporting that they have used instant messaging or e-mail to contact teachers or classmates for help with school work (Lenhart, Simon, & Graziano, 2001). It is not just in the classroom that literacy demands have changed, but also in the workplace, with writing demands on the rise as new technologies create an environment were record keeping and information processing are more in demand than ever before (Beaufort, 2009). With the quickly changing, technological landscape of twenty-first century life, youth must rely on their abilities to

read, write, think, and process information more than ever before (Beaufort, 2009; Schmar-Dobler, 2003).

Today's students are faced with more technology and more change, however, they must rely on strong traditional literacy skills in order to navigate their way through the new technologies (Coiro & Dobler, 2007; Gambrell, 2005; Kim & Kamil, 2004; Schmar-Dobler, 2003). Indeed, students use similar comprehension strategies when reading paper text and online text, such as activating prior knowledge, monitoring comprehension, determining important ideas, synthesizing, drawing inferences and asking questions (Schmar-Dobler, 2003). Likewise, Kim and Kamil (2004) assert that strong literacy skills are needed when communicating online due to the lack of eye contact and the inherent anonymity of online communication, the writer must by able to communicate their meaning accurately. This is not to imply that online and traditional text literacies are identical, however, it is clear that there is a distinct overlap in skills that are needed to be successful in both literacies.

The need for strong literacy skills in the twenty-first century spills over into the workplace for students working at virtually every level (Beaufort, 2009). The majority of written documents in the workplace from manuals to memos are written at the high school or college level of difficulty (Kaestle, et al., 2001). Additionally, due to workplace demands and restructuring, workers at all levels are likely to encounter unfamiliar written information that needs to be managed such as charts, graphs, manuals, computer screen information, and written forms (Kaestle et al, 2001). Finally, workplace literacy is a concern for all levels of employment given that more than half of today's workers do not have a college degree and the majority of workers report that they learned all their basic

literacy skills at home or at school with only 8% seeking additional basic skills from their employers (Kaestle et al, 2001, Beaufort, 2009). Given the literacy demands placed on workers, the role of the schools in providing comprehensive literacy skills for students, at all levels, is imperative.

Secondary Reading

In the following section, the goals and processes of reading are examined for secondary students. It is clear that high level literacy skills such as comprehension and critical thinking are valued in our society, however these skills are also critical for students if they are to graduate from high school, seek post-secondary employment or post-secondary education. Our twenty-first century society demands high levels of literacy skills from our students and our workers. Thus, it is important to examine both the processes of reading along with how to best foster better comprehension for secondary students.

Goal of reading instruction.

The goal of reading instruction is not to teach children to read the words, or to read quickly and efficiently, but to understand what they have read and to be able to use reading to enrich their lives. A focus on comprehension occurred in the late 1970's with Durkin's (1978/1979) study which looked at third through sixth grade classrooms and comprehension. Durkin observed the assessment of comprehension skills, but not much teaching of those skills. For example, students are often asked to summarize, self-question or predict, however they were not necessarily taught how to perform those tasks while reading. During the next few decades, the focus of comprehension moved from study skills instruction to strategies instruction and focused on theories such as schema theory,

metacognition, Vygotskian theories of development, and reader response theory (Pressley, 2006)

In today's complex world, good readers must know why they are reading and recognize when they are not meeting that goal, and change gears as needed (Westby, 2004). This self-awareness or metacognition of reading coupled with the ability and knowledge to change "gears" or reading strategies as warranted are hallmarks of good readers (Pressley & Afflerbach, 1995; Pressley & Lundeberg, 2008a). It is not surprising then that teachers are well aware of the need for more comprehension instruction especially in the content areas (Pressley, 2004). Reading comprehension for secondary students is often over looked in lieu of content instruction even though there is a general consensus that comprehension is a goal of reading (RAND Reading Study Group, 2002).

Secondary content teachers generally do not see themselves as reading teachers, even though they ask their students to comprehend information from informational print and digital media (Bean, 1990; Sturtevant & Linek, 2003). The nature of content area texts also indicates that these texts are distinctly different than narrative texts. Students are exposed to texts that utilize many different text structures (e.g., compare/contrast, cause/effect, problem/solution, timeline/sequence, argumentation) and utilize discipline specific vocabulary that represent complex concepts (e.g., photosynthesis, Westward Expansion) (Ciardiello, 2002; Cook & Mayer, 1988; Freebody & Anderson, 1983; Montelongo, Berber-Jimenez, Hernandez, & Hosking, 2006). Students are increasingly asked to synthesize information from multiple sources of information, such as texts, digital media, graphs, and tables. Each of these unique features of informational text increases the cognitive demands on secondary students. These demands are evidenced by the extensive

literatures on the comprehension challenges of expository texts, including difficulties students have in utilizing text structure to aid comprehension (Ciardiello, 2002; Cook & Mayer, 1988), summarizing main ideas (P. Afflerbach, 1990), utilizing metacognitive strategies to guide breakdowns in comprehension monitoring (Duke, Pressley, & Hilden, 2004; Hacker, 2004; Klingner & Vaughn, 1999; Westby, 2004), and effectively using cognitive strategies before, during, and after reading (Klingner & Vaughn, 1999; Palincsar & Brown, 1984; Sharon Vaughn, Klingner, & Bryant, 2001).

Learning theories and comprehension.

In order to fully understand the scope of influences on reading comprehension, various learning theories related to reading comprehension can be examined. The learning theories that influenced reading follow a somewhat time oriented path beginning with behaviorist ideas in the 1950's and early 1960's, moving toward an interest in cognition beginning in the mid 1960's through today (Alexander & Fox, 2004). Beginning in the mid 1980's and evolving with increasing sophistication, the sociocultural aspects of reading are examined (Alexander & Fox, 2004).

During the 1950's and early 1960's a behaviorist view of learning was predominate and post World War II America was ripe with a baby boom of new learners entering school (Alexander & Fox, 2004). Reading was viewed as a conditioned behavior that was the result of careful programming and practice (Alexander & Fox, 2004). A Skinnerian perspective did not view reading as a developmental process, but a set of behaviors acquired through the manipulation of the environment (Alexander & Fox, 2004). From a behaviorist perspective, observable behavior is of paramount importance and anything that cannot be observed, cannot be altered by the outside environment (Kazdin, 1982). Thus, researchers during

this time were focused on the components of reading and perceptual activities (Alexander & Fox, 2004). For example, identifying visual signals (i.e. letter "b") and translating that into sound, using sounds to make words, phrases and eventually sentences (Alexander & Fox, 2004). Additionally, the behaviorist research was focused on finding instruments and means for remediation (Alexander & Fox, 2004).

This behaviorist perspective was challenged in the 1960's with the Chomsky view of linguistics as nativist (Pearson, 2000). Chomsky's view of language was that it was both a complex and a natural process that children were hard wired to learn in their own community (Pearson, 2000). This perspective challenged the behaviorist view and opened the door for linguists and psycholinguists to explore the processes of reading including comprehension, as inner workings of the mind and to examine how these inner workings influenced learning to read. However, the behaviorist perspective did contribute to the development of reading theory by opening the doors to the processes of reading involving visual cues and how those visual cues are translated into sounds.

Chomsky's view of the child as a natural learner of language and the psycholinguistic view that children imitate the language in their community, was set aside in favor to a cognitive information processing view (Alexander & Fox, 2004; Pearson, 2000). However, Chomsky and the psycholinguistics would be revisited in the form of sociocultural theory in the 1980's.

In the mid 1970's, emerging new technologies and intelligent machines enamored the United States populace, thereby fueling a fascination with how the human mind worked in terms of both its structure and processes. This fascination was also individualistic in nature; it explored how the individual mind worked to acquire and use knowledge;

essentially ignoring the naturalistic and sociocultural underpinnings of the Chomsky perspective and the psycholinguistic perspective. This interest coupled with the federal government's increase in funding of reading research fueled the research and resulting theories focusing on cognitive information processing (Alexander & Fox, 2004).

Research into cognitive information processing changed the traditional view of reading comprehension by introducing the idea of schema theory, which is still influential today (Alexander & Fox, 2004). Six functions of schemata were provided by Anderson (1978) and Anderson and Pichert (1978) which outline how schemata affects a readers ability to learn and remember information, including: (1) providing niche for text information which can be easily accessed when needed, (2) allowing a reader to make inferences, (3) making determinations on the importance of text when reading, (4) facilitating the ability to remember, (5) summarizing and, (6) editing read information (Anderson, 2004; Pearson, 2000)

Cognitive information processing further influenced reading with theories on prior knowledge, including its acquisition and how readers use prior knowledge to make sense of texts (Pichert & Anderson, 1977). There was also research focusing on the organization of the mind and novice versus expert readers and how the mind was different for each learner (Chi, Feltovich, & Glaser, 1981; Lundeberg, 1987). Cognitive theorists also considered the role of text itself, such as text structure, cohesion, and story grammar (Kintsch & van Dijk, 1978; B. Taylor & Beach, 1984; Thorndyke, 1977). Finally, research emerged on the techniques and instructional environments that facilitated the understanding of text such as inferencing, self-questioning, predicting, and summarization (Brown, Campione, & Day, 1981; Hansen, 1981; Raphael & Wonnacott, 1985).

Interestingly, in the mid-eighties the computer-based, machine-like, and individualistic research agendas began to lose favor as application of information processing in classroom and group settings did not always have the computer-like precision that was hoped for when applying some principles (Alexander & Fox, 2004). Additionally, works from such authors as Vygotsky, Lave, and Heath provided both an alternate viewpoint as well as alternate methodologies (ethnography, qualitative) for literacy researchers (Alexander & Fox, 2004; F. Erickson, 1986; Florio-Ruane & Clark, 1983; Michaels, 1981).

The focus shifted from individuals acquiring knowledge to how the understanding of many influenced the learning of the group; thus ushering in a focus on both the social and cultural underpinnings of literacy (Cole, 1996; Wertsch, 1991). This sociocultural perspective brought new ideas about literacy to the forefront, such as social constructivism (Bloome, 1994; Moll, Amanti, Neff, & Gonzalez, 1992), shared cognition (Cole, 1996; Lave & Wenger, 1991), and cognitive apprenticeship (Rogoff, 1991) .

Cognitive perspective.

Each of the above perspectives contributed to the complex understanding of reading and reading comprehension generally held today. Indeed the RAND Study Group (2002) conceptualized reading comprehension to encompass the reader, the text and the activity with all three dimensions occurring in a larger sociocultural context. Using this conceptualization of reading comprehension, the current study takes a micro look at reading comprehension by focusing primarily on the reader as he/she employs cognitive strategies while reading texts independently. The RAND Study Group acknowledges that a portion of reading comprehension is made up of the readers cognitive capabilities such as

attention, memory, analytic ability, inferencing and visualization. Additionally, strategies that good readers use include such cognitive processes as making predictions, asking questions, constructing images, clarifying, summarizing, using prior knowledge and paraphrasing (Peter Afflerbach, 2002; Duke, et al., 2004). Focusing on these cognitive processes of reading comprehension in no way implies that reading comprehension is a solely cognitive activity. Indeed, the means for students to learn such cognitive processes are sociocultural in nature (i.e., learned in interactions with other knowledgeable others through various activity settings, texts, and contexts). However, this study examines the cognitive processes and strategies employed by individual readers to better understand how those cognitive processes and strategies are utilized during the reading process.

Reading Comprehension

In order to examine the processes and strategies students' use in the act of comprehending text, it is important to define reading comprehension and examine the reading skills related to successful reading comprehension. The following definition of comprehension is adopted from the RAND Reading Study Group, "the process of simultaneously extracting and constructing meaning through interaction and involvement with written language" (RAND Reading Study Group, 2002, p. 11). Globally, students who can read accurately and fluently, with good oral vocabularies and listening skills coupled with expansive world knowledge from experiences in the home, school and community, and with exposure to literacy experiences will be on their way to becoming good comprehenders (RAND Reading Study Group, 2002). Undeniably, reading comprehension is a complex task, however, in order to examine reading comprehension on a closer level, it is beneficial to break it down into components that contribute to reading comprehension

such as word recognition, vocabulary knowledge, fluency, prior knowledge and metacognition.

Word recognition.

Word recognition is an important facet of reading comprehension for the obvious fact that one cannot comprehend written text without first being able to recognize words and read them. This however, is a simplistic view of the processes involved in learning to read. In order to deconstruct this process, Ehri's phase theory for acquiring word reading skills will be overviewed (Ehri & Snowling, 2004). The four phases include prealphabetic, partial-alphabetic, full-alphabetic, and consolidated-alphabetic phases with each one overlapping the other (Ehri & Snowling, 2004). In the prealphabetic stage children do not have a grasp of the letter-sound relationship and "read" words they associate with visual features or guessing. This phase is sometimes referred to as the logographic phase because children will read words that they are exposed to in their environment that are associated with visual cues, such as "stop," and "McDonalds," however, when the visual cues are removed, students are not able to read the words (Ehri & Snowling, 2004). The second phase is the pre-alphabetic stage because children know some letters, such as their names. However, children are not decoding, but reading words through partial letter cues often coupled with visual cues such as seeing the letter "b" and a picture of a barn (Ehri & Snowling, 2004). The third stage is the full-alphabetic phase because students have knowledge of the graphemes and phonemes in words and students are able to decode unfamiliar words (Ehri & Snowling, 2004). For most students, this phase requires instruction in phonemic awareness and phonics (Ehri & Snowling, 2004; Pressley, 2006). The final consolidated-alphabetic phase is characterized by the student's working

knowledge of repeated letter sequences and blended units, such as affixes, root words, onsets, rimes, and syllables (Ehri & Snowling, 2004).

In typical reading development, students progress through the stages in a relatively systematic manner, however, that is not the case for all students and some students face obstacles and acquire sub skills that impact their ability to decode words in a fluent manner (Ehri & Snowling, 2004). Problems with comprehension crop up when readers are not able to fluently decode words due to their inability to decode for a variety of reasons (Ehri & Snowling, 2004). Some research shows that good and poor readers make similar phonetic mistakes, however poor readers make more of them (Mann, 2003). Additionally, readers who have not progressed through the phases, or who have acquired sub skills, may be utilizing a lot of working memory in the act of decoding hence impacting their ability to comprehend (Ehri & Snowling, 2004; Mann, 2003). It is clear that the ability to decode words effectively and fluently has an impact on a reader's ability to comprehend text.

Vocabulary.

The National Reading Panel (2000) asserts there is a link between text comprehension and vocabulary knowledge, hence the more vocabulary knowledge, either orally or print-wise, the better a student will be able to comprehend text. Likewise, Freebody and Anderson (1983) found that vocabulary "had a consistent, direct effect on performance." (p. 286). In terms of students with learning disabilities, Vaughn and Klingner (2004) assert that these students in particular, lag behind their peers in terms of vocabulary knowledge because of general language deficits, recall problems or memory problems which impacts the students' ability to comprehend text.

However, the research is mixed on how to best teach vocabulary and whether vocabulary instruction in isolation is able to effect comprehension (National Reading Panel, 2000; RAND Reading Study Group, 2002). Hence, both the National Reading Panel and the RAND Reading Study Group recommend that vocabulary instruction should be varied and include direct and indirect instruction. Furthermore vocabulary instruction should include strategy instruction that teaches students how to learn the meanings of new words encountered in the text. Similarly, Vaughn and Klingner (2004) suggest that many students with learning disabilities need more explicit instruction in vocabulary because they will not pick up the meanings of words incidentally through experiences with text, and that students need an in-depth understanding of concepts and not just words to enhance their comprehension.

Fluency.

The National Reading Panel defines fluent readers as, "able to read orally with speed, accuracy, and proper expression" (2000, p. 11). Fluency is an important factor of reading comprehension because when a student's reading is labor intensive and choppy, it is difficult then for the student to remember and understand what has been read (2000; RAND Reading Study Group, 2002). Archer, Gleason and Vachon (2003) assert the link between reading comprehension and fluency is important because students have limited cognitive resources, and comprehension and decoding compete for these resources making comprehending more difficult if decoding is not fluent. Furthermore, Archer, Gleason and Vachon assert that as students get older and continue to struggle with decoding and fluency, they are exposed to less text, often choosing alternative activities over reading, which can be laborious and difficult. Ironically, one way to combat poor fluency is more

reading, thus many students exacerbate their problems with fluency instead of enhancing their fluency.

Prior knowledge.

The use of prior knowledge in constructing meaning is another important strategy examined in the literature (P. Afflerbach, 1990; Crain-Thoreson, Lippman, & McClendon-Magnuson, 1997). In Afflerbach's think-aloud study on expert readers and main idea construction, he found that main idea construction occurred significantly more when skilled readers were reading text with familiar topics. Afflerbach proposes that when reading unfamiliar topics, more working memory is used to comprehend the text, and main idea construction becomes more difficult. However, in Crain-Thoreson, Lippman and McClendon-Magnuson's (1997) study with high school students, prior knowledge was found to inhibit comprehension in some cases, perhaps because it was not integrated with the passage properly or interfered with the meaning construction of the text. On the other hand, some students reported a lack of prior knowledge, and scored quite well on the comprehension tests (Crain-Thoreson et al. 1997). Crain-Thoreson et al. propose that the students who lacked prior knowledge were more effective in their use of paraphrasing and inferencing, or that they actually did have a wealth of general knowledge on the topic being read which was related to their own life experiences. For instance, a music student reported having prior knowledge on Beethoven, however, scored poorly on the comprehension of a passage on Beethoven. The student reported themes of music in her head while reading, however her verbal protocol showed no evidence that she linked her prior knowledge to the passage she was reading. It seems that prior knowledge can be

useful when used as a strategy and linked specifically with the reading, however, merely possessing a lot of prior knowledge on a subject may not be helpful if it is not activated.

In Hartman's think aloud study of eight proficient high school students reading, he examined how the students made connections not only within the text the students were reading, but from across related texts and outside the text (1995). Hartman asserts that the students constructed meaning from the text in different and "messy" ways, making connections across a web of texts that the students had previously encountered and defining text in a broad sense to encompass a passage read to a short discourse or utterance. Thus, students use many resources when constructing knowledge of a reading passage and that understanding can and does change as the student experiences various other passages (Hartman, 1995).

Text structure.

Good readers and comprehenders use their knowledge of text structure to assist in the meaning construction and planning of reading (Caldwell & Leslie, 2003; Englert & Hiebert, 1984; Kletzien, 1991; Lundeberg, 1987; RAND Reading Study Group, 2004). Before skilled readers begin to read, they will overview the text, know the purpose for reading the text, and activate prior knowledge related to the text and the text structure (Englert & Hiebert, 1984; Pressley & Afflerbach, 1995). For instance, in Caldwell and Leslie's (2003) think-aloud with middle school students, they found that the students were better able to comprehend the narrative text than the expository text. The researchers assert that middle school students are more familiar with the structure of narrative text, and thus, better able to comprehend the text (Caldwell & Leslie, 2003). Likewise, Kletzien (1991) found in her think-aloud study with high school students on passages with differing levels of difficulty

that good comprehenders commented on, and seemed more aware of the structure and organization of the passages. For instance in Kletzien's study, a student commented, "This paragraph is giving causes. It is listing all the causes" (1991, p.74). Additionally, Lundeberg (1987) observed in her think-aloud study on expert and novice lawyers that the experts demonstrated that they were not only familiar with the structure of the text, in this study legal cases, but that they used that knowledge to regulate their reading. For example, the expert lawyers relied on text structure and language to determine how to go about reading the case; they asked for the type of case and used headings to demonstrate their search for structure. Verbal protocol analysis revealed how novices to expert readers use text structure to aid in their reading and understanding.

Additionally, Englert and Hiebert (1984) found in their study of third and sixth-grade students that knowledge of text structure and reading comprehension were related and improved with age. In regards to students with learning disabilities, Englert and Thomas (1987) found in their study with participants ranging from third through seventh grade, those students with learning disabilities did not tap into text structure knowledge and it subsequently affected both their reading and writing performance(1987). Of particular note in the study of students with learning disabilities, the students had items read aloud to them in order to ameliorate word level difficulties these students would have such as word recognition and fluency (1987). Thus, lack of text structure knowledge impacts students with learning disabilities in their ability to read expository text at least in the mid and upper elementary grades.

Metacognition and comprehension monitoring.

If the goal of reading lies in comprehending passages that are read, we can assume that the reader is aware of his or her own comprehension as reading occurs. However, good comprehension monitoring is not always the case and it is incumbent upon the reader to regulate and monitor his/her reading in order to ensure understanding (Hacker, 2004). Some students are able to detect errors in reading, but are unable to correct those mistakes while some students fail to detect errors in the first place (Hacker, 2004). Comprehension monitoring is a metacognitive task that requires the reader to detect when comprehension is not occurring and regulate the reading task to accomplish comprehension of the text (Baker, 1989; Pressley & Afflerbach, 1995).

Hacker (2004) further asserts that strategy use is an integral piece of comprehension, comprehension monitoring and metacognition. Hacker creates two subgroups of strategies, including *monitoring* strategies such as rereading, looking back, predicting upcoming information, and comparing points, and *control* strategies which include summarizing text, clarifying text, and correcting text. Furthermore, Hacker asserts that these strategies reduce the demands on the working memory of the reader and assist in information processing.

This form of comprehension monitoring has been evident in multiple studies using verbal protocol analysis in the form of re-reading and slowing down when the text has been both confusing or even particularly relevant (Lundeberg, 1987; Pressley & Lundeberg, 2008a; Wineburg, 1991). For example, Lundeberg (1987) observed that the expert lawyers in her study marked parts of the legal cases they were reading, then went back and checked the facts when reading the ruling in the case. While Lundeburg observed that the novices used the same strategies as the experts, the experts used them more often. In Wineburg's

(1991) think-aloud study of high school students and historians reading historical text, he noted one student who did engage in monitoring strategies, such as re-reading, pausing, and accessing prior knowledge. However, Wineburg also notes that historians tended to slow down their reading not necessarily for comprehension, but to evaluate, process and engage in a kind of conversation with the author. Wineburg and Lundeberg highlight the difference between the general monitoring of understanding and comprehension, and the deeper monitoring of the expert reader. When skilled readers engage with material for which they are experts, the monitoring changes from, "do I understand this?" to "how can I use this," "what is the author's purpose," "what are the implications of this?" The expert reader appears to be searching for deep meaning while the school-age reader appears to be searching for information, however, this may be a question of reading purpose with both types of comprehension monitoring relevant to completing the reading goal at hand.

Baker (1989) found in her study of adult readers that the readers were able to monitor their comprehension, however the more proficient readers and students were more aware of their own comprehension monitoring and more able to control the monitoring. Baker further asserts that better readers were more metacognitively aware than the less proficient readers (1989). Young children along with less proficient readers have been shown to be less apt to monitor their own comprehension or understanding of a passage and to focus more on the decoding process (Mokhtari & Reichard, 2002; S. G. Paris & Jacobs, 1984; S. G. Paris & Winograd, 1990). Furthermore, Paris and Jacobs (1984) study of 183, eight and ten year olds, demonstrated that more proficient readers were more metacognitively aware of reading strategies at both eight and ten years of age. Since metacognition and comprehension monitoring can aid in distinguishing between good and

poor readers, a measure of students' metacognition while reading can shed light on the reading process that the students are engaged in while reading. Metacognition and comprehension monitoring are important pieces in the picture of proficient reading.

Reading comprehension and reading disabilities.

While learning disabilities and reading disabilities have various meanings and some debate surrounds their very existence based on a social constructivist model, they generally encompass a group of students who struggle with one or more of the processes of reading (Spear-Swerling, 2004). Spear-Swerling proposes a model of phases of typical reading development beginning with word recognition and progressing to proficient reading. In Spear-Swerling's reading development model, a child first develops strategic reading around the third or fourth grade, which includes automatic word-recognition skills along with the use of text structure, vocabulary, and summarization to aid comprehension. As a child progresses through later adolescence, he/she would progress to proficient reading which would include higher-order comprehension skills such as evaluating and integrating information, reading critically and using a range of reading processes to aid in comprehension (pp. 524-525).

The model suggests that a break down can occur at various levels that would contribute to a student's inability to become either a strategic reader or proficient reader (Spear-Swerling, 2004). In particular, students may have a specific word recognition deficit (inability to read individual words) from oral language deficits or phonological deficits (Rack, Snowling, & Olson, 1992). However, some students may have adequate word recognition skills but weak comprehension strategies that are not related to the early weak word recognition skills. For example, children may have adequate word recognition skills,

but around fourth grade, may struggle with comprehension due to weak vocabulary, limited background knowledge or lack of reading comprehension strategies (Garner, 1990; Kletzien, 1991; Stanovich, 1986). Additionally, some students have weak word recognition along with poor comprehension skills, and these students are often coined "garden variety" poor readers (Gough & Tunmer, 1986).

Specific reading difficulties.

With the framework of phases in mind, it is helpful to examine specifically where and how a reading difficulty can manifest itself. However, it is important to keep in mind that reading is an intensely complex activity, and theories on the development of reading such as the ones outlined above, will have inherent weaknesses in capturing that complexity. Additionally, Siegel (2003) asserts that, "no reliable evidence supports the concept of subtypes and no clear subtypes have been delineated" in reference to reading disabilities (p. 159). While these frameworks of reading development will assist in examining areas where reading can break down, it is important to note that there are multiple levels where proficient reading can break down.

Without a doubt, the development of phonological processing is a foundation of proficient reading (Stanovich, 1988). For our purposes, phonological processing is defined as enveloping multiple processes such as the ability to associate sounds with letters or groups of letters (Ehri & Wilce, 1985). If beginning readers are not able to master phonological processing, they will sometimes memorize words and visual representations; however, this is not efficient as it places a high demand on visual memory and will slow the reader down as they progress (Siegel, 2003). Furthermore, using studies of pseudo-words, researchers have shown that fundamental breakdowns in phonological processing can

persist into adulthood with some of the adults able to read reasonably fluently, but not able to read pseudo-words, thus not being able to apply phonological processing to unknown words (Bruck, 1990; Shafrir & Siegel, 1994).

Another area that can cause breakdowns in the reading process is working memory which is the ability to store information in short term memory while processing text (Siegel, 2003). Readers need to use efficient processes to recognize and understand text in order to limit the demands on the short term memory, and readers who have not mastered phonological processing place higher demands on working memory, leaving less for comprehension (Mann, 2003). However, according to Swanson and Saez (2003) working memory deficit is not always related to phonological processing. Further, Swanson and Saez assert that children with learning disabilities can do well academically in some areas due to multiple reasons, such as external support, high domain knowledge or with tasks that place a relatively small demand on the working memory. Finally, due to developmental factors such as better-organized prior knowledge and development of faster processing speeds; older children seem to have more working memory capacity. Both working memory and phonological processing must be considered when examining deficits in reading, especially when considering instruction aimed at mediating reading difficulties (H. L. Swanson & Saez, 2003).

It is clear from the plethora of studies on reading what constitutes good reading (Biancarosa & Snow, 2006; Pressley & Afflerbach, 1995; RAND Reading Study Group, 2002). Phonological awareness has been shown to be an important component of beginning reading (Ehri & Wilce, 1985; Stanovich, 1988), which assists in students learning to read words and develop vocabulary (Ehri & Snowling, 2004; Freebody & Anderson,

1983), which is tied to a reader's ability to read fluently (Archer, Gleason, & Vachon, 2003). Additionally, good readers are aware of text structure (Englert & Hiebert, 1984; Englert & Thomas, 1987), use prior knowledge effectively (Crain-Thoreson, et al., 1997), and are metacognitive throughout their reading adjusting speed and reading strategies to aid in comprehension (Hacker, 2004; Wineburg, 1991). From these studies, it is easy to see that reading is a highly complex endeavor that incorporates many components from letter/sound integration to word recognition to comprehension construction, thus a reading difficulty can manifest itself across multiple areas. Therefore, students with reading difficulties may exhibit vastly different approaches to reading text and constructing knowledge and meaning from that text based on how the reading difficulty manifests itself for the reader. Understanding how secondary students with and without reading disabilities construct meaning can shed light into the nature and types of ways these students come to understand what they read.

Framework of Reading Processes

The purpose of this study is to take a snap shot of what high school readers do as they read and construct meaning from text. In order to examine what readers do, a framework of reading processes must be established. The framework adopted for this study is based on Pressley and Afflerbach's (1995) framework of constructively responsive reading, which asserts that expert readers engage in three basic processes while reading; constructing meaning, monitoring, and evaluating, which can be captured through verbal protocol analysis. Because of the complexity of the act of reading, these activities are often intertwined and overlap, however, in order to examine what readers are doing as they

read, these categories need to be deconstructed. The following table summarizes the categories and a discussion follows.

Table 1. Framework of reading processes

Reading Actions	Components
Constructing meaning	1. Text organization 2. Prior knowledge 3. Speculating beyond text 4. Paraphrasing 5. Main idea construction 6. Visualization 7. Rereading
Monitoring	1. Content monitoring 2. Word level monitoring
Evaluating	1. Acceptance 2. Skepticism 3. Overt reaction – laughter, surprise, negativity

Constructing meaning.

Constructing meaning from text is a major goal of reading and is accomplished by utilizing many skills. Skilled readers are active readers, who employ a multitude of

strategies and conscious acts in order to comprehend what they are reading (Pressley & Afflerbach, 1995; Pressley & Wharton-McDonald, 1997). The following is a brief description of some of what readers do when they read expository text for comprehension.

Students often will begin making predictions and tapping into prior knowledge from the moment they read the title of the text or view the text structure (Pressley & Afflerbach, 1995). Indeed, sensitivity to text structure in expository text aids students in comprehension, and is an area that some students with learning disabilities may need instruction and scaffolding in to become more proficient in comprehending text (Armbruster, Anderson, & Ostertag, 1987; Englert & Thomas, 1987). Awareness and use of text structure when reading expository material clearly aids in comprehension (Gersten, Fuchs, Williams, & Baker, 2001).

Good readers engage with the material through making predictions, attempting to connect ideas with prior knowledge, summarizing or paraphrasing important ideas and choosing to reread or skim material for further understanding (Pressley & Afflerbach, 1995). Hence, if a reader lacks the prior knowledge to connect ideas covered in the reading of expository text, it will impact their comprehension of the text (Gersten, Fuchs, Williams, & Baker, 2001). On the other hand, it is important for readers to regulate their prior knowledge and not make irrelevant inferences as that could become overwhelming and distracting (Duke, et al., 2004).

Constructing meaning from text requires the reader to get the gist of the text or understand the main idea. The ability to find the main ideas in expository text aids in making appropriate inferences, being able to paraphrase, and knowing the important parts of the text to reread or skim (Williams, 2003). Indeed finding the main idea is a difficult

task and intertwined with the ability access prior knowledge, make inferences and recognize the text structure (Bakken, Mastropieri, & Scruggs, 1997; Williams, 2003).

Monitoring and evaluating.

Reading for comprehension also requires the reader to monitor what they are reading for understanding and to be able to take actions to regulate their reading and resolve any problems (Pressley & Afflerbach). Again, these actions are not simplistic and require readers to be actively engaged and metacognitive in their reading (Gersten, et al., 2001; Pressley & Afflerbach, 1995). Often readers will recognize that they have lost their place, concentration, or understanding and will need to go back and reread or skim portions of the text. Additionally, readers monitor their understanding of new vocabulary or unfamiliar words and make decisions about how to resolve any misunderstandings whether they reread, skim, look for context clues, or decide to skip the unknown word. Again, knowledge of text structure, prior knowledge, main idea selection, and vocabulary all play a role in the reader's ability to effectively monitor reading comprehension and make adjustments as needed.

Finally, this framework purports that readers make various evaluations while they are reading (Pressley & Afflerbach, 1995; Pressley & Wharton-McDonald, 1997). Readers make evaluations at different levels and at different times throughout the reading (Pressley & Afflerbach). Sometimes readers will make an evaluation immediately upon reading the title or see the text structure, which can indicate the use of prior knowledge to begin to make connections and integration. At other times, readers may have a reaction to the text that can take the form of agreement, disagreement or questioning of the content (Pressley & Afflerbach). Again, evaluation of text is complex and requires the reader to employ many

facets of reading in order to make an evaluation such as knowledge of vocabulary and activation of prior knowledge. Monitoring reading is the "future oriented," requiring the reader to make decisions about what needs to happen next, while evaluation, "focuses on what has been processed" (Pressley & Afflerbach, p. 79).

Conclusion

It is clear that adolescent readers are asked by society to demonstrate high levels of literacy proficiency in multiple areas including high stakes assessments, exit exams for high school, content course work and in post-secondary training, education and jobs. However, literacy scores for adolescents have remained relatively flat over the past thirty years. In a review of reading comprehension studies related to students with learning disabilities from 1966 through 1992, only 23% of the studies examined high school aged students (Talbott, Lloyd, & Tankersley, 1994). While there are clear expectations for what high school students should do when they read, there is also a paucity of research on what they actual do when they read. Essentially, we do not know what the end product of twelve years of formal education in reading and reading comprehension looks like.

If society's expectations of adolescent readers are to be fulfilled, we must have a greater understanding of what high school readers do when they read including the skills and processes that they employ. A clear profile of proficient adolescent readers will contribute to our understanding of the developmental path of proficient readers while a profile of struggling readers may assist in both understanding how reading comprehension can break down and how reading comprehension can be boosted through instruction.

Research Questions

In order to begin to understand adolescent readers, this study will focus on what high school readers do in the domains of constructing knowledge, monitoring, and evaluating while reading expository text as well as their self-perceptions of the strategies they use while reading expository text. The over arching research question is, what do above average and learning disabled eleventh and twelfth grade readers do while engaged in reading expository text? This main question is broken into the following sub questions.

a. What *knowledge construction* processes do 11th and 12th grade above average and learning-disabled readers demonstrate when constructing understanding through reading expository texts?

b. What *monitoring* processes do 11th and 12th grade above average and learning-disabled readers demonstrate when constructing understanding through reading expository texts?

c. What *evaluating* processes do 11th and 12th grade above average and learning disabled readers use when constructing understanding through reading expository texts?

d. How are above average and learning-disabled 11th and 12th grade students quantitatively and qualitatively similar and/or different in how they utilize knowledge construction, evaluation, and monitoring strategies when constructing understanding through reading expository texts?

e. What are the self-perceptions of high achieving and learning disabled 11th and 12th grade students as to their use of reading strategies when reading expository texts?

f. How are high achieving and learning disabled 11th and 12th grade students self-perceptions quantitatively and qualitatively similar and/or different in how they utilize reading strategies when reading expository texts?

g. In looking across the reading processes elicited in the verbal protocol and students' self-

perceptions on the MARSI, what patterns and themes emerge around across group (high achieving, LD) and within group comparisons?

Chapter Three

Methods

Participants

Twenty-five eleventh- and twelfth-grade students from a high school in Michigan participated in this study. Twelve of the students were classified as above average readers based on their enrollment in an honors English class or membership in the National Honor Society. Additionally all of the above average readers scored above 12.2 grade level equivalency on the Gray Silent Reading Test (GSRT) (Wiederholt & Blalock, 2000). Conversely, students with learning disabilities were identified based on meeting the criteria for having a learning disability in reading according to the State of Michigan definition. The State of Michigan (*Revised Administrative Rules for Special Education*, 2002) definition of learning disabilities according to rule 340.1713, defines a specific learning disability as the following:

> a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, that may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculation. The term includes such conditions as perceptual impairments, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. The term does not include children who have learning problems that are primarily the result of a visual, hearing, or motor impairment; a cognitive impairment; an emotional impairment; autism; or of environmental, cultural, or economic disadvantage (p. 6).

Additionally, the students with learning disabilities scored at least two grade levels below their current grade on the Gray Silent Reading Test (GSRT). Furthermore, standard achievement scores in reading for the students in the learning disabilities group on the Woodcock-Johnson III, averaged 79.77, which falls within the low range. The scores ranged from a high of 89 to a low of 69. ACT and PSAT scores were collected for students in the above average reader category. Overall, nine students took the ACT and scored an average

of 23.67, in the basic reading category with a range of 19 to 35. In the reading category, a score of 17 indicates that the student is prepared for first year college level courses. Three students took the PSAT and scored an average of 55.3 on the basic reading section with a range of 53 to 57. The national average scores in reading for 2009, for eleventh graders was 47 ("The College Board: Scores & Review," 2010).

Recruitment.

The participants were recruited at their high school through oral presentations in their English classes, which consisted of resource room English classes and honors English classes. An additional recruitment presentation was given at a National Honor Society meeting. Students were given written consent forms for their parents to sign and written assent forms for them to sign (see Appendix A and B). Once students turned in consent and assent forms and it was established that they met the criteria for the study, the researcher contacted the students via phone to set up a mutually agreeable time to meet at the high school during non-academic time.

Materials and Data Sources

Multiple data sources were used. In addition to the think aloud data, student demographic and achievement data were collected as well as comprehension data related to the passage read and survey data related to the perceived reading strategies used. The think aloud protocol used grade-level reading material matched to each student. The students also answered comprehension questions related to the think aloud passage and performed a written re-tell of the passage. Finally, the students filled out a survey about their perceptions of the reading strategies they employ while reading. Each component is discussed further in the following section.

Think-aloud reading material.

It is important that the reading material be at the instructional level for the participants, so as not to distort the think-aloud (Kletzien, 1991). As Kletzien found in her think-aloud with high school students reading text with varying levels of difficulty, students reading text above their instructional level exhibited traits similar to poor readers reading at their independent level, such as focusing on individual words versus big ideas. Additionally, it is important to consider the structure of the text, as it has been shown that skilled readers pay attention to structure and organization of text to their advantage (Cote & Goldman, 2004; Lundeberg, 1987; Pressley & Lundeberg, 2008b). Consequently, expository passages were used that corresponded to individual reading levels. The reading levels of the text were determined by using the Flesch-Kincaid Grade-Level test formula.

In order to ensure that the reading passages for each student were at their individual instructional level, the participants were assessed using the Gray Silent Reading Test. Each participant was given a passage to read which was matched with his/her reading level. Each passage was adapted from a 400 word expository article on pollution problems (Spargo, 1989) and was rewritten to reflect a range of reading levels from seventh-grade through twelfth-grade levels (Appendix C). The topic of pollution was chosen because it is part of the school's required curriculum for all high school students. This ensured that all of the students had some familiarity with the topic. Additionally, six main ideas were generated from the original passage with fifty-two details. Please see appendix D, for a summary of main ideas and details that were maintained for each passage. The chart below summarizes the number of words for each grade-level passage,

the number of sentences, the average sentence length, and the number of main ideas and details.

Table 2. Comparison of grade level reading passages

Passage	# of Words	# of Sentences	Average Sentence Length	Number of Main Ideas	Number of Details
7th Grade Pollution Passage	556	55	10.1	6	52
8th Grade Pollution Passage	581	52	11.2	6	52
9th Grade Pollution Passage	562	44	12.8	6	52
10th Grade Pollution Passage	559	35	15.9	6	52
11th Grade Pollution Passage	559	30	18.6	6	52
12th Grade Pollution Passage	559	25	22.3	6	52

Comprehension measures.

Two measures of comprehension were used in the study. The first measure was a written retelling of the information read in the passage. The students were asked to do a written retelling of the passage in any format that they wanted. This written retelling served two purposes. First, it assisted in defining the reading task for the students because it required the student to engage in a sub process of writing called text generation which required the writer to both plan ideas and then connect them into expressive sentences, phrases and words (Puranik, Lombardino, & Altmann, 2008). Second, the retelling

contributed to the data collected in the think aloud as it generated information about what the students found most relevant in the article.

The second measure of comprehension was a ten question multiple-choice assessment that contained five literal and five inferential comprehension questions. The publisher of the article developed the comprehension questions (Spargo, 1989). The comprehension questions were written at a ninth-grade reading level based on the Flesch-Kincaid readability formula. Any student with below a ninth-grade reading level had the questions read aloud to him/her by the researcher. This data source provided further confirmation that the think-aloud protocol did not interfere with the students' abilities to comprehend the passage. See appendix F for sample comprehension questions.

Metacognitive Awareness of Reading Strategies Inventory.

Finally, the students were asked to fill out the *Metacognitive Awareness of Reading Strategies Inventory* (MARSI) that measures adolescent and adult metacognitive as well as perceived use of strategies while reading academic, expository text (Mokhtari & Reichard, 2002; Sheorey & Mokhtari, 2002). Skilled readers tend to be more metacognitively aware while engaged in reading for comprehension, thus the MARSI serves as a tool to triangulate the data and validate the differences between the two groups, students with learning disabilities and above average readers (S. G. Paris & Jacobs, 1984; Pressley & Afflerbach, 1995). Additionally, the MARSI was developed as a comprehensive measure of comprehension monitoring and as a tool to aid teachers in both assessment and instruction in addition to being useful in classroom or clinical research (Mokhtari & Reichard, 2002).

The MARSI is made up of three subscales, which were determined by Cronbach's alpha to have internal consistency reliability coefficients as follows; Global Reading

Strategies (.92), Problem Solving Strategies (.79), and Support Strategies (.87), with an overall reliability of .93 in terms of measuring metacognitive awareness of reading strategies used (Mokhtari & Reichard, 2002; Sheorey & Mokhtari, 2002).

The MARSI is made up of 30 statements accompanied by a 1 through 5 Likert rating scale and is appropriate for students with fifth through college-level reading abilities (Mokhtari & Reichard, 2002). The MARSI was designed to measure Global Reading Strategies, Problem-solving Strategies, and Support Reading Strategies (Mokhtari & Reichard, 2002). *Global reading strategies* include setting purpose, activating prior knowledge, predicting, previewing, using text structure and using context clues; *problem-solving strategies* include adjusting reading rate, visualizing, guessing meaning of unknown words; and *support reading strategies* include, paraphrasing, self-questioning, and summarizing (Mokhtari & Reichard, 2002). See appendix G for a sample of the MARSI survey.

Procedure

The researcher met with each student individually to explain the think-aloud procedure, acclimate the student to the audio recording, and allow the student to practice a think-aloud on a short expository passage (Meyers, Lytle, Palladino, Devenpeck, & Green, 1990). Each reading passage was marked with a small dot at the end of every third sentence to prompt the students to report what they are thinking as they read. Students were informed of the dot, but also told that they could ignore it if they were thinking aloud.

Once the student indicated and demonstrated that he/she was comfortable with the think-aloud procedure, the student performed the audio recorded think-aloud. In order to acclimate the student to the think aloud, the researcher modeled the think aloud, and then

asked the student to practice the think aloud using a passage different from the passage for the recorded think aloud. The student practiced the think aloud until there were no hesitations and the student indicated that he/she felt comfortable with the procedure of the think aloud. The student was asked to read the passage at a comprehension level that would allow him/her to write down the main ideas and details from the passage and answer questions about the passage after reading. The student was also told to verbalize whatever he/she is thinking while reading the passage. If a student initially failed to verbalize his/her thoughts, the researcher prompted the student to, "comment please." Students were informed during practice that this would be the prompt if needed.

When the student finished reading the passage, the student was asked to write whatever information they remembered from the passage on a blank piece of paper using whatever format they felt comfortable utilizing. After the written retelling, the student was asked to answer the literal and inferential multiple choice comprehension questions. Finally, the student filled out the 30-item *Metacognitive Awareness of Reading Strategies Inventory* (MARSI). The complete procedure typically took forty-five to sixty minutes depending on the student, and all sessions were completed in one sitting.

Data Analysis

Quantitative.

A number of quantitative measures for the verbal protocol were calculated. In order to determine what students do when they read expository text, totals were tallied for reading processes demonstrated in the areas of knowledge construction, monitoring and evaluation. In order to address the research question about how the two groups are quantitatively similar and different in relation to the verbal protocol, numerous word

counts were tallied and averaged. The total number of words read along with the total number of words spoken was tallied. The number of events was counted, which was defined as the number of times a student read part of the passage and commented on the passage. Additionally, the number of words read and spoken during the events was counted. The totals and averages of the misspoken words, missed punctuation, omitted words, and added words were also counted.

In order to answer the research question related to the students' perceptions of the reading strategies used, quantitative measures were used to analyze the *Metacognitive Awareness of Reading Strategies Inventory* (MARSI). The MARSI, has three main sections (global reading strategies, problem-solving strategies, support reading strategies) and an overall survey rating. Independent sample t-tests were used to determine if the two groups were different in their self-perceptions of strategy use in each category and for overall use. Additionally, the self-perceptions of reading strategy use for each group was rank-ordered to determine further differences and similarities between the two groups.

Once the written retelling was coded (see description in next section), the number of main ideas, details, and total ideas recalled was analyzed using independent sample t-tests to determine if there was a difference between the two groups.

Coding.

Coding was performed on the transcripts of the verbal protocols to determine the categories and sub-categories of comments made by the student participants. Additionally, the written retelling of the passage was coded to determine how many main ideas and main ideas plus details were evident in the written retelling from each student participant.

Verbal protocol.

The coding for the verbal protocol analysis was developed to encompass as much of the verbal protocol as possible. In order to accomplish this, a pilot study was done to determine how much of the verbal protocol can be captured accurately. In the pilot study, high school students not participating in the current study, read Timed Reading (Spargo, 1989) passages while engaging in a think-aloud. The students were audio taped and their think-alouds were transcribed. The verbal protocols in Pressley and Afflerbach's (1995) book, *Verbal Protocols of Reading: The Nature of Constructively Responsive Reading* were used as a template to begin the coding. The verbal protocols as outlined by Pressley and Afflerbach in the areas of constructing knowledge, monitoring and evaluating along with the categories for the pilot were used as a template, and strategies for each category emerged.

The verbal protocols were transcribed and then separated into lines based on the student pauses. The read text and the spoken text were separated into two columns. See Appendix H, for sample transcriptions. Read text was defined as words that were read directly from the text of the article, while spoken text was defined as words spoken outside of the written text. For a first pass, the words spoken outside of the written text were analyzed to determine their broad category, which included knowledge construction, monitoring or evaluating. A second pass was done to determine the specific category within each broad category. During the second pass, any comment that did not seem to "fit" into the template from the pilot study was marked with a question mark. A third pass was done to resolve any questions using the template from Pressley and Afflerbach's (1995) book, *Verbal Protocols of Reading: The Nature of Constructively Responsive Reading*. For any new sub-categories that emerged during the third pass, subsequent passes were made to

determine if other comments fit into the new sub-category. Inter-observer agreement was calculated for five percent of the samples to verify the coding. A special education teacher was trained in the coding procedure and given the transcripts. The inter-observer agreement for the coding was calculated at 91%.

Coding explanations and samples.

Knowledge construction included paraphrasing or restating part of the text in the student's own words, often prefaced by comments, such as, "so…," or "I guess." Also included under knowledge construction was when a student reread a section of the passage. Visualization was another specific category that emerged within knowledge construction and was characterized by, "I see," or "I am thinking it looks like." Knowledge construction included speculating beyond the text and relating the text to prior knowledge. Speculation beyond the text included explaining what would happen next even though it was not in the text. Students using the term, "like" and relating the text to information outside the text or giving a personal example not used in the text signaled prior knowledge. Finally, knowledge construction included integration or the use of pictures accompanying the text to assist in making meaning of the text.

Monitoring emerged as two broad categories, monitoring the content or monitoring for unknown words or phrases. Monitoring for content was further separated into monitoring for content understanding which was signaled by comments such as, "I knew that," or "that makes sense," and monitoring content when confused or not understanding, sometimes signaled by "I don't understand" or "I don't know what that means." Occasionally, students monitored their content by posing questions such as, "wait a second, isn't that the same thing?" or "didn't they just say that?" Monitoring for word meaning was

signaled by, “what is that word?” “sorry,” or “I don’t know that word.” Many times, these comments followed attempts to sound out the word or re-read the passage.

Evaluation comments were often characterized by agreement or disagreement, or a positive or negative reaction to the text. Since the passage was about water pollution, often a negative reaction would include, “that’s gross,” or “ewww.” On the other hand, a positive reaction may include a statement such as, “that’s interesting.” Evaluative comments that signaled agreement with the text may include, “well, of course that would happen,” which disagreement many include, “why is that there?” Specific examples of the text coupled with student comments are found in the following table.

Table 3. Coding Examples

Category	Subcategories	Text	Examples of Student Comments
Knowledge Construction	Paraphrasing	Many manufacturing facilities use huge quantities of freshwater to carry away wastes of many kinds, and this waste-bearing water, or effluent, is discharged into streams and rivers, which in turn disperse the polluting substance.	B-1, “So they’re using freshwater to get rid of all their garbage and its like making it go like disperse through the lake.”
	Rereading	The other is the amount of agriculture within the river basin.	A-1, “Agriculture within the river basin.”
	Visualization	Correction of a pollution problem in a river must include the river basin.	A-5, “I am picturing in my head a river.”

Table 3 (Contd)

	Speculating beyond text	Correction of a pollution problem in a river must consist of an integrated approach, and should included measures to correct all sources of pollution within the river basin or land area	B-1, "So you can tell what's wrong in a river by what it puts in the ocean."
	Use of prior knowledge	Some industries pollute water in a different way by using large quantities of water to cool certain equipment; therefore the heat from the equipment makes the water hot.	B-7, "So, the cooling stuff like we use in FERMI would pollute some of the water."
	Integration (use of tables/pictures)	The land area surrounding the river is a drainage basin or watershed.	B-5, "Looking down at the picture."
Monitoring	Content – understanding	One factor is the type of agriculture within the river basin.	A-5, (After re-reading), "Oh, okay."
	Content – confused or do not understand	Many manufacturing facilities use huge quantities of freshwater to carry away wastes of many kinds, and this waste-bearing water, or effluent…	B-9, "I don't know what that means."
	Content – asking a question	The other is the amount of agriculture within the river basin.	A-7, "Wait a second, isn't that the same thing?"
	Word meaning	Many of these will contain chemicals that are either toxic or noxious.	A-5, "Don't know what that word means."

Table 3 (Contd)

Evaluating	Reaction to text negative	Agriculture includes animal wastes and fertilizer runoff.	A-7, "That's gross."
	Reaction to text positive	The industries then discharge the hot water into rivers and lakes	A-1, "That's pretty interesting."
	Agreement	Untreated animal wastes pollute the water system when these lagoons overflow or leak.	A-7, "Well of course it's going to, it's poop and urine. "
	Disagreement	Fish for human consumption are raised in large livestock farms.	B-5, "I don't know what that means, I don't what that is, I don't know what that means in this paragraph.

Written retell coding.

The coding for the written retelling was done using a scoring rubric listing all the main ideas and details in the order that they appeared in the passages (see Appendix D). Each written retelling was examined and scored using the rubric. The number and percentages of main ideas and main ideas plus details were calculated for each participant. The same special education teacher was trained in scoring the main ideas and details as for the coding. Inter-observer agreement was calculated on five percent of the sample to verify the scoring protocol and the overall agreement was 83%.

Chapter Four

Quantitative Results

Introduction

This study relied on both quantitative and qualitative measures to answer the research questions related to what high school students do and what high school students perceive that they do while reading expository text. This study used the transcripts of the verbal protocols of the twenty-five students to quantify multiple aspects of what students do while reading expository text. The verbal protocols were analyzed to determine the types of utterances the students made outside of reading the text. An utterance was defined as a statement made outside of the text and was separated by pauses made by the student in his/her speech. Each utterance was coded in one of three categories (knowledge construction, monitoring or evaluating) with each category broken into multiple sub-types. Group averages were calculated for each category and sub-type.

Various other quantitative measures were calculated such as amount of turns (read words coupled with spoken words), the amount of words read and spoken per turn, and miscues of read words. These quantitative measures of the verbal protocol assisted in describing the similarities and differences between the two groups when reading expository text. Additionally, the study used the Metacognitive Awareness of Reading Strategies Inventory (MARSI) to measure the students' self-perceptions of what they do when they read expository text. Finally, two comprehension measures were used to assess the students' comprehension while performing the verbal protocol.

Knowledge Construction

The majority of spoken utterances fell within the category of knowledge construction with a total of 463 knowledge construction utterances out of 589 overall utterances or an overall of 78.6%. Within knowledge construction, the majority of the utterances were paraphrases (259) and rereads (175) with prior knowledge (13), integration (8), speculating beyond the text (4) and visualization (4) making up the rest of the utterances. Within group comparisons showed that the above average readers made some type of knowledge construction utterance 88% of the time, while the students with learning disabilities made knowledge construction utterances 72% of the time. See the table below for the percentage breakdown for each group within knowledge construction utterances.

Table 4. Knowledge construction group totals

GROUP	TOTALS	PARA-PHRASE	RE-READ	VISUAL-IZATION	SPECULA-TING BEYOND	PRIOR KNOW-LEDGE	INTEGRA-TION
LD	71.9%	54.8%	41.1%	1.6%	0.4%	2%	0%
	N(248)	N(136)	N(102)	N(4)	N(1)	N(5)	N(0)
AA	88%	57.2%	33.9%	0%	1.3%	3.7%	3.7%
	N(215)	N(123)	N(73)	N(0)	N(3)	N(8)	N(8)

Individually, utterances for students in both groups tended to be grouped into one or two categories. Of the students in the AA group, ten of the twelve students demonstrated comments from the two or less sub-types in the knowledge construction category.

Typically, students used some combination of paraphrasing and/or rereading. Likewise, in the LD group, ten of the thirteen students demonstrated comments from two or less sub-types, again typically paraphrasing or rereading comments. Thus, the majority of the students in both groups stuck to one type or two types of comments within the knowledge construction category. See the graphs below for the by participant, within group breakdown.

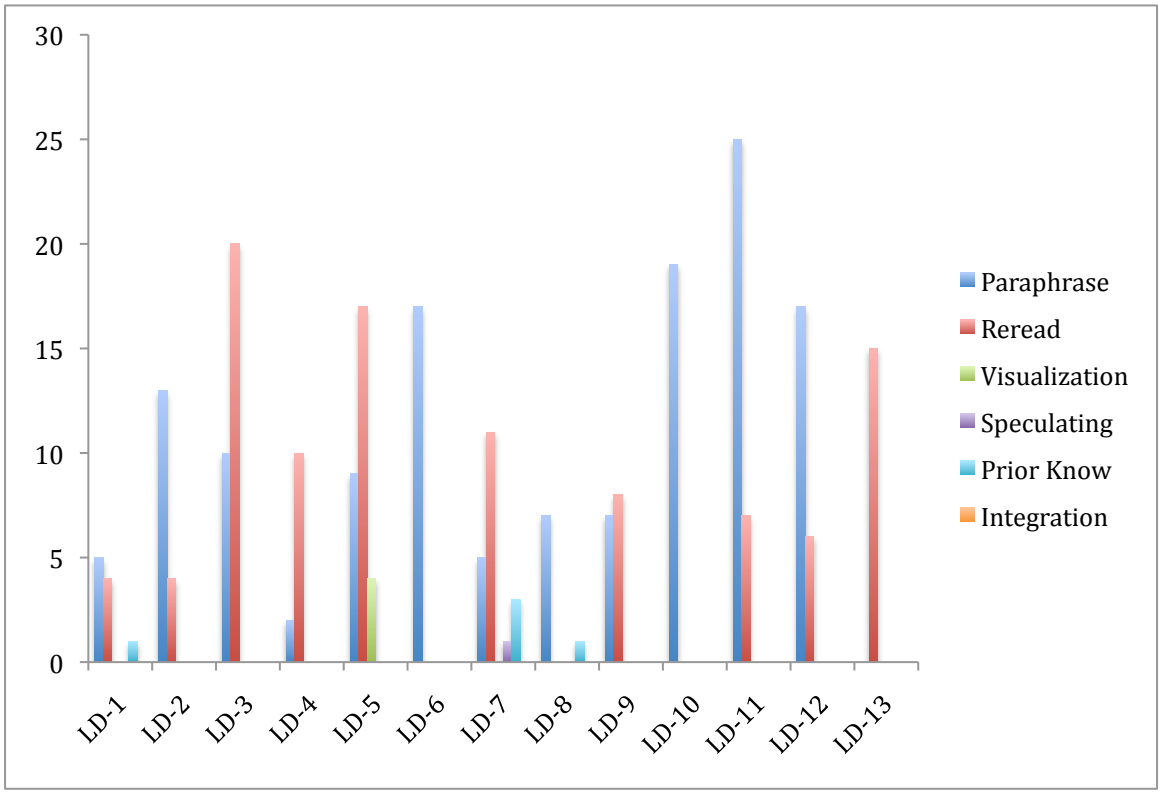

Figure 1. Learning-disabled readers knowledge construction use

For interpretation of the references to color in this and all other figures, the reader is referred to the electronic version of this thesis (or dissertation).

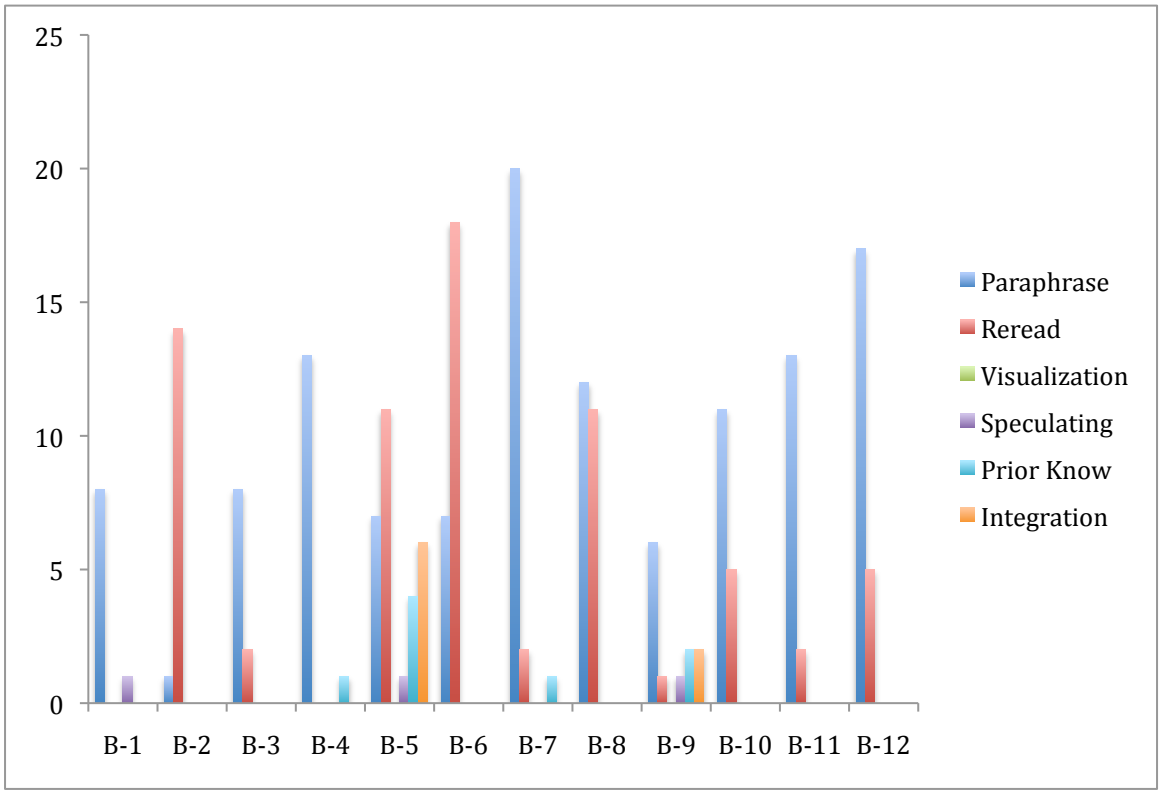

Figure 2. Above average readers knowledge construction use

Monitoring

The monitoring category comprised the next largest category with 92 utterances out of 589 total utterances thus making up 15.6% of all utterances. The students with learning disabilities made more monitoring utterances at 68 (19.7%) than the above average readers who made 24 (9.8%) utterances. The majority of monitoring utterances made by the students with learning disabilities were made in reference to word meanings at 23 (33.8%) utterances. However, the students with learning disabilities were relatively similar in their number of utterance across monitoring content affirming understanding, indicating confusion and indicating a problem with word meaning. The above average readers made the most utterances monitoring content while confirming understanding;

this category made up 14 utterances for 58.3% of their monitoring utterances. The above average readers did not make any utterances indicating problems with word meaning. See the table below for the total monitoring breakdown.

Table 5. Monitoring utterances group totals

GROUP	TOTAL	CONTENT-UNDERSTANDING	CONTENT – CONFUSED	CONTENT QUESTION	WORD MEANING
LD	19.7%	27.9%	30.8%	7.4%	33.8%
	N(68)	N(19)	N(21)	N(5)	N(23)
AA	9.8%	58.3%	33.3%	8.3%	0%
	N(24)	N(14)	N(8)	N(2)	N(0)

Evaluating

Evaluating utterances made up the final category of utterances with the least amount for both groups with a total of 34 (5.8%) utterances made out of 589 total utterances. The evaluative utterances (5) made up only 2% of the total utterances made by the above average readers while the evaluative utterances (29) made by the students with disabilities made up only 8.4% of the total utterances made overall. However, the students in the learning disabilities group made 85.3% (29) of the total utterances in the evaluating category with the above average readers making only 14.7% (5) of the utterances in this category. The majority of the utterances (20) made in the learning disabilities group came

from one student in the category of "negative reaction." See the table below for the break down of the evaluating utterances and categories.

Table 6. Evaluating utterances group totals

GROUP	TOTAL	NEGATIVE REACTION	POSITIVE REACTION	AGREEMENT	DISAGREE-MENT
LD	8.4%	75.8%	10.3%	13.8%	0%
	N(29)	N(22)	N(3)	N(4)	N(0)
AA	2%	60%	0%	20%	20%
	N(5)	N(3)	N(0)	N(1)	N(1)

Events

An event is defined as a pairing of read text with spoken text. An event does not include when the student is sounding out words, adding words (like, "the" or "an") or misspoken words. An event occurs when the student reads the text, pauses and then makes utterances in relation to the text. In order to get a clearer picture of what the students do while they read expository text, events were counted along with the average number of words read and the average number of words spoken for the events. Students in the learning disabilities group had more events with 15.1 average events to the above average readers who had 12.7 events. There was a large range of number of events in both groups with the learning disabilities group having a low of three events to a high of 26 events and

the above average readers having a low of six events and a high of 24 events. Both groups averaged about the same number of words read per event with the learning disabled group reading an average of 51.8 words per event and the above average readers reading 52 words per event. Likewise, the average number of words spoken per event was similar between both groups with the learning disabled group saying an average of 20.8 words per event and the above average readers saying 21.8 words per event. Again, each group had a wide range of words read and spoken per event. See the table below for a breakdown of group averages and ranges for number of events, words read and words spoken.

Table 7. Event averages and ranges

GROUP	AVERAGE # EVENTS	STANDARD DEVIATION	AVERAGE WORDS READ	STANDARD DEVIATION	AVERAGE WORDS SPOKEN	STANDARD DEVIATION
LD	15.1	5.48	51.8	46.27	20.8	18.43
AA	12.7	5.02	52.0	22.96	21.8	16.11

Miscues

Miscues for the read passage were counted in five categories, and the students in the learning disabled (LD) group had the highest averages of miscues in the read passages. Even though all passages were at the student's individual reading level, the LD students generally demonstrated a choppier reading style due to the amount of miscues which included misspoken words, missed punctuation, unknown words, omitted words and

added words. Misspoken words were counted when a student stumbled on a word or changed the tense of a word. For instance, a student would say, “base” for “basin” or “river” for “rivers.” The students in the LD group averaged 21.2 misspoken words per passage while the students in the above average (AA) group averaged just 3.5 words per passage. The AA students did not miss any punctuation, which was generally a failure to stop at a period and to keep reading through to the next sentence. The LD group had a total of 10 missed punctuations, however one student had five, one had four and the other student had one, so 10 of the 13 students in the LD group did not have any missed punctuation. Unknown words were further evaluated to determine if the student resolved it correctly or incorrectly. Unknown words were counted when a student attempted to sound out the word. Again, the students in the AA group did not have any unknown words. However, the students in the LD group averaged 18 unknown words per passage with 32.9% of those words resolved correctly and 67.9% percent of the words resolved incorrectly which included sounding the word out wrong or giving up. The range of unknown words within the LD group was large with one student having no unknown words to one student having a high of 40 unknown words. The student with 40 unknown words resolved four of them correctly. Finally, omitted and added words were counted. Omitted words were counted if the student omitted a word from the read passage, and was typically a small word like, “of” or “the.” The students in the LD group averaged 2.5 omitted words per passage while the students in the AA group averaged 0.25 words per passage. Added words were counted when the student inadvertently added a word to the reading. Again, this was often a small word such as “the” or “in.” Again the LD group averaged more added words with an average of 4.1 words per passage while the AA group averaged 0.75 words per passage. The count

of the miscues demonstrates that even with passages at individual reading levels, the students in the LD group struggle with the fluency of their reading while reading expository passages compared to the AA group.

Metacognitive Awareness of Reading Strategies Inventory

The Metacognitive Awareness of Reading Strategies Inventory (MARSI) was given to the twenty-five students in this study to determine their self-perceptions about the strategies they use when reading expository text. The MARSI is comprised of thirty items that fall into three broad categories. The MARSI uses a likert scale with a low of one to a high of five. Unpaired T-tests were done to compare the two groups in their overall ratings and their ratings in each of the three sub-groups in order to determine if the there was a statistically significant difference between the two groups in terms of their self-perceptions. In each subcategory as well as overall, the students in the AA group rated themselves as more likely to use the reading strategies compared to the students in the LD group further confirming previous studies that suggest that more proficient readers tend to be more metacognitive in their reading (Baker, 1989; S. G. Paris & Jacobs, 1984; S. G. Paris & Winograd, 1990). See the table below for a summary of the statistical analysis.

Table 8. MARSI individual mean scores for LD students

ID	Overall	Global	Problem-Solving	Support
LD-1	2.3	2.3	3.1	1.7
LD-2	2.7	2.8	3.8	1.4
LD-3	1.97	2.0	2.6	1.3
LD-4	2.97	2.9	3.3	3.0

Table 8 (Contd)

LD-5	3.07	2.9	4.1	2.3
LD-6	2.8	2.5	3.6	2.4
LD-7	1.96	1.6	2.6	1.9
LD-8	2.9	2.9	3.4	2.4
LD-9	2.7	2.5	3.1	2.7
LD-10	2.9	2.5	3.4	3.1
LD-11	2.5	2.5	3.1	1.8
LD-12	3.6	3.4	4.4	3.3
LD-13	3.3	3.0	4.0	3.2
Total	2.52	2.61	3.43	2.33

Table 9. MARSI individual means scores for AA Students

ID	Overall	Global	Problem-Solving	Support
AA-1	3.5	3.6	4.1	2.8
AA-2	3.3	3.3	4.8	2.0
AA-3	3.8	3.7	4.6	3.2
AA-4	3.5	3.3	4.1	3.3
AA-5	3.9	4.3	4.3	2.9
AA-6	4.5	4.6	4.9	4.0
AA-7	4.4	4.2	4.3	4.7
AA-8	3.2	3.2	4.0	2.4

Table 9 (Contd)

AA-9	3.8	3.6	4.4	3.6
AA-10	3.3	2.9	3.9	3.3
AA-11	3.7	3.9	3.9	3.1
AA-12	3.4	3.4	3.5	3.2
Total	3.68	3.67	4.22	2.94

Table 10. MARSI group comparison

Strategies	LD	AA	t	df
Overall	2.74	3.69	5.26***	23
	(0.48)	(0.42)		

Note. *=$p \leq 0.005$, **=$p \leq 0.0004$, ***=$p \leq 0.0001$. Standard Deviations appear in parentheses below means.

While it is clear that the LD group rate themselves as using reading strategies less across the board, further inspection does show some similarities between the groups. Both the LD and the AA groups rated themselves as using the strategies in the sub-type Problem Solving strategies the most, which includes such strategies as guessing the meaning of unknown words or phrases, rereading and back tracking. Both groups rated themselves as using the strategies in the sub-type, Global Strategies next in frequency, which includes such strategies as using tables and figures to increase understanding, using context clues and prior knowledge. Finally, each group rated their use of strategies in the sub-type Support Strategies with the least frequency. This sub-type includes, paraphrasing,

summarizing, and using reference materials. Thus, regardless of group, the frequencies of the subtypes were the same. It is not surprising that the AA readers are demonstrating more metacognitive awareness, however, it is interesting to note that the AA and LD readers are proportionately similar.

In order to dig deeper into the rankings to determine further similarities or differences, all scores were averaged for each group across the thirty items and within the subtypes. The scores were then ranked from highest (most used) to lowest (least used) within the subtypes and groups. There were thirteen items in the Global Strategies section. All thirteen items were ranked according to the average score across the group and both groups had the same five of seven items in the top half of the rankings within their group. Thus, both LD and AA students ranked similar strategies as more frequently used in the Global Strategies sub-type as shown in the following table.

Table 11. Rankings for MARSI strategies

LD Ranking	AA Ranking	Statement
2	1	I think about what I know to help me understand what I read.
3	2	I use context clues to help me better understand what I am reading.
3	4	I check my understanding when I come across conflicting information.
4	7	I preview the text to see what it's about before reading it.
5	6	I check the meaning of unknown words or phrases.

Table 11 (Contd)

6	5	I have a purpose in mind when I read.

There were also some similarities in the Problem Solving Strategies sub-group, which had a total of eight statements. Both of the groups gave the statement, "I read slowly but carefully to be sure I understand what I am reading," as the least used strategy within the sub-group. Additionally, both of the groups rated the statement, "when text becomes difficult, I reread to increase my understanding," as second in frequency. Interestingly, the LD group rated, "I try to guess the meaning of unknown words or phrases," as the most used strategy in this sub-group, while the students in the AA group rated that as one of the least used strategies in the sub-group. Considering that the LD students averaged 18 unknown words per reading passage and the AA students did not average any unknown words, it is not surprising that the LD students rated "I try to guess the meaning of unknown words or phrases," as a strategy that they use often. Additionally, the AA students would not need to guess the meaning of unknown words or phrases for the passages read as none of the AA readers demonstrated that they came across unknown words in the read passages. Clearly the students in the LD group had more problems with word identification than the AA students.

Finally, the students in the AA group rated "I try to get back on track when I lose concentration," as the most used strategy, while the students in the LD group rated that third in frequency.

The Support Strategies group had nine statements and was overall rated as the least used sub-group. However, this sub-group had many similarities in rankings between the LD and AA groups. Both of the groups rated "I paraphrase to better understand what I read," as the most used strategy and "I go back and forth in the text to find relationships among ideas in it," as the second most used strategy. Additionally, both of the groups rated, " I underline or circle information in the text to help me remember it," as the third most used strategy. Finally, both groups rated, "I take notes while reading to help me understand what I read," as the least used strategy in this sub-group.

While the MARSI clearly showed that the students in the AA group rate themselves as using reading strategies at a more frequent rate than their peers in the LD group, the two groups show similarities in the strategies that they use more frequently within their groups. Hence, the above average readers and the readers with learning disabilities are using similar strategies but to different degrees of frequency.

Comprehension Measures

Two different comprehension measures were used in this study. First, students answered multiple-choice questions about the passage after performing the verbal protocol. The purpose of this was to verify that the verbal protocol did not interfere with the students' understanding of the passage. Students in the LD group scored an average of 77% on the multiple-choice measure with a range of 50% to 100%. Students in the AA group scored an average of 95%, with a low of 70% and a high of 100%. The multiple-choice questions included five literal and five inferential questions. The LD students scored an average of 75.38% on the literal questions with a range between 20% and 100% while the AA students scored an average of 91.67% on the literal questions with a range of 60%

to 100%. On the inferential questions, the LD students scored an average of 78.46% with a range between 20% and 100%, and the AA students scored an average of 98.33% with a range between 80% and 100%. The individual scores are listed in the table below.

Table 12. Above average readers multiple choice comprehension scores

Identification	Literal	Inferential
AA-1	100%	100%
AA-2	60%	80%
AA-3	100%	100%
AA-4	100%	100%
AA-5	100%	100%
AA-6	100%	100%
AA-7	80%	100%
AA-8	100%	100%
AA-9	80%	100%
AA-10	80%	100%
AA-11	100%	100%
AA-12	100%	100%
Total Mean	91.67%	98.33%

Table 13. Learning disabled readers multiple choice comprehension scores

Identification	Literal	Inferential
LD-1	20%	100%
LD-2	100%	100%
LD-3	100%	80%
LD-4	80%	60%
LD-5	80%	80%
LD-6	40%	80%
LD-7	100%	100%
LD-8	100%	80%
LD-9	80%	20%
LD-10	60%	100%
LD-11	80%	100%
LD-12	80%	60%
LD-13	60%	60%
Total Mean	75.38%	78.46%

The second comprehension measure was a written retell of the passage, which was used to set the purpose for the reading. Each student's written retell was coded on an excel sheet listing all the main ideas and details for the passages. The number of main ideas and details across the different level passages were matched. There were six possible main ideas in the passages and 52 details for a total recall (main idea and details) of 58.

Percentages of the main idea recall and the total recall (details and main ideas) were calculated and averaged for each group. Students in the LD group averaged 19.24% of main idea recall while students in the AA group averaged 51.41% of main idea recall. Likewise the LD group demonstrated 9.01% of total recall from the passage while the AA group average 24.71% of total recall. The table below lists the individual scores for all participants on both main idea recall and total recall.

Table 14. Above average readers written recall

Identification	Main Idea	Total Recall
AA-1	50%	27.5%
AA-2	0%	6.9%
AA-3	33.3%	17.2%
AA-4	66.7%	24.1%
AA-5	50%	29.3%
AA-6	66.7%	34.5%
AA-7	66.7%	29.3%
AA-8	66.7%	27.6%
AA-9	16.7%	10.3%
AA-10	66.7%	32.8%
AA-11	66.7%	32.8%
AA-12	66.7%	24.1%
Total Mean	51.4%	24.7%

Table 15. Learning disabled readers written recall

Identification	Main Idea	Total Recall
LD-1	0%	6.9%
LD-2	0%	10.3%
LD-3	50%	19%
LD-4	0%	3.4%
LD-5	16.7%	8.6%
LD-6	0%	5.2%
LD-7	0%	3.4%
LD-8	66.7%	20.7%
LD-9	0%	5.2%
LD-10	33.3%	10.3%
LD-11	66.7%	15.5%
LD-12	16.7%	3.4%
LD-13	0%	5.2%
Total Mean	19.2%	9.0%

Unpaired t-tests were done to compare the two groups written retelling. Percentage of main ideas and total recall (main ideas plus details) for each group was tested, and it was determined that the groups were statistically different. See the table below for the t-test results.

Table 16. Written retell t-test

Categories	LD	AA	t	*df*
Main Ideas	19.24 (26.23)	51. 41 (22.99)	3.25*	23
Total Recall	9.01 (5.95)	24.71 (8.88)	5.23**	23

Note. *=p = 0.0035, **=p < 0.0001. Standard Deviations appear in parentheses below means.

The written retell was also compared to the verbal protocol analysis to determine if the knowledge construction comments such as paraphrasing or rereading were mirrored in the written retell. Overall, the students in the AA group had more knowledge construction comments in the written retell with 25.4%, compared to the LD group, which had 14.3% of their verbal protocol comments reflected in the written retell. Further analysis showed that the AA group had more paraphrasing comments (37.9%) and more rereading comments (18.3%) reflected in their written retells than the LD group, which had 27.3% paraphrasing comments and 4.5% rereading comments. The tables below show the individual breakdown of the comparisons between the verbal protocol analysis and the written retell.

Table 17. LD percentages of verbal protocol analysis comments in written retell

ID	Total	Paraphrasing	Reread	Other
LD-1	11.1%	20.0%	0%	NA
LD-2	35.5%	46.2%	0%	NA

Table 17 (Contd)

LD-3	13.3%	20.0%	10%	NA
LD-4	3.3%	10%	0%	NA
LD-5	6.7%	11.1%	0%	25% (visualization)
LD-6	35.3%	35.3%	NA	NA
LD-7	6.7%	25%	0%	NA
LD-8	25%	14.3%	NA	100% (prior knowledge)
LD-9	6.7%	14.3%	0%	NA
LD-10	15.8%	15.8%	NA	NA
LD-11	18.8%	24.0%	0%	NA
LD-12	13.0%	11.8%	16.7%	NA
LD-13	13.3%	NA	13.3%	NA

Table 18. AA percentages of verbal protocol analysis comments in written retell

ID	Total	Paraphrasing	Reread	Other
AA-1	44.4%	50%	0%	NA
AA-2	20.0%	0%	21.4%	NA
AA-3	30%	37.5%	0%	NA
AA-4	14.3%	15.4%	NA	0% (prior knowledge)
AA-5	20.7%	42.9%	9.1%	40% (prior knowledge and speculating beyond text)

Table 18 (Contd)

AA-6	34.6%	62.5%	22.2%	NA
AA-7	30.4%	35.0%	0%	NA
AA-8	18.2%	16.7%	18.2%	NA
AA-9	27.3%	16.7%	0%	100% (Visualizing)
AA-10	43.8%	45.5%	40.0%	NA
AA-11	46.7%	53.8%	0%	NA
AA-12	40.9%	47.1%	20.0%	NA

While the quantitative analysis showed differences between the two groups in their strategy use, metacognition and comprehension, there were also some proportionate similarities. Further analysis in chapters five and six will highlight these similarities and differences.

Chapter Five

Qualitative Results

Introduction

In addition to quantitative methods to describe high school readers, qualitative methods where employed to examine the high school readers on a more individual level. The main research question seeks to investigate what high school readers do while reading expository text, and two of the sub-questions are related to investigating how the above average readers and their peers with learning disabilities are qualitatively similar and different. One sub-question is related to how students demonstrate their use of knowledge construction, monitoring and evaluating when reading expository text and one sub-question is related to their self-perceptions of what they do while reading expository text. The following section examines three meaning construction profiles that emerged from the data and six case studies of the twenty-five participants in a more in-depth manner to better demonstrate similarities and differences in both their approaches to reading expository text and their perceptions of what they do when they read expository text. The six case studies were chosen from their respective categories because they demonstrated a good representation of the category.

There were three main categories of meaning construction that student profiles fell into when examining the broad question of what students do when constructing meaning while reading. The first category is *Single Knowledge Construction Strategy Use,* which is characterized by the student using predominately one type of knowledge construction strategy in the think aloud protocol, typically rereading or paraphrasing. The second category is *Patterned Knowledge Construction Use,* which is characterized by the students

using a patterned approach to knowledge construction by moving back and forth between rereading and paraphrasing. Finally, a *Multiple Strategy Use* category emerged in which students demonstrated using multiple knowledge construction strategies without any type of back and forth pattern characterized. The following table gives a break down of the categories and the number of AA and LD students in each category.

Table 19. Strategy use category totals

Category	# AA	% AA	# LD	% LD
Single Use	6	50%	6	46.2%
Pattern Use	4	33.3%	5	38.5%
Multiple Use	2	16.7%	2	15.3%

Single Knowledge Construction Use

Within the category of knowledge construction, there were six sub-categories. Most students employed more than one sub-category when reading expository text, however, many demonstrated only limited flexibility. The preference for a single use of sub-category demonstrates a similarity on the surface between the readers in the two groups and warrants a closer examination of the verbal protocol. Sara and Colleen were chosen from the 12 students who demonstrated this single use because they both used rereading for knowledge construction.

The two students who demonstrated a clear preference for rereading were Sara, an above average reader and Colleen, a student with a learning disability. Sara read the twelfth-grade passage, while Colleen read the eighth-grade passage. Both students made roughly the same number of rereads in their passages, however, beyond the number, their

think alouds were quite different. Ironically, their comprehension measures and self-perceptions were similar.

Sara's approach to rereading was dispersed throughout the passage and more targeted. Sara tended to reread only sections of sentences versus whole sentences or paragraphs. For instance after reading the following two sentences, "The land area surrounding the river is a drainage basin or watershed. Correction of a pollution problem in a river must consist of an integrated approach, and should include measures to correct all the sources of pollution within the river basin or land area," she chose to reread, "Integrated approach, source of pollution within the river basin or land area." After rereading, Sara went on to the next paragraph. In the beginning of the passage, Sara would read three to four sentences of the text and then chose to reread, typically only the final part of the paragraph. Toward the end of the passage, she would read a sentence and then reread part of the sentence and move on to the next sentence.

Colleen demonstrated a different use of rereading. She would read one to two paragraphs and then reread the end of the final paragraph. Colleen would reread whole sentences. It did not appear that she was looking for anything in particular, she would just loop back to a point in the paragraph and reread until she had gotten to what she had not read and she would continue reading the text. Colleen had three big chunks of rereading versus Sara's back and forth method. Colleen would read a couple of paragraphs and then reread three sentences, read a couple more sentences, reread four sentences, read another paragraph, and then reread eight sentences. Finally, she finished reading the passage and did not go back and reread at the end. At the end of Sara's passage, she reread the conclusion. These two different styles of rereading demonstrate that rereading is not a

straightforward endeavor and may be more complicated. Additionally, Colleen demonstrated more problems with fluency and word recognition, which may have led her to reread paragraph endings in order to look for a conclusion or to make sense of the paragraph as a whole.

Unlike Sara's reading of the twelfth-grade passage, which was fluent, Colleen's reading of the eighth-grade passage was choppy and labor intensive. Colleen read two sentences within the whole passage without having a pronunciation problems or having to stop and sound out a word. Colleen frequently struggled with the pronunciation of words, but would make a best guess and continue on in the reading. For instance, Colleen had a hard time pronouncing the word, "industry." She pronounced it, "in-dur-dustry" or "in-du-dustry," throughout reading the passage and throughout the reread. She also struggled with the words, "agriculture" and "sewage," but was able to pronounce both correctly by the end of the passage.

Ironically, both Sara and Colleen struggled with both comprehension measures despite their different approaches to rereading. Sara scored a seven out of ten on the multiple-choice questions while Colleen scored a six out of ten on the multiple-choice questions. Both readers missed the questions about water pollution problems being more complex in the future which was a main idea of the passage as a whole. They both also missed the question about the number of primary pollution sources, again a main idea of the passage overall. Both students indicated that there were two main sources of water pollution, however, the passage devotes a paragraph to introducing the three main sources, and there is an individual paragraph about each source.

On the written retell, Sara was able to retell four details and no main ideas, while Colleen retold three details and no main ideas. In Sara's retell, she focused on details versus main ideas and got some details wrong or mixed up. For instance, she wrote, "some waste reduction methods are more complex than others, involving more advanced procedures." In the passage, she reread the following section, "rapidly expanding industries that involve more and more complex chemical processes will produce larger volumes of liquid wastes." The passage never talked about waste reduction methods or advanced procedures; waste reduction was never mentioned. On the other hand, Colleen's retelling was very broad and then also mentioned some minor details. Colleen started her retell by listing that the passage was, "about pollution." The passage was specifically about water pollution and the three sources, however, she never mentions the water or three sources. Colleen also states that, "things they are doing so they can fix the problem of pollution." Similar to Sara, however, the passage never talked about solutions to the pollution problem.

Sara and Colleen both had an overall score of 3.3 (on a 1 through 5 likert scale) on the Metacognitive Awareness of Reading Strategies Inventory (MARSI). This would indicate that they had an overall perception of medium reading strategy use. Interestingly, they both (Sara – 4, and Colleen – 5) rated themselves as using paraphrasing frequently when reading expository text, however, they did not demonstrate that strategy. Additionally, both indicated that they frequently (Sara – 4, and Colleen – 5) use tables and figures to aid in understanding, but neither of them demonstrated that strategy either. They both rated themselves as frequently (Sara and Colleen – 5) using rereading to help them understand the text, which was clearly evident. Overall, the students in the above average group rated themselves as using reading strategies in general more frequently than the students in the

learning disabled group, so it is interesting to note that these two students rated themselves very similarly.

Sara and Colleen both used re-reading as a main strategy for reading and understanding text. However, Sara tended to go back and forth more, reading smaller portions of text and circling back to reread partial sentences of the text. Colleen had a more chunky style of rereading as she would read large sections of the text and go back and reread multiple sentences of the text. While their styles were different, their outcomes were somewhat similar in that they were not very efficient at recalling main ideas or details on the written retell and their scores on the multiple-choice comprehension assessment were relatively poor. Additionally, both readers seemed to be somewhat aware of their preference for rereading on the MARSI, but also rated themselves as frequently using strategies that were not demonstrated.

Patterned Knowledge Construction Use

Some students relied on a patterned approach by rereading and then paraphrasing to construct knowledge of the passage. Two students who demonstrated this approach were Jack, a student with a learning disability and Kurt, an above average reader. Jack and Kurt were chosen because they both demonstrated this approach and additionally, they both demonstrated roughly the same amount of turns based on rereading and paraphrasing, making them a good qualitative match. Jack read the seventh-grade passage and made twenty rereading comments and ten paraphrasing comments. Kurt read the twelfth-grade passage and made eleven rereading comments and twelve paraphrasing comments. On the comprehension measures, Kurt scored ten out of ten correct on the multiple-choice questions while Jack scored nine out of ten correct. On the written retell,

Kurt recalled slightly more information than Jack. Their self-perceptions of reading strategy use were vastly different.

Even though both Kurt and Jack used a pattern of rereading and paraphrasing to construct knowledge of the passage, their individual approaches were quite different on a length and depth level. Kurt generally read at least three sentences before he would pause and go back to reread or paraphrase. Indeed, on average, Kurt read 39.9 words before pausing to reread or paraphrase, and then spoke on average 26.1 words before returning to the passage. In contrast, Jack read on average 30.9 words before rereading or paraphrasing and then spoke only 15.6 words on average. For example upon reading about how water flows from a river into a lake or ocean and that reflects everything that happens on the land, Kurt said, "so, water that flows from a river into a lake or ocean reflects what happens on land," while Jack said, "rivers into lakes or oceans." The shorter, less in depth snippets of rereading were more indicative of Jack. The passages end by stating that water pollution problems will become worse and more complex in the future. Kurt paraphrases the following, "So there will be a lot of water problems in the future because population is increasing and there's going to be more sewage and a lot of demand for wat…, the demand for water will rise." Jack states, "Pollution will get larger from human waste." Kurt is able to explain a relationship between higher population, more sewage and more demand for water, while Jack's paraphrase is more one-dimensional stating that human waste will increase, but not explaining why.

Both Kurt's and Jack's reading of the passages was quite fluent. Kurt made no errors of misspoken words, unknown words, omitted or added words. On the other hand, Jack did make a few mistakes while reading, but was still relatively fluent. For instance, Jack would

change the tenses for words, like saying, “comes,” for come or “waste,” for wastes. Occasionally, he would add a word like, “the,” or skip a word like, “more.” Overall, he was able to read the passage with little trouble.

Both Kurt and Jack demonstrated good comprehension on the multiple-choice questions. Kurt got all ten questions correct, while Jack got one question wrong. Jack felt that the passage was “argumentative,” versus an “explanation.” Jack did get all the detail questions correct. On the written retell, Kurt identified four of six main ideas while Jack identified three of six main ideas. In his written retell, Kurt was more tuned in to the introductory paragraph, which outlined the rest of the passage. The main idea from that paragraph was that there are three main sources of water pollution on land, agriculture, humans and industry. Kurt retold the main idea and eight of the ten details in that paragraph. In contrast, Jack retold that water pollution came from agriculture, humans and industry, but never put them altogether as the three main sources of water pollution. This may indicate that Kurt was more in tune to the structure of the passage than Jack.

Both Jack and Kurt retold information in the passage in sequence or chunks. Jack retold that industries use water to cool equipment, equipment made the water hot, the hot water was discharged into streams and rivers. Kurt retold the rest of the paragraph, that thermal pollution occurs when hot water is discharged into streams and lakes, and that plants and animals are harmed because of this action. It is important to note that the high school where this research was done is located close to a major industry that uses water to cool equipment. While neither of these students commented on this industry, two other students directly commented on this fact, so the chunked information may be due to prior knowledge, however, neither Jack nor Kurt commented on this directly. In the verbal

protocol, Jack reread the section on thermal pollution while Kurt paraphrased the section; focusing mostly on how thermal pollution killed the plants and animals, so it was not a surprise to see this on his written retell. Again, Kurt seems more focused on the conclusion as demonstrated by his mention of how hot water pollutes. Jack stops short of this and states only that hot water is introduced into the lakes, not why that is bad.

Kurt and Jack have very different self-perceptions of the reading strategies they use while reading expository text. Overall, Kurt rates himself as using reading strategies at a medium rate (3.2), while Jack rates himself as using reading strategies at a low rate (1.97). Indeed, Kurt rates himself higher in every category, especially in problem solving strategies (4). Jack also rates himself as using problem solving strategies more than any other sub-group of strategies (2.6), but he still rates the frequency of use a below what Kurt rates himself (4). Likewise, Kurt rates that he uses rereading to help him understand material as a four and Jack rates that he uses rereading as a three. They both used rereading as a primary source for constructing knowledge, however, Jack indicates that he does it "sometimes," while Kurt indicates that he "usually," rereads. Ironically, they both indicated that they "never or almost never," paraphrase to help them understand material while both demonstrated paraphrasing as an often-used strategy. It is unclear why students are sometimes off target with what they do and what they say they do with regard to reading strategies. Perhaps the students are not fully aware of the strategies they utilize because they are not purposefully and consciously using the strategies.

Kurt and Jack are two students who demonstrated a similar pattern of strategy use moving back and forth between rereading and paraphrasing. However, Kurt demonstrated a more in-depth use of the strategies along with a more in-depth ability to recall the

information that was read. Finally, Kurt rated himself as using reading strategies more frequently than Jack although, their self-ratings were parallel with Jack rating himself as using the strategies less across the board.

Multiple Strategy Use

Four students used multiple strategies from both knowledge construction and monitoring when reading the passages. Anna and Mary were profiled because Anna demonstrated a diverse use of strategies, and Mary was chosen because she also demonstrated a wide range of strategy use and the other student in the LD group who used a variety of strategies relied on visualization, which was not demonstrated by any other student. Anna is a twelfth-grade student in the above average readers group who read the twelfth-grade passage, while Mary is an eleventh-grade student with a learning disability who read an eighth-grade passage. Both students used rereading the most, followed by paraphrasing, use of prior knowledge and speculating beyond the text. Anna also made comments integrating the pictures into the text meaning. Both students used the most monitoring comments in their respective groups. Both made comments about the content in regards to understanding the content, being confused by the content or asking a direct question about the content of the text. Additionally, Mary made comments about understanding the meanings of individual words while Anna made no such comments. Thus in terms of amount of strategies demonstrated along with the relative rate of strategies, their verbal protocols are similar. On their multiple-choice comprehension assessment, both students demonstrated that they understood the passage by answering all ten questions correctly. However, on the written retell, Anna was able to retell many

more details and main ideas than Mary. Likewise, their self-perceptions of reading strategy use are vastly different.

The main difference between Mary and Anna's style is purposefulness. Mary begins reading the first paragraph, skipping the title, getting caught up on a word and one of her first comments is, "I don't get that," which forces her to begin again with 18 lines of rereading and monitoring to attempt to understand the first paragraph of the passage. Mary ends the 18 lines with, "I semi-get that you know it's just not clicking," and moves on to continue reading. The article talks a lot about sewage being related to water pollution, and Mary makes the connection between sewage and "poop." Mary finds this "gross," and comments on it a lot. For instance, after reading, "Most water pollution from large farms comes from animal wastes," Mary comments, "animal poop, not wastes that's gross." She seems so fixated on the poop and how gross it is that she never really makes all the connections in the article. This is not new, and studies have shown the young children and students with LD may struggle to recognize intrusive information when reading expository text (Englert & Hiebert, 1984; Englert & Thomas, 1987).

After her initial lengthy attempt to really make sense of what she is reading, it appears that she mostly gives up and comments on parts of the article that pertain to poop or that she really does not understand. For example, she reads, "Finally, humans contribute to water pollution through sewage. Sewage includes human wastes, garbage, and water…." She stops part way through this sentence and says, "ewwww poop again and its human poop, ewww. Okay where was I at? Okay." She essentially loses her place and train of thought and has to regroup and continue on. It seems like Mary is reading the words and sentences as discreet separate facts. She does not make an attempt to integrate any

information, nor does she make connections between the paragraphs. Her written retell demonstrates this. The entire written retell is, "I remember it talking about the poop going into the lakes and rivers. I also remember stuff about the septic tanks." While Mary on the surface, demonstrates the use of many strategies, she does not use them effectively to make connections within the reading.

Anna's reading is highly purposeful. She is immediately looking for connections and structure. The title of the article is, "Water Pollution Problems." There was also an "F" on the title line to indicate to the researcher that this was passage F or the twelfth-grade passage. Anna read the title and the first sentence and then comments, "flows, I don't know, maybe that has something to do with F, into a lake or ocean." Not a single student in the study other than Anna ever commented on the F, let alone tried to find meaning with it. She quickly abandons the idea that F is in anyway significant, but she is clearly aware of the text and looking for ways to construct meaning.

All of the passages had three pictures connected to the reading. Anna was one of only two students who commented or appeared to even look at the pictures. None of the students in the group with learning disabilities looked at or commented on the pictures. Anna read the first three lines of the article and immediately looked at the picture to attempt to integrate it into the reading. She comments, "looking down at the picture, I don't know." She then continues reading and goes to the picture again saying, "Um, I should look at the picture." She then sums up the reading and integrates it with the picture by saying, "You have soil, manure, fertilizers all running into the pond or lake or river. I don't know what it is let me look up." She then looks back at the article and rereads, "The water that flows from a river into a lake or ocean." She then comments on the picture again, "Okay, so

that's a lake or ocean." She is very purposeful in understanding the reading along with the picture. Anna does this with each of the three pictures, purposefully, reads, rereads, paraphrases, and makes monitoring comments indicating if she understands or does not understand how the reading and the picture are connected.

Anna's use of rereading is also purposeful. She comments, "Nitrogen and phosphorus, were those mentioned earlier?" She then pages back into the article intent on finding the answer to her question. She rereads seven lines and at one point comments that what she is looking for is further back. She then finds what she is looking for and says, "Nitrogen and phosphates, phosphorous, different things." She thought she had read about phosphorous and she had read about phosphates and concludes that they are not the same. This is a fairly small detail, but her searching was purposeful and directed, not because she lost her place or train of thought.

There was one sentence in the article that was incongruous to the article and did not belong. This sentence tripped up a couple of students, but the majority of students accepted it and moved on. The sentence was in the paragraph on lagoons used to store toxic animal wastes. It reads, "Fish for human consumption are raised in large livestock farms." Mary and Anna both dealt with this sentence in different ways. Mary, read it and initially indicates that she does not understand the line, so she reads it again, and says, "I don't get that." Mary then reads it for a third time and then says, "I don't get that word. Like what it means, that's my only problem." Mary then asks the researcher what consumption means and is told eating. She says, "Ohhh, kinda get it now," and reads the line for the fourth time. Finally, she says, "okay, alright." She accepts the sentence even though she is clearly still a little unsure about its meaning.

Anna on the other hand is a little put off by the line. She reads it and immediately says, “What?” and rereads the line. She is clearly agitated and after reading the line a second time says, “I don’t know what that means, I don’t what that is, I don’t know what that means in this paragraph.” She dismisses the line and does not spend any more time on it as she has come to the conclusion that, “I don’t know what that means in this paragraph,” which is vastly different than not understanding the meaning in general. Anna is clearly monitoring the structure of the paragraph and does not see how that statement is relevant because it is not relevant in the paragraph at all.

As noted, Mary’s written retell is short, unfocused and lacking in detail. In contrast Anna’s written retell takes up almost one full page of writing and includes a sketch of a septic tank similar to the one in the passage. Her written retell captures three main ideas and 14 details in the reading. Additionally, Anna chunks (two consecutive idea from a category) eight times; clearly making connections between pertinent details in the passage. On the multiple choice comprehension measure, both students were able to answer all ten questions correctly, which demonstrates that Mary understood basically what she had read.

On the Metacognitive Awareness of Reading Strategies Inventory (MARSI), Anna rated herself overall as using strategies at a high level (4.4 out of 5), while Mary rated herself as lower (1.96 out of 5). Clearly, Anna feels that she uses reading strategies more frequently. The MARSI is broken into three categories, Global Strategies, Problem-Solving Strategies, and Support Reading Strategies. Anna rated herself as using the strategies in each category on average between “usually” and “almost always.” Mary rated herself as using the strategies in each category on average between “never to almost never” to

"occasionally." There was not a single category that was rated a lot higher than any other category for either one of them and neither of them showed a preference for a specific category within the verbal protocol.

While on the surface, there seemed to be similar approaches between some students with learning disabilities and some students who are above average readers, there are qualitative differences upon closer inspection. The students using the single strategy preference had the most similarities in both their approach and MARSI score. As the strategy approach became more varied, the underlying differences between the two groups became more visible. In the multiple strategy use profile, the difference in purpose and planning is clearly visible in the profile of the above average reader. The profile of the student with a learning disability showed multiple strategy use, but not in an effective, planned manner. Additionally, the student with the learning disability was not able to effectively capture the reading in a written retell, and rated herself as using most strategies at a low frequency.

Chapter Six

Discussion

This study focused on what high school students do when reading expository text. By the time a student reaches the upper grades of high school, they have received almost twelve years of formal schooling in literacy, and expectations from society that those students can use that training to become productive members of their communities is high. However, little research has been done to examine how high school students translate those twelve years of instruction into making sense of expository text. Hence the purpose of this study was to take a snap shot of high school readers while they were reading expository text to determine what they did while reading. Additionally, this study aimed to examine how effective those students were and how self-aware those students were of their use of reading strategies. Finally, this study focused on above average students as well as students with learning disabilities. Hence the overarching question for this study was, what do above average and learning disabled eleventh and twelfth grade readers do while engaged in reading expository text? Additionally, there were seven specific subcategories of research questions. In order to provide a comprehensive snapshot of those questions, a data summary table is provided below.

Table 20. Data summary

Research Question	Findings AA	Findings LD	Interpretation
a. What knowledge construction processes?	Paraphrase (55%) Reread (41%)	Paraphrase (57%) Reread (34%)	Both groups quantitatively used the same two strategies the most.

Table 20 (Contd)

b. What monitoring processes?	Content – understanding (58%) Word meaning (0%)	Content – understanding (28%) Word meaning (34%)	Students in the LD group had a much higher rate of comments related to unknown word meanings despite reading at their reading levels. It appears that students in the LD group struggled more with content at the word level than at the content level.
c. What evaluating processes	Total comments (2%)	Total comments (8%)	Small amount of overall evaluative comments. Majority (67%) of evaluative comments in LD group came from one student.
d. How are AA and LD readers qualitatively different?	Targeted rereading and paraphrasing; longer passages read, longer responses; purposeful in strategy use	Caught up on words meanings, less targeted rereading and paraphrasing	While both groups used similar strategies, the AA readers tended to use strategies to a greater depth and in a more purposeful manner. Additionally, AA students did not struggle with word level meanings.
e. What are the self-perceptions of reading strategy use?	Overall strategy use: 3.69/5.0 Subcategory ranking in importance: 1. Problem Solving 2. Global 3. Support	Overall strategy use: 2.74/5.0 Subcategory ranking in importance: 1. Problem Solving 2. Global 3. Support	In each category and overall, AA students self-perception of strategy use is higher than LD students. Additionally, both groups ranked the importance of the subgroups the same with Problem Solving strategies being the most important.
f. How are the self-perceptions of AA and LD readers qualitatively and similar/different?	Self-perceptions of strategy use higher	Self-perception of strategy use lower	The main difference in self-perception of strategy use is in degrees. Both groups rank similar strategies as important, however, AA readers report using them with more frequency.

Table 20 (Contd)

g. What patterns or themes emerged?	Single Strategy Use (50%) Pattern Use (33%) Multiple Use (17%)	Single Strategy Use (46%) Pattern Use (38%) Multiple Use (15)	While both groups demonstrated similar frequencies of strategy use patterns, at a qualitative level, the AA group demonstrated a more targeted and conscious use of strategies.

For a more in depth discussion, the above sub-questions can be pooled into three sub-topics:

1. How do students use *knowledge construction, monitoring*, and *evaluating* to understand expository text?
2. What are the students' *self-perceptions* of their strategy use?
3. What *reading profiles* emerged from the verbal protocols?

Knowledge construction, Monitoring, and Evaluating

Reading is a vastly complex endeavor that is not easily captured in it entirety. In order to capture as much of the reading profile as possible, the framework outlined in Pressley and Afflerbach's book, *Verbal Protocols of Reading: The Nature of Constructively Responsive Reading* was utilized. This framework consists of three distinct reading processes that are intertwined, but deconstructed to allow for analysis. The first and foremost process was knowledge construction. In this study, knowledge construction processes were by far used the most by the participants followed by monitoring and then evaluation. This was perhaps due to the nature of the task, which was to read a passage on water pollution for understanding.

By far paraphrasing and rereading were the strategies within knowledge construction that students used the most and often used together. Students did not appear particularly flexible with the strategies that they used and often their strategy use had a pattern or cadence to the way it was used. Most students read the passage and then employed either paraphrasing or rereading. Again, this could have been the nature of the reading task, to read the 500 plus passage for understanding. Contrary to other studies that found that good readers are highly flexible, most of the students observed, were not particularly flexible. This was true of both above average readers and students with learning disabilities. The studies that found that good readers were highly flexible were often done with experts in their respective fields, such as Lundberg's (1987) study of lawyers and Wineburg's (1991) study of historians. In this study, none of the students were experts in water pollution; however, the passage was similar to a typical high school reading assignment. The students seemed to approach this passage as they would any reading assignment that they had no real interest in or passion for, which is probably more representative of general reading requirements in high school.

The students with learning disabilities made far more word level errors while reading aloud than the above average students, which was not surprising. This made their oral reading seem choppier with constant stops and starts in spite of the fact that the students were reading at their own reading level. Despite this, the two groups were surprisingly similar in their knowledge construction profiles in terms of how many times the students chose to paraphrase or reread. However, closer inspection revealed that the students with in the learning disabilities (LD) group paraphrased incorrectly more often (13%) than the above average readers (AA) group (5%). This suggests that the AA readers

are more proficient at paraphrasing. Additionally, when the paraphrasing comments were compared to the written retell comprehension task, the AA students had 37.9% of their paraphrasing comments in their written retells while the LD students had 27.3% of their paraphrasing comments in the written retell. Interestingly, the LD group had only 4.5% of their rereading comments in their written retells, and the AA group had only 18.3% of their rereading comments in the written retells. This suggests that perhaps the LD students would possibly benefit from instruction or additional practice in a particular strategy, such as paraphrasing if that is a strategy that they show a proclivity towards utilizing and if it was a particularly effective strategy in terms of recall.

Students in both groups made less monitoring and evaluative statements overall. Even though all students were reading at their reading level, students in the LD group struggled with word meanings far more often then their counterparts in the AA reader group. A statement was only counted as a monitoring statement if the students made a direct comment about not understanding the word. If a student merely struggled with a word, by attempting to sound it out, it was counted as an "unknown" word. If the student could sound out the word correctly, it was counted as "resolved correctly," and if the student was not able to pronounce the word, it was counted as "resolved incorrectly." Students in the AA group did not have any problems pronouncing any of the words in the passages they read. However, like the monitoring comments about word meaning, students in the LD group struggled with unknown words. Students in the LD group were only able to resolve their unknown words correctly 33% of the time, which means that 67% of the time, the students gave up or came to incorrect conclusions. On the simple comprehension assessment of multiple-choice questions, the students in the LD group averaged 77%

correct (compared to 95% correct for the AA group). This suggests that the word level mistakes and misunderstandings were not great enough for the students in the LD group to completely miss the meaning of the passages. However, it also brings up the question as to how conscious were the decisions of the students in the LD group when it came to giving up on an unknown word and moving on. Did the students in this group lack the skills to figure out the unknown words, or did they decide that some of the words just were not that important in terms of time effort to impact understanding?

There were relatively few evaluative statements made overall by students in both groups. This is not surprising given the task and topic of the passage. Again, the expert readers in their own fields made far more evaluative statements, but they were also experts who had a lot of background knowledge and opinions about the topics that they were reading. The students in this study tended to accept the information with little to no questioning of the information.

Indeed there was a line in each passage that really did not have anything to do with the passage. The sentence in the passage was, "Fish for human consumption are raised on large livestock farms." Overwhelmingly the students accepted the odd statement and moved on. Occasionally, the students would reread the sentence; possibly to make sure they read it correctly. One student in the LD group attempted to integrate the sentence into the passage by saying, "Um, wait animal waste goes in the water and fish eat it and we eat it and we can get sick." There was nothing in the passage about fish eating anything or humans getting sick. Only one student commented that the sentence did not belong in the paragraph and she wondered why it was there. This was a student in the AA readers group. However, across both groups, the students accepted what they read as fact and did not

generally question or make evaluative comments. This suggests that the students were generally not critical readers, which would certainly be a trait of a good reader.

Self-perceptions of Strategy Use

Both sets of students completed the Metacognitive Awareness of Reading Strategy Inventory (MARSI) as a measure of their self-perceptions of strategy use. On one hand the students in the AA reader group rated themselves as using more strategies more often when compared to the students in the LD group. However, when examining the groups, there are many similarities. Both groups of students rated themselves as using the strategies in the sub-type Problem Solving Strategies the most. This included guessing meanings of words, rereading, and backtracking. Furthermore within the sub-types the top strategy use from both groups was similar albeit the LD students still used them less compared to the students in the AA group.

Essentially, the difference between the two groups on the MARSI was one of degrees. This suggests that the students in both groups find similar strategies useful to the degree that the students in that particular group use strategies. Additionally, the rank order of the importance of the strategies between the groups is similar suggesting that students in both groups employ similar strategies to different degrees with the students in the AA group using the strategies more frequently than the students in the LD group. Perhaps students in the LD group would benefit from being more metacognitive of their strategy use, thus employing strategies more frequently.

Reading Profiles

Across the two groups, students generally had a pattern or system to reading the expository text. Most students stuck to between one and three general knowledge

construction strategies when reading. Additionally, most of the students used rereading and paraphrasing. Three different profiles within the two groups emerged beginning with the most simplistic of using one primary strategy and moving to the more complex usage of multiple strategies. It is interesting to note that as the strategy use became more diverse, the differences between the two groups (Above Average readers and students with Learning Disabilities) became larger. When examining the students who used primarily one strategy, both the AA and the LD students struggled with comprehension measures and they both had the same overall score on the Metacognitive Awareness of Reading Strategies Inventory (MARSI). This may suggest that single strategy use is a more simplistic and ineffective plan for reading.

However, when examining the two students who used the most strategies in each group, there were large differences in their comprehension measures and MARSI scores. Additionally, the AA reader who used multiple strategies appeared more purposeful in the strategies she employed. She continually looks for patterns and connections in the reading, and she readily drops lines of inquiry that appear to be unimportant while pursuing what she deems relevant in the passage. On the other hand, the student with the LD seems focused on one main theme that is not an overall relevant theme in the passage. She returns again and again to the idea of human and animal wastes and at the end of the passage is only able to recall that one detail versus the multiple main ideas and details that her AA peer could recall. Additionally, the student with LD, becomes hung up on parts of the passage that she does not understand or a word that she does not understand and may reread multiple times and then give up or abruptly say, "okay," without any real indication that she understood the passage. The student with LD rates herself quite low on strategy

use on the MARSI indicating that she does not believe that she uses reading strategies frequently while the AA reader rates herself quite high on the MARSI.

It is clear that the AA reader who uses multiple strategies does so intentionally and deliberately while her peer with LD does not seem to have a plan of attack and is not purposeful in her reading. This difference is evident in the students' ability to retell important information with the LD student able to retell two details and the AA reader able to retell three main ideas and fourteen details from the passage. It is clear that the LD student is aware of various strategies, however she does not use them in an effective manner.

Implications

It is encouraging to note some similarities between AA readers and readers with LD at the high school level. Additionally, the differences between the two groups have implications for instruction at both the high school level and potentially at the elementary and middle school levels. Students in both groups seem aware of the various reading strategies and are able to use them effectively on passages written at their instructional level to construct knowledge of expository text. Both groups were able to answer sufficient multiple-choice questions to indicate basic comprehension of the passages. However, students in the AA reader group were able to retell more details and main ideas from the passages than the students in the LD group, and students in the AA group demonstrated higher levels of metacognition related to their use of reading strategies. Finally, some students in the AA group demonstrated more planning and purposefulness related to their use of strategies when reading expository text.

Once students get to high school, they are expected to know how to read expository text for information, and most secondary content teachers do not see themselves as reading teachers as that is a skill they expect the students to have. Clearly, not all students are able to read expository text equally well, and some students may need a more direct plan of scaffolded reading instruction to help them develop a purposefulness and metacognition related to their reading of expository text. Reading is a highly complex endeavor, and it is clearly not enough for students to have a big toolbox of reading strategies. Students must know when and how to employ that strategies. Explicit instruction on how and when to use reading strategies may be warranted in the earlier grades. Thus teachers need to have knowledge on how to instruct and scaffold strategy use across grade levels.

Additionally, students in both groups ranked similar strategies as important, however, the LD students were not as metacognitive in terms of reading strategies when compared to AA readers. The findings of this study suggest that LD students would benefit from becoming more purposeful and metacognitive when they are reading. The challenge for teachers is how to increase students' metacognitive awareness of strategy use while reading expository text. This may take the form of more directed practice, rehearsal and modeling for students as they read expository text in all grades.

Another implication is the students' lack of critique of the information that they read. The students in this study accepted and did not question the information presented in the passages. The students were told to read the passages for understanding as they would in class and to understand it enough to take a test and write notes on the passage when they were done reading. Most of the students did not make any evaluative comments about

the article; they accepted the information being presented as fact. However, good readers evaluate what they read, they interact with the text and make judgments about the information presented in the text (Pressley & Afflerbach, 1995). Neither the AA nor the LD readers did this while reading, which may indicate that students are not asked to be critical of expository text often enough to develop this skill.

Limitations

This study of high school readers is limited by several factors. First, there were twenty-five students who participated in the study, which is a relatively small sample size. The students read a 500 word expository passage, which was not a socially valid task, such as an assignment or project for school, thus making the task artificial. While the parameters of the reading task were intended to duplicate a classroom assignment, such as reading an article or textbook and answering questions, the nature of a think aloud itself is foreign and unnatural for most students.

Expert readers as studied by Lundeberg (1987) and Wineburg (1991) were all intimately knowledgeable of their field and were naturally inclined to monitor and evaluate passages in rich and deep ways. The students in the study were not experts in pollution and the task at hand had the students reading the text in order to answer questions about the passage and write about the passage after reading. It may be that the students did not monitor or evaluate extensively because of the task. Hence, knowledge construction emerged as the most evident type of reading; perhaps more due to the task than the students' abilities.

Future Research Directions

There are not many studies that examine how high school students read expository text and the strategies that they use. Based on the high expectations placed on youth today to be able to read and understand expository text for higher learning, employment, and increase technology use (Beaufort, 2009; A. S. Erickson, et al., 2007; Schmar-Dobler, 2003; C. B. Swanson, 2008; Umpstead, 2008; Vernon, et al., 2003), it is important to understand what students do when reading. This study examined what above average high school readers do while reading expository text versus students with learning disabilities, in hopes that it will begin to shed light on not only the differences between the two groups, but the similarities as well.

LD students reported that they use reading strategies with less frequency, but they rank the strategies in relative importance similar to the AA readers. While the LD students are aware of the strategies to use, they do not use them with the frequency or purpose that the AA readers use the strategies. This raises the question of how to scaffold LD students to use reading strategies more often and in a more purposeful manner that will allow them to understand the text on a deeper level. Beyond how to teach students to be more purposeful, where to fit that instruction into a packed secondary curriculum is another issue. It is often assumed that students come into the high school with these skills, and there is little room in the content area classroom for instruction on strategy use. Therefore, studies on how to incorporate strategy use instruction into content area curriculum for students with disabilities are needed.

Indeed, Conley (2008) asserts that there is not suffiecient research on how to effectively teach cognitive strategies such as paraphrasing, rereading, and using prior

knowledge at the middle and high school levels. Furthermore, the research that does exist is often focused on younger children performing relatively easier tasks (2008).

While it appears that students may have some preferences with regard to the methods they use when constructing knowledge, this study raises questions related to those preferences, such as how malleable are those preferences to instruction? If there are preferences, when in the development of reading do students begin to form those preferences? Do students with LD who struggle with word level reading, gravitate toward certain strategies (i.e…rereading versus paraphrasing) based on word level versus content level problems? Understanding how cognitive strategies develop over time is an important endeavor when attempting to understand how to teach cognitive strategies (Conley, 2008).

Conclusion

Given passages to read at their own reading level, high school students with learning disabilities and above average readers demonstrate both similarities and differences when reading expository text. Both students with learning disabilities and above average readers demonstrate preferences and patterns in how they construct knowledge when reading expository text, and both sets of students ranked similar strategies as used relatively more often than others. However, the above average readers self-reported significantly more strategy use and demonstrated a more proficient and purposeful use of reading strategies while reading fluently.

In order to bridge the gap between the students with learning disabilities and the above average readers, reading instruction to meet individual student needs must continue at the high school level. This instruction may need to be at a word level to increase fluency for some students. Additionally, students need to learn and practice using reading

strategies such as rereading and paraphrasing in a purposeful manner to understand the expository text on a more meaningful level. Short think alouds performed by students may be useful formative assessments at the secondary level to allow teachers to uncover hidden reading preferences and potential fluency problems. The good news is that students with learning disabilities at the secondary level in this study demonstrated a knowledge of and use of reading strategies to construct knowledge. The challenge is to teach students to use the strategies more often and more effectively.

APPENDICES

Appendix A

High School Readers Study

Parent Consent Form

A research project, the High School Think-Aloud Study, is investigating the strategies that high school students use when they read informational text. High school students will be taught how to think aloud while they read and process informational text. This study is being conducted to better understand the strategies that students use when they read informational text. Gaining insights into students' thinking provides valuable information that leads to the design of reading interventions. By teaching reading strategies that students underutilize, teachers can more effectively equip their high school readers with the tools that lead to successful performance. Simultaneously, students who are aware of their reading strategies are better able to direct and monitor their performance. Although I cannot promise that the participation of your student will lead to a successful result, this information will be used to formulate some guidelines that might improve the reading instruction and performance of high school readers.

As part of this study, your student would participate in one, ninety-minute session. First, your student's reading level will be assessed using the Gray Silent Reading Test, which will take between 10 and 20 minutes. The purpose of this assessment is to assure that each student will be given passages to read at their own reading level. Second, your student, individually and privately, will be introduced to and provided instruction in simultaneously reading and thinking aloud. Third, your student individually and privately will practice reading and thinking aloud. Learning and practicing the think aloud process will take between 10 and 20 minutes. Then, your student individually and privately will read a short passage aloud while talking about what he/she is thinking during reading. This five to ten minute read aloud will be audiotaped. Your student

will be asked to answer five, multiple choice, comprehension questions related to the passage to ensure the passage was read for comprehension. Finally, your student will be asked to fill out the Metacognitive Awareness of Reading Strategies Inventory to assess the reading strategies that your student reports using when reading academic text. This survey will take between 10 and 20 minutes to complete.

To ensure anonymity, no student names will be used and your student (and all students) will be given pseudonyms. There are no other known risks associated with your student's participation in this project. In reporting the results of this study, your student's names will not be used, only their pseudonyms. The privacy of your student (and all the students) will be protected to the maximum extent allowable by law. If you are interested in the results of this study, we will be happy to provide you with that information.

If parents or guardians do not grant permission, it will not affect your student in any way. If parents or guardians do give permission, they or their student may decide to withdraw their participation in the study at any time without penalty. This study is not related to schoolwork; therefore, your student's participation or nonparticipation will not affect his or her grades. If your student withdraws or is withdrawn from the study, all data, transcripts, audiotapes, interview data, and comprehension data will be destroyed. For students who choose to withdraw from the study, no individual data will be included in any analysis.

We hope that you will give us permission to include your son or daughter in the study. If you would like further information, please contact Dr. Troy Mariage via email (mariaget@msu.edu) or by phone (517.432.1981) or Catherine Wigent via email (wigentca@msu.edu) or by phone (269.789.2613). If you have any questions regarding your child's rights as research subjects, please contact Dr. Peter Vasilenko, Ph. D., Director of Human

Research Protections, (517)355.2180, fax (517)432.4503, email irb@msu.edu, mail 202 Olds Hall, Michigan State University, East Lansing, MI 48824-1047. We look forward to working with your student.

Catherine Wigent
16871 Abby Circle
Northville, MI 48168
Michigan State University
Ph.D. Candidate

Dr. Troy Mariage
Faculty, MSU College of Education
339 Erickson Hall
East Lansing, MI 48824-1034

Consent form for Student Participation

I voluntarily give my consent for my student to participate in the High School Think-Aloud Study, which includes audiotaping. This consent and my student's participation can be withdrawn at any time without penalty.

Student's Name:_____

Parent or Guardian Signature:_____

Appendix B

High School Readers Study

Student Assent Form

The purpose of the study is to examine the strategies high school readers use when they read informational text. During the study, you will be asked to read a short passage and talk about what you are thinking while they read. Students who are aware of their reading strategies are able to direct and monitor their reading. I cannot promise that your participation will lead to a successful result. However, this information will be used to improve the reading instruction and performance of high school readers.

As part of this project, you will be asked to participate in one, ninety-minute session. You will be asked to complete a reading assessment. The reading assessment is called the Gray Silent Reading Test. The reading assessment will take 10 to 20 minutes. The assessment will help the researcher to pick reading passages at your individual reading level. You will be taught how to read and think aloud. You will be asked to practice reading and thinking aloud. It will take approximately 10 to 20 minutes to learn and practice thinking aloud while you read. You will be asked to read aloud and think aloud about a short passage. It will take about five minutes to read aloud and think about the final passage. The final passage is the only passage that will be audiotaped. You will also be asked to answer five, multiple-choice comprehension questions related to the passage you read. This will show the research how well you comprehended while reading and thinking aloud. Finally, you will be asked to fill out the Metacognive Awareness of Reading Stratgies Inventory which is a survey used to determine the strategies you use while reading school text. The survey will take 10 to 20 minutes to fill out.

In reporting the results of the study, your real name will never be used. Your privacy (and the privacy of all students) will be protected to the maximum extent. In addition, there is no penalty if you do not choose to participate in this study. Your grades are not affected in any way. You can choose to withdraw from the study at any time. If you choose to withdraw from the study, no individual data will be kept or used in the study.

We hope that you will give us permission to be included in the study. If you would like further information, please contact Dr. Troy Mariage via email (mariaget@msu.edu) or by phone (517.432.1981) or Catherine Wigent via email (wigentca@msu.edu) or by phone (734.956.6016). If you have any questions regarding your child's rights as research subjects, please contact Dr. Peter Vasilenko, Ph. D., Director of Human Research Protections, (517)355.2180, fax (517) 432.4503, email irb@msu.edu, mail 202 Olds Hall, Michigan State University, East Lansing, MI 48824-1047. We look forward to working with you.

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Dr. Troy Mariage
Faculty, MSU College of Education
339 Erickson Hall
East Lansing, MI 48824-1034

Assent Form for Student Participation

I voluntarily give my assent to participate in the High School Think-Aloud Study, which includes audiotaping. This assent and my participation can be withdrawn at any time without penalty.

Student's Printed Name: _____

Student's Signature:_____

Appendix C

Sample Passages

Seventh Grade Passage

Water Pollution Problems - A

Water flows from rivers into lakes or oceans. This water reflects everything that happens on the land. The land area surrounding the river is a drainage basin or *watershed*. Correction of a pollution problem in a river must include the land. All sources of pollution within the river basin or land area should be addressed.

Water pollution problems come from three sources on land. The first source is from agriculture. Agriculture includes animal wastes and fertilizer runoff. The second source is from industry. Industries release chemicals into the water and cause thermal pollution. Finally, human sewage causes water pollution. Sewage includes human wastes, garbage, and water that has been used for laundering or bathing.

Figure 3. Runoff

Water pollution from agriculture will vary. Water pollution will depend on two factors. One factor is the type of agriculture. The other factor is the amount of agriculture within the river basin. Most water pollution from large farms comes from animal wastes. Large farms must store and dispose of animal wastes. Livestock farms store farm wastes in large tanks known as *lagoons*. Lagoons can hold millions of gallons of manure and urine. Animal wastes pollute the water when lagoons overflow or leak. These animal wastes contain bacteria and antibiotics. Fish for human food are raised in large livestock farms. Runoff can also cause water pollution. Fertilizers used in fields can leak into rivers and streams. Fertilizer runoff puts nitrogen and phosphates into the water system.

Water pollution from industry depends on the type of industry located in the river basin. Many industries use large amounts of freshwater to dilute wastes. The waste-bearing water is called *effluent.* Industries pump this wastewater into streams and rivers. This will break up the pollution. Some industries pollute water in a different way. They use a lot of water to cool equipment. The heat from the equipment makes the water hot. The industries put the hot water back into rivers and lakes. The hot water heats the river or lake. Thermal pollution occurs when this heating harms plants or animals.

The amount of people who live in an area affects how much pollution there is in that area. Human pollution comes mostly from sewage. The type of sewage treatment used also affects pollution. In countries like the United States and Canada most of the sewage goes to treatment plants. Treatment plants remove solids and dissolved nutrients such as nitrogen and phosphorus. About 25 percent of the households of the United States use septic tank systems. Septic tanks pass the sewage through tanks. Then the sewage is filtered through leaching fields and into the land. Some sewage in the United States still goes directly into waterways without being treated.

Water problems in the future will become harder to fix. A larger population will cause more human waste. This larger population will need more clean water. Less water will be available for diluting wastes. There will be more industries and more complex chemical processes. Industries will produce larger amounts of liquid wastes. Many of these will contain chemicals that are either toxic or noxious. Agriculture will have to be increased to feed the larger population. There will be more fertilizers used and more animal waste. It is apparent that drastic steps must be taken to correct the pollution problem.

Eighth Grade Passage

Water Pollution Problems – B

The water that flows from a river into a lake or ocean reflects everything that happens on the land. The land area surrounding the river is a drainage basin or *watershed*. Correction of a pollution problem in a river must include the river basin. All sources of pollution within the river basin or land area should be addressed.

Water pollution problems arise from three sources on land. The first source is from agriculture. Agriculture includes animal wastes and fertilizer runoff. The second source is from industry. Industries release noxious byproducts and excess chemicals into the water system. Industries also cause thermal pollution. Finally, humans contribute to water pollution through sewage. Sewage includes human wastes, garbage, and water that has been used for laundering or bathing.

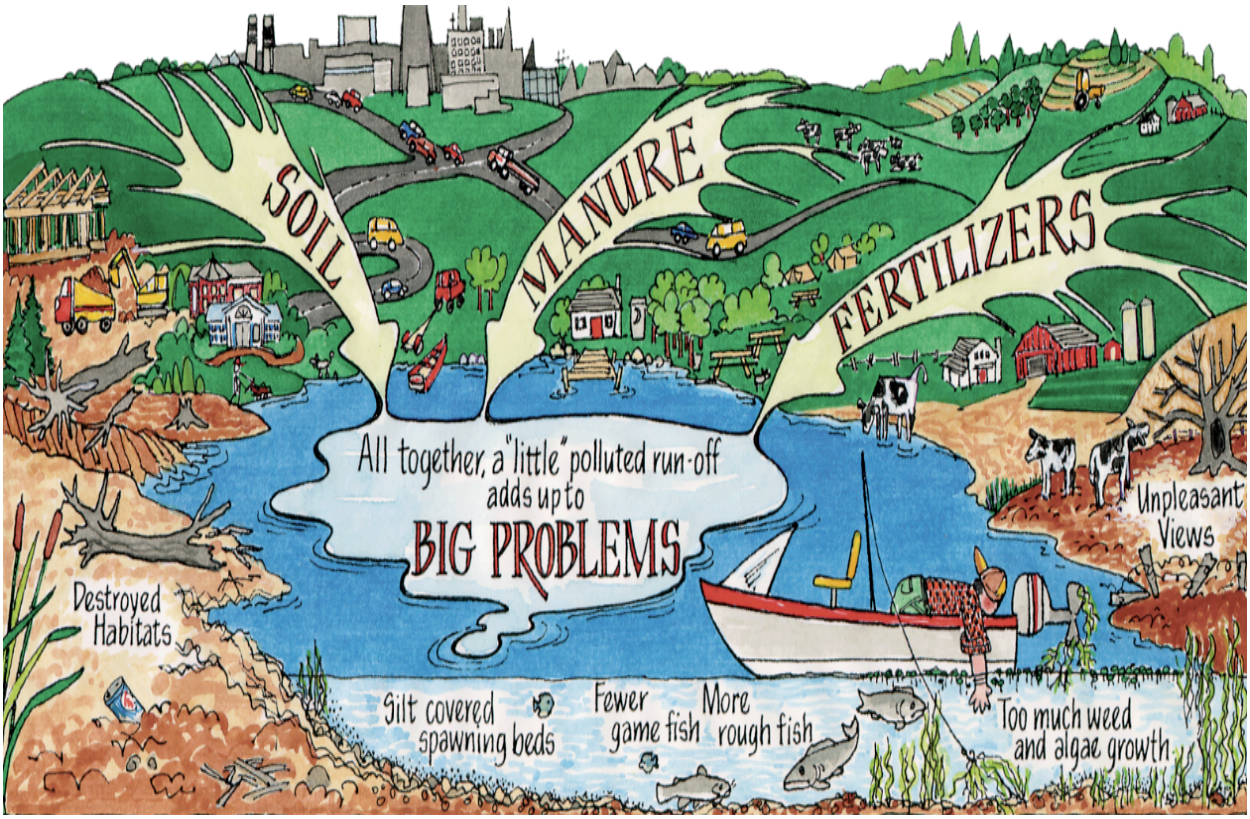

Figure 4. Runoff

Water pollution from agriculture will vary. Water pollution will depend on two factors. One factor is the type of agriculture within the river basin. The other is the amount of agriculture within the river basin. Most water pollution from large farms comes from animal wastes. Large farms must store and dispose of animal wastes. Livestock farms store manure and other farm wastes in large tanks known as *lagoons*. Lagoons can hold millions of gallons of manure and urine. Untreated animal wastes pollute the water system when these lagoons overflow or leak. These animal wastes contain bacteria and antibiotics. Fish for human consumption are raised in large livestock farms. Water pollution can also occur in the form of runoff. Fertilizers used in fields leach into rivers and streams. This runoff puts nitrogen and phosphates into the water system.

The type of industry located in the river basin will determine the type of water pollution. Many industries use huge quantities of freshwater to carry away wastes of many kinds. The waste-bearing water, or *effluent*, is discharged into streams and rivers. This will break up the pollution. Some industries pollute water in a different way. They use large quantities of water to cool equipment. The heat from the equipment makes the water hot. The industries then discharge the hot water into rivers and lakes, heating those bodies of water. Such heating that harms plants or animals is known as thermal pollution.

Human pollution will vary with population distribution. Human pollution is mostly from sewage. The type of sewage treatment used will also affect the amount of pollution. Most of the sewage in countries like the United States and Canada go through treatment plants. This process removes solids and dissolved nutrients such as nitrogen and phosphorus. About 25 percent of the households of the United States use septic tank systems. Septic tanks pass the sewage through tanks and filter it through leaching fields into the land. Some sewage in the United States still goes directly into waterways without being treated.

Water problems in the future will become worse and more complex. Our growing population will increase human wastes such as sewage. On the other hand, increasing demands for water will reduce the amount of water available for diluting wastes. Industries will expand and use more complex chemical processes. Industries will also produce larger amounts of liquid wastes. Many of these will contain chemicals that are either toxic or noxious. Agriculture will have to be increased to feed our rapidly expanding population. This will increase the agricultural chemicals and animal wastes such as manure. From this,

it is apparent that drastic steps must be taken to develop corrective measures for the pollution problem.

Ninth Grade Passage

Water Pollution Problems – C

The water that flows from a river into a lake or ocean reflects everything that happens on the land. The land area surrounding the river is a drainage basin or *watershed*. Correction of a pollution problem in a river must consist of an integrated approach. This approach should include measures to correct all sources of pollution within the river basin or land area.

Water pollution problems arise from three sources on land. The first source is from agriculture. Agriculture includes animal wastes and fertilizer runoff. The second source is from industries. Industries release noxious byproducts and excess chemicals into the water system. Industries also cause thermal pollution. Finally, humans contribute to water pollution through sewage. Sewage consists of human wastes, garbage, and water that has been used for laundering or bathing.

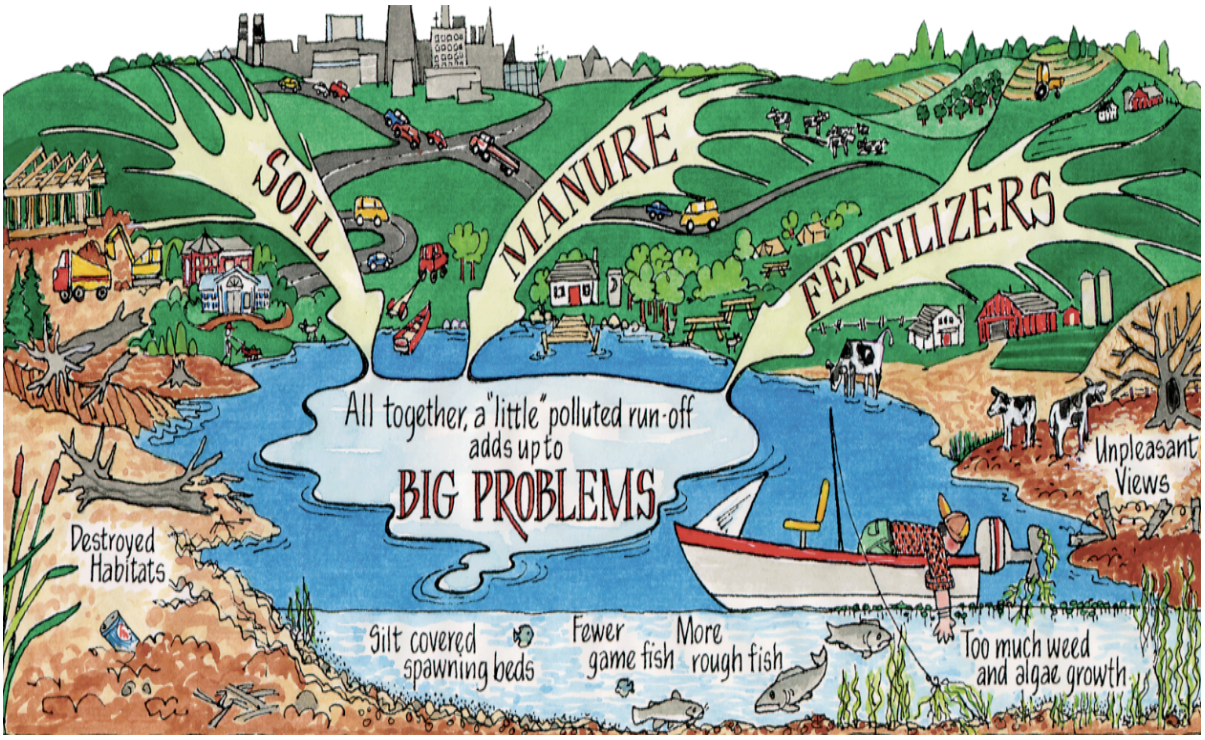

Figure 5. Runoff

Water pollution from agriculture will vary depending on the type of agriculture and the amount of agriculture located within a river basin. Most water pollution from large farms comes from the storage and disposal of animal wastes. Large livestock farms store manure and other farm wastes in gigantic tanks known as *lagoons*. Lagoons can hold millions of gallons of manure and urine. When these lagoons overflow or leak, toxic animal wastes containing bacteria and antibiotics pollute the water system. Fish for human consumption are raised in large livestock farms. Water pollution can also occur in the form of runoff from fields where fertilizers are used. This runoff puts nitrogen and phosphates into the water system.

Contamination of waters by industry will also depend upon the types of industry located within the basin. Many manufacturing facilities use huge quantities of freshwater to

carry away wastes of many kinds. The waste-bearing water, or *effluent*, is discharged into streams and rivers. This will break up the pollution. Some industries pollute water in a different way. They use large quantities of water to cool certain equipment. The heat from the equipment makes the water hot. The industries then discharge the hot water into rivers and lakes, heating those bodies of water. Such heating that harms plants or animals is known as thermal pollution.

Human pollution, mostly from sewage disposal, will vary with population distribution and the degree and type of sewage treatment used. Most of the sewage in countries like the United States and Canada go through treatment plants. This process removes solids and dissolved nutrients such as nitrogen and phosphorus. About 25 percent of the households of the United States use septic tank systems. Septic tanks pass the sewage through tanks and filter it through leaching fields into the land. Some sewage in the United States still goes untreated directly into waterways.

Water problems in the future will become worse and more complex. Our growing population will increase human wastes such as sewage. On the other hand, increasing demands for water will reduce the amount of water available for diluting wastes. Industries will expand and use more complex chemical processes. Industries will also produce larger amounts of liquid wastes. Many of these will contain chemicals that are either toxic or noxious. Agriculture will have to be increased to feed our rapidly expanding population. This will increase the agricultural chemicals and animal wastes such as manure. From this, it is apparent that drastic steps must be taken to develop corrective measures for the pollution problem.

Tenth Grade Passage

Water Pollution Problems – D

The water that flows from a river into a lake or ocean reflects everything that happens on the land. The land area surrounding the river is a drainage basin or *watershed*. Correction of a pollution problem in a river must consist of an integrated approach. This approach should include measures to correct all sources of pollution within the river basin or land area.

Water pollution problems arise from three sources on land. The first source is from agriculture, which includes animal wastes and fertilizer runoff. The second source is from industries, which release noxious byproducts, excess chemicals and thermal pollution. Finally, humans contribute to water pollution through sewage, which consists of human wastes, garbage and water that has been used for laundering or bathing.

Figure 6. Runoff

Water pollution from agriculture will vary depending on the type of agriculture and the amount of agriculture located within a river basin. Most water pollution from large farms comes from the storage and disposal of animal wastes. Large livestock farms store manure and other farm wastes in gigantic tanks known as *lagoons*. Lagoons can hold millions of gallons of manure and urine. When these lagoons overflow or leak, toxic animal wastes containing bacteria and antibiotics pollute the water system. Fish for human consumption are raised in large livestock farms. Water pollution can also occur in the form of runoff from fields where fertilizers are used. This runoff puts nitrogen and phosphates into the water system.

Contamination of waters by industry will also depend upon the types of industry located within the basin. Many manufacturing facilities use huge quantities of freshwater to carry away wastes of many kinds. The waste-bearing water, or *effluent*, is discharged into streams and rivers, which in turn disperse the polluting substances. Some industries pollute water in a different way. They use large quantities of water to cool certain equipment; therefore the heat from the equipment makes the water hot. The industries then discharge the hot water into rivers and lakes, heating those bodies of water. Such heating that harms plants or animals is known as thermal pollution.

Human pollution, mostly from sewage disposal, will vary with population distribution and concentration and the degree of effective sewage treatment. Most of the sewage in countries like the United States and Canada go through treatment plants. This process removes solids and dissolved nutrients such as nitrogen and phosphorus. About 25 percent of the households of the United States use septic tank systems, which pass the sewage through tanks and filter it through leaching fields into the land. Some sewage in the United States still goes untreated directly into waterways.

Water problems in the future will become more intense and more complex. Our growing population will increase human wastes such as sewage. On the other hand, increasing demands for water will reduce the amount of water available for diluting wastes. Rapidly expanding industries that involve more and more complex chemical processes will produce larger volumes of liquid wastes. Many of these will contain chemicals that are either toxic or noxious. To feed our rapidly expanding population, agriculture will have to be increased. This will create increasing quantities of agricultural

chemicals and animal wastes such as manure. From this, it is apparent that drastic steps must be taken to develop corrective measures for the pollution problem.

Eleventh Grade Passage

Water Pollution Problems – E

The water that flows from a river into a lake or ocean reflects everything that happens on the land. The land area surrounding the river is a drainage basin or *watershed*. Correction of a pollution problem in a river must consist of an integrated approach, and should include measures to correct all sources of pollution within the river basin or land area.

Water pollution problems arise from three sources on land. The first source is from agriculture, which includes animal wastes and fertilizer runoff. The second source is from industries, which release noxious byproducts, excess chemicals and thermal pollution. Finally, humans contribute to water pollution through sewage, which consists of human wastes, garbage and water that has been used for laundering or bathing.

Figure 7. Runoff

Water pollution from agriculture will vary depending on the type of agriculture and the amount of agriculture located within a river basin. Most water pollution from large farms comes from the storage and disposal of animal wastes. Large livestock farms store manure and other farm wastes in gigantic tanks known as *lagoons*, which can hold millions of gallons of manure and urine. When these lagoons overflow or leak, toxic animal wastes containing bacteria and antibiotics pollute the water system. Fish for human consumption are raised in large livestock farms. Water pollution can also occur in the form of runoff from fields where fertilizers are used, and this runoff leaches nitrogen and phosphates into the water system.

Contamination of waters by industry will also depend upon the types of industry located within the basin. Many manufacturing facilities use huge quantities of freshwater to carry away wastes of many kinds. The waste-bearing water, or *effluent*, is discharged into streams and rivers, which in turn disperse the polluting substances. Some industries pollute water in a different way by using large quantities of water to cool certain equipment; therefore the heat from the equipment makes the water hot. The industries then discharge the hot water into rivers and lakes, heating those bodies of water. Such heating that harms plants or animals is known as thermal pollution.

Human pollution, mostly from sewage disposal, will vary with population distribution and concentration and the degree of effective sewage treatment. Most of the sewage in countries like the United States and Canada go through treatment plants that remove solids and dissolved nutrients such as nitrogen and phosphorus. About 25 percent of the households in the United States use septic tank systems, which pass the sewage through tanks and filter it through leaching fields into the land. Some sewage in the United States still goes untreated directly into waterways.

Water problems in the future will become more intense and more complex, and our growing population will increase human wastes such as sewage. On the other hand, increasing demands for water will reduce the amount of water available for diluting wastes. Rapidly expanding industries that involve more and more complex chemical processes will produce larger volumes of liquid wastes. Many of these will contain chemicals that are either toxic or noxious. To feed our rapidly expanding population, agriculture will have to be increased. This will create increasing quantities of agricultural

chemicals and animal wastes such as manure. From this, it is apparent that drastic steps must be taken to develop corrective measures for the pollution problem.

Twelfth Grade Passage

Water Pollution Problems – F

The water that flows from a river into a lake or ocean reflects everything that happens on the land. The land area surrounding the river is a drainage basin or *watershed*. Correction of a pollution problem in a river must consist of an integrated approach, and should include measures to correct all sources of pollution within the river basin or land area.

Water pollution problems arise from three sources on land. The first source is from agriculture, which includes animal wastes and fertilizer runoff. The second source is from industries, which release noxious byproducts, excess chemicals and thermal pollution. Finally, humans contribute to water pollution through sewage, which consists of human wastes, garbage and water that has been used for laundering or bathing.

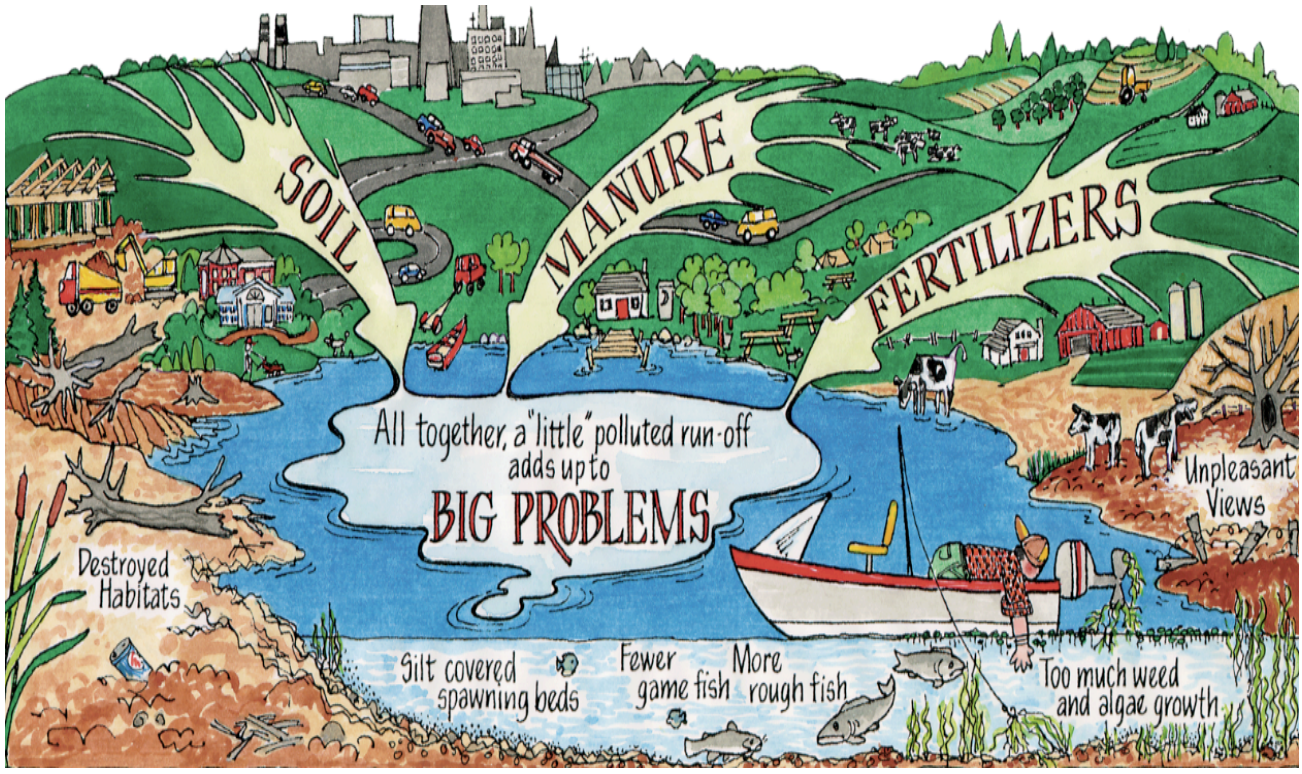

Figure 8. Runoff

Water pollution from agriculture will vary depending on the type of agriculture and the amount of agriculture located within a river basin. Most water pollution from large farms comes from the storage and disposal of animal wastes. Large livestock farms store manure and other farm wastes in gigantic tanks known as *lagoons*, which can hold millions of gallons of manure and urine. When these lagoons overflow or leak, toxic animal wastes containing bacteria and antibiotics pollute the water system. Fish for human consumption are raised in large livestock farms. Water pollution can also occur in the form of runoff from fields where fertilizers are used, and this runoff leaches nitrogen and phosphates into the water system.

Contamination of waters by industry will also depend upon the types of industry located within the basin. Many manufacturing facilities use huge quantities of freshwater to carry away wastes of many kinds, and this waste-bearing water, or *effluent*, is discharged into streams and rivers, which in turn disperse the polluting substances. Some industries pollute water in a different way by using large quantities of water to cool certain equipment; therefore the heat from the equipment makes the water hot. The industries then discharge the hot water into rivers and lakes, heating those bodies of water causing thermal pollution, which harms plants and animals by heating their ecosystem.

Human pollution, mostly from sewage disposal, will vary with population distribution and concentration and the degree of effective sewage treatment. Most of the sewage in countries like the United States and Canada go through treatment plants that remove solids and dissolved nutrients such as nitrogen and phosphorus. About 25 percent of the households in the United States use septic tank systems, which pass the sewage through tanks and filter it through leaching fields into the land; however, some sewage in the United States still goes untreated directly into waterways.

Water problems in the future will become more intense and more complex, and our growing population will increase human wastes such as sewage; however, increasing demands for water will reduce the amount of water available for diluting wastes. Rapidly expanding industries that involve more and more complex chemical processes will produce larger volumes of liquid wastes, and many of these will contain chemicals that are either toxic or noxious. To feed our rapidly expanding population, agriculture will have to be increased. This will create increasing quantities of agricultural chemicals and animal

wastes such as manure. From this, it is apparent that drastic steps must be taken to develop corrective measures for the pollution problem.

Appendix D

Written Retelling Scoring Protocol: Water Pollution

Student ID _____

SCORING SUMMARY

Comprehension Trait or Quality	Score	Total Possible	Percentage
1. Total Recall (Details + Main Ideas)		58	
2. # Main Ideas		6	
3. # Chunks (2 consecutive Ideas from category)			

1. Water from a river reflects everything that happens on land.	M
a. A watershed is the land area surrounding a river.	
b. Correction of a pollution problem in a river must include the land.	
c. Must correct all sources of pollution within the river basin or land area.	
2. Water pollution problems come from three sources on land.	M
a. Agriculture is one source.	
b. Agriculture includes animal wastes.	
c. Agriculture includes fertilizer runoff.	
d. Industries are another source.	
e. Industries release noxious byproducts or chemicals.	
f. Thermal pollution comes from industries.	
g. Humans are another source.	
h. Sewage can be from human waste.	
i. Sewage can be from garbage.	
j. Sewage can be from water that was used for laundering or bathing.	
3. Water pollution comes from agriculture.	M
a. Pollution will vary depending on the type of agriculture.	
b. Pollution will vary depending on the amount of agriculture.	
c. Most pollution from large farms comes from animal wastes.	

d. Large farms store manure or farm wastes in lagoons.	
e. Lagoons are gigantic tanks that hold millions of gallons of waste	
f. Lagoons can overflow or leak.	
g. Toxic animal wastes pollute water with bacteria and antibiotics.	
h. Fish for human consumption are raised in large livestock farms.	
i. Water pollution can come from runoff from fields.	
j. Runoff from fertilizers contains nitrogen and phosphates.	
4. Industry causes water pollution.	M
a. Water pollution will vary depending on the type of industry.	
b. Industries use huge quantities of water to carry away wastes.	
c. Effluent is waste-bearing water.	
d. Effluents are discharged into streams and rivers to disperse waste.	
e. Industries use water to cool equipment.	
f. Heat from the equipment makes the water hot.	
g. Hot water is discharged into streams and lakes.	
h. Thermal pollution occurs when hot water is discharged into streams and lakes.	
i. Plants and animals are harmed because their ecosystem is heated.	
5. Humans cause water pollution.	M
a. Human pollution will vary depending on the population or amount of people in an area.	
b. Human pollution is mostly from sewage.	
c. They type of sewage treatment effects pollution.	
d. Most sewage in US and Canada goes through treatment plants.	
e. Treatment plants remove dissolved solids and nutrients.	
f. Nutrients are nitrogen and phosphates.	
g. 25% of households in US use septic tanks.	
h. Septic tanks pass the sewage through tanks.	
i. The sewage is then filtered into leaching fields.	
j. Some sewage still goes untreated into waterways.	
6. Water problems in the future more intense and complex or harder to fix.	M
a. Growing population increase human wastes.	
b. More people will need more water.	
c. Less water for diluting wastes.	
d. Industries will have more complex chemical processes.	
e. Industries will produce more liquid wastes.	
f. Industrial waste will contain chemicals that are toxic or noxious.	
g. Agriculture will be increased to feed expanding population.	
h. Agriculture will create more chemicals or fertilizers.	
i. Agriculture will create more animal wastes like manure.	
j. Drastic steps must be taken to correct pollution problem.	

Scoring Notes:

1. Circle all main ideas on score sheet.

2. Draw an arc connecting ideas recalled as a chunk from within * a category.

3. If student recalls an **idea related to a detail, but in a slightly different form, assign credit, ie., “The hummingbird flies” should be given credit as a detail even though it does not match text verbatim; give credit for slight errors in recall, ie., 3/4 rather than 1/4 mile. Give no credit for gross errors, I.e., Hummingbird is a very large bird.

4. Transfer number of main ideas, total recalled, chunks to front page.

Appendix E

High School Readers Study

File Review Consent

In order to further determine what variables might impact a student's ability to think aloud while they are reading, a file review will be conducted. This review would include only information related to special education status (does the child have a disability, the type of disability, the date of the last educational evaluation certifying disability). No identifying information or non-academic information will be reviewed or collected. No identifying information will be reported, only group information will be reported.

If you would like further information, please contact Dr. Troy Mariage via email (mariaget@msu.edu) or by phone (517.432.1981) or Catherine Wigent via email (wigentca@msu.edu) or by phone (269.789.2613). If you have any questions regarding your child's rights as research subjects, please contact Dr. Peter Vasilenko, Ph. D., Director of Human Research Protections, (517)355.2180, fax (517)432.4503, email irb@msu.edu, mail 202 Olds Hall, Michigan State University, East Lansing, MI 48824-1047. We look forward to working with you.

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I give Catherine Wigent permission to conduct a file review of my student's academic records to include a review of special education status to include type of disability and date of last educational evaluation certifying disability.

Parent's name_____

Student's name_____

Appendix F

Comprehension Questions – circle the correct answer

1. Most river basins contain large areas of land that are
a. agricultural
b. commercial
c. residential

2. Water problems in the future will be
a. less severe
b. eliminated
c. more complex

3. Liquid wastes are being used in some areas as
a. inexpensive fuel
b. animal feed
c. for irrigation

4. A primary source of urban pollution is
a. garbage
b. detergents
c. sewage

5. How many solutions to the water pollution problem are offered?
a. two
b. three
c. four

6. The purpose of this selection is to
a. tell the reader about water pollution problems
b. alert the reader to the dwindling water supply
c. explain industrial uses of water

7. The author implies that correcting a pollution problem in a river
a. can be a dangerous job
b. involves a survey of the land area or basin
c. requires a careful study of underwater plant growth

8. The selection could be labeled
a. argumentation
b. explanation
c. narration

9. The author gives substance to the selection through the use of
a. interviews with authorities in the field of water controls
b. definitions that clarify important terms
c. opinions and personal observations

10. the reader can conclude that
a. some industries are now making economic uses of wastes
b. countries of the world will work together on pollution progress
c. science is making great progress on increasing water supplies

Appendix G

Metacognitive Awareness of Reading Strategies Inventory

Demographic Information:

Date of Birth_____

GRADE_____

Directions: Listed below are statements about what people do when they read *academic or school-related materials* such as textbooks or library books.
Five numbers follow each statement (1, 2, 3, 4, 5), and each number means the following:
• **1** means "I **never or almost never** do this."
• **2** means "I do this **only occasionally**."
• **3** means "I **sometimes** do this" (about **50%** of the time).
• **4** means "I **usually** do this."
• **5** means "I **always or almost always** do this."
After reading each statement, **circle the number** (1, 2, 3, 4, or 5) that applies to you using the scale provided. Please note that there are **no right or wrong answers** to the statements in this inventory.

1. I have a purpose in mind when I read.
1 2 3 4 5

2. I take notes while reading to help me understand what I read.
1 2 3 4 5

3. I think about what I know to help me understand what I read.
1 2 3 4 5

4. I preview the text to see what it's about before reading it.
1 2 3 4 5

5. When text becomes difficult, I read aloud to help me understand what I read.
1 2 3 4 5

6. I summarize what I read to reflect on important information in the text.
1 2 3 4 5

7. I think about whether the content of the text fits my reading purpose.
1 2 3 4 5

8. I read slowly but carefully to be sure I understand what I'm reading.
1 2 3 4 5

9. I discuss what I read with others to check my understanding.
1 2 3 4 5

10. I skim the text first by noting characteristics like length and organization.
1 2 3 4 5

11. I try to get back on track when I lose concentration.
1 2 3 4 5

12. I underline or circle information in the text to help me remember it.
1 2 3 4 5

13. I adjust my reading speed according to what I'm reading.
1 2 3 4 5

14. I decide what to read closely and what to ignore.
1 2 3 4 5

15. I use reference materials such as dictionaries to help me understand what I read.
1 2 3 4 5

16. When text becomes difficult, I pay closer attention to what I'm reading.
1 2 3 4 5

17. I use tables, figures, and pictures in text to increase my understanding.
1 2 3 4 5

18. I stop from time to time and think about what I'm reading.
1 2 3 4 5

19. I use context clues to help me better understand what I'm reading.
1 2 3 4 5

20. I paraphrase (restate ideas in my own words) to better understand what I read.
1 2 3 4 5

21. I try to picture or visualize information to help remember what I read.
1 2 3 4 5
22. I use typographical aids like boldface and italics to identify key information.
1 2 3 4 5

23. I critically analyze and evaluate the information presented in the text.
1 2 3 4 5

24. I go back and forth in the text to find relationships among ideas in it.

1 2 3 4 5

25. I check my understanding when I come across conflicting information.
1 2 3 4 5

26. I try to guess what the material is about when I read.
1 2 3 4 5

27. When text becomes difficult, I reread to increase my understanding.
1 2 3 4 5

28. I ask myself questions I like to have answered in the text.
1 2 3 4 5

29. I check to see if my guesses about the text are right or wrong.
1 2 3 4 5

30. I try to guess the meaning of unknown words or phrases

1 2 3 4 5

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Appendix H

Sample Transcription

	1. The water flows
2. The water that flows from a river into a lake or ocean reflects everything that happens on the land.	
3. The land area surrounding the river is a drainage basin or watershed.	
4. ….(correction) of a ...pollution problem in a river must include the river basin.	4. Con, Connection…polluted
	5. That the surrounding river is drainage basin or watersheld
6. All sources of pollution within the river basin or land area should be addressed.	
7. Water pollution problems arise from three sources on land.	
8…the first source is from avriculture (mispronouces agriculture)	8. Is..that the first source is from avriculture (mispronouces agriculture)
9. Avriculture (mispronouces agriculture) includes animal wastes and fertilizer runoff.	
10. The second source is from industry.	
11. (Industries release noxious) byproducts and (excess) chemicals in(to) the water system.	11. Industry releases (pause) nox-is… excesses…
	12. That the second source is from chemicals and runoff from avriculture.
13. Industy (ies) also causes (cause) thermal pollution.	
14. Finally, humans contribute...(to)water pollution through sewage.	the..
15. Sewage includes human wastes, garbage, and water that has been used	

for laundy (laundering) or bathing	
	16. That its ah..as industry from thermal pollution and humans that gives off sewage and pollute.
17. Water pollution from avriculture (misprononces agriculture) will vary.	
18. (Water)…. pollution will depend on two factors.	18. What…
19. One factor is the type of agriculture... within the river basin.	19. …in…
	20. Pollution will depend on two factors and one is avriculture (mispronouces agriculture)within the river basin
21.The other is the amount of agriculure within the river basin.	
22. Most water pollution from large farms comes from animal wastes.	
23. Large farms must store and dispose of animal wastes.	
	24.That farms dispose of animal wastes and that pollutes the water.
25. Livestock farms store manure and other farm wastes in large tanks known as lagoons.	
26. Lagoons can hold millions of gallons of manure and urine.	
27. Untreated animal wastes….(pollute) the water system…when these lagoons overflow or leak.	27….pollution… when…
	28. That they store animal wastes in lagoons and they can hold millions of gallons.
29. These animal wastes contain bacteria and antibiotics.	
30.Fish (for)…human consumption (are)…raised in large livestock farms.	30….from…and

31. Water pollution can also occur in the form of runoff.	
	32. Like uh can be con is a form of runoff and as antibiotics and bacteria in there (choppy)
33. Fertilizers used in fields leach into…river(s) and streams.	33. …the
34. This runoff puts nitrogen and phosphate (s) into the water system.	
35. The type of industry located in the river basin will…(determine) the type of water pollution.	35….be determined
	36. That the industry can puts runoff into water and fertilizers and fields leak into the river and stream.
37. Many industries use huge quantities of freshwater to carry away wastes of many kinds.	
38. The waste-bearing water, or…(effluent) is discharged into…streams and rivers.	38. …eh…affiliated, err..
39. This will break up…(the) pollution.	39. …into
40. Some (industries pollute water in a different way).	40….industy pollution water in different ways.
	41. The one word why I don't really know and ah that's the project .
42. ...They use large quantities of water to cool equipment.	42. They ah…
43. The heat from the equipment makes the water hot.	
44. The industries then discharge the hot water into rivers and lakes, heating those bodies of... water.	44. river, I mean of
45. Such heating that harms plants or animals is (known as) thermal pollution.	
	45. Thermal pollution and ah it uses when also ah places use cooling equipment to cool the water. Will cool stuff and also makes the water hotter.

46. (Human) pollution will vary with population distribution.	46…Humans
47. Human pollution is mostly from sewage.	
48. The type of sewage treatment used will also affect the amount of pollution.	
49.Most of the sewage in countries like the United States and Canada go through treatment plants.	
50. This process removes solids and dissolved nutients such as nitrogen and...phosphorous.	50. …phosphate
	51. That we use um water treatment plants and ah pollution will vary with population distribution.
52. About 25 percent of the households of the United States use septic tank systems.	
53. Septic tanks (pass)... the sewage through tanks and (filter)... it through leaching fields into the land.	53….passes…filters
54. Some sewage in the United States still goes directly... into waterways without being treated.	54. to
	55. That most houses have ah septic tanks and some still goes ah to the waterways and about 25% have the septic tanks.
56. Water problems in the future will become worse and more complex.	
57. Our growing population will increase human wastes such as sewage.	
58. On the other hand, increasing demands for water will reduce the amount of water available for (diluting wastes)…	58. durilating waters.
	59. That it is going to become worse and more complex as we grow in population.
60. Industries will expand and use more	60. …chemicals

complex (chemical) ….processes.	
61. Industries will also produce(lager)... amounts of liquid (wastes)…	61….large….waste.
62. Many of these will contain chemicals... that are either toxic or (noxious)....	62….uhhh…non-toxic.
	63. That ahh has a complex chemical process and industries give off large amounts of liquid wastes and the toxins are either non-toxic or toxic.
64. (Agriculture) will have to be increased to feed our rapidly... expanding population.	64. Avriculture (mispronounces agriculture)…growing
65. This will increase the (agricultural chemicals)... and animal wastes such as manure.	65. avriculture (mispronounces agriculture) chemical…
66. (From).. this, it... (is) apparent that drastic steps must be taken to develop... (corrective) measures for (the) pollution... (problem).	66. For…appears…connectivity…problems.
	67. That's gonna increase the amount of chemicals that we need and (pause) and that's it.

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