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Comprehension monitoring skills of reading-disabled/learning-disabled students and normally-achieving students

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COMPREHENSION MONITORING SKILLS OF READING-DISABLED/LEARNING-DISABLED STUDENTS AND NORMALLY-ACHIEVING STUDENTS

by

Jean Fryer Schedler

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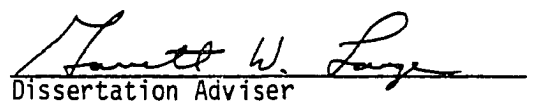

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The primary purpose of the present study was to examine the use of comprehension monitoring skills of fifth- and seventh-grade reading-disabled/learning-disabled and normally-achieving children under different levels of reading difficulty. A reading level design was used whereby reading-disabled students were compared with younger normally-achieving matches on measures of comprehension accuracy and comprehension monitoring performance. Contrary to the hypotheses of the present study, the results showed that reading-disabled/learning-disabled (RD/LD) students generally made more errors on the comprehension monitoring tasks than their normally-achieving/instructional reading-level matches (NA/IRLMs) even when reading difficulty was controlled. The RD/LDs also made different types of errors which are indicative of different types of monitoring strategies. The error patterns of seventh-grade RD/LDs suggest the use of top-down strategies (Bobrow & Norman, 1975). The error pattern of fifth-grade RD/LDs suggest the use of bottom-up strategies. Neither of the RD/LD groups appear to use an effective balance of top-down and bottom-up strategies. The relatively high error rates of RD/LD students do not seem to put them at a disadvantage for comprehension as measured in the present study. Interpretations of these findings and directions for further research are discussed.

DEDICATION

This study is dedicated to my husband, Alton D. Fryer III. Your support, love, and understanding of the personal significance of holding fast to my academic dream has been "the wind beneath my wings." Thank you and I love you.

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Special thanks go to my friends who helped me manage my family of our children in the midst of this academic pursuit. Lydia Brincefield, Melanie Eblee, Jane Erwin, and Nancy Fjellstedt are but a

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CHAPTER I

INTRODUCTION

During the past several decades there has been an abundance of research concerning learning-disabled (LD) children. However, the literature is unclear in outlining the specific types of deficits exhibited b y these children. The general purpose of the present research is to examine one line of theory regarding the deficits of reading-disabled/learning-disabled (RD/LD) children; namely, the apparent lack of use of comprehension monitoring skills and strategies during the reading process. In the present research it is hypothesized that the lack of use of comprehension monitoring skills may not reflect the lack of knowledge of these skills, but rather the children's inability to use them at complex reading levels. Thus, the present study was designed to examine the extent to which comprehension monitoring skills are used at more and less complex reading levels.

Description of Learning-Disabled Children

The learning disability (LD) designation has been in existence, as a federally designated handicapping condition, for only 23 years (U.S.O.E., 1968). The field has been, and continues to be, beset with deep and pervasive disagreements about definition (see Hammill, 1990 for a review; Kirk & Kirk, 1983; McLeod, 1983).

Currently, one of the most precise and accepted definitions is that proposed by the National Joint Committee on Learning Disabilities (cited in Hammill, 1990) which reads as follows.

> Learning disabilities is a general term that refers to a heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning, or mathematical abilities. These disorders are intrinsic to the individual, presumed to be due to central nervous system dysfunction, and may occur across the life span. Problems in self-regulatory behaviors, social perception, and social interaction may exist with learning disabilities but do not themselves constitute a learning disability. Although learning disabilities may occur concomitantly with other handicapping conditions (for example, sensory impairment, mental retardation, serious emotional disturbance) or with extrinsic influences (such as cultural differences, insufficient or inappropriate instruction, they are not the result of those conditions or influences. (p. 75)

A major criticism of definitions of learning disabilities is that most definitions characterize learning disabilities by a process of exclusion. Moreover, the above definition cited in Hammill (1990) is an example. Most definitions focus on causality and imply a unitary cause, and most avoid description of the changing nature of language, learning, and reading problems over time.

The majority of research efforts carried out in the study of LD have consisted of single investigations comparing learning-disabled persons with normally-achieving persons (NA) on one or more dependent variables of interest. These efforts have produced a large amount of information over the years that ostensibly suggests that learning-disabled students differ from their normally-achieving peers

on measures of attention, perception, linguistic skills, memory, conceptual thinking skills, social skills, and academic achievement variables.

Description of Reading-Disabled/Learning-Disabled Children

New label combinations have begun to appear in the research in an attempt to make some of the connections between language, learning, and reading more explicit, and to more precisely define subgroups within the heterogeneous LD population. This has proven to be a difficult task. The study of homogeneous subgroups withing a heterogeneous population is extremely complex. Until further understanding of LD subgroups is obtained, the task of developing accurate identification criteria will remain extremely difficult.

Research and clinical data from a variety of sources and orientations indicate that the largest percentage of learning-disabled children have language problems (Maxwell & Wallach, 1984). The prevalence of language problems within the learning disabilities population has been well documented (Gerber & Bryen, 1981; Johnson & Myklebust, 1967; Wiig & Semel, 1976). However, how to conceptualize the language problems of learning-disabled children continues to be unresolved (Ceci & Baker, 1987).

The present study is restricted to reading disabilities exhibited by learning-disabled children. The term "reading disability" (RD), as it refers to a sub-population within the field of

learning disabilities (RD/LD), will be defined according to Spear and Sternberg (1987). The term "reading disability" withing the field of learning disabilities, refers to individuals who have a specific deficit in reading, coupled with average or above average intelligence. The deficit is an intrinsic deficit, one not caused by external factors such as poor teaching or environmental deprivation, or by other handicapping conditions such as sensory impairment or emotional disturbance.

Reading Acquisition of NA and RD/LD Students

Word recognition and decoding skills are the primary foci of reading instruction in the early grades. Much of the literature on the reading acquisition of normally-achieving (NA) and reading-disabled/learning-disabled (RD/LD) children focuses on decoding and fluency deficiencies. Specifically RD/LS students seem to experience difficulty with several of the phonological aspects of language which play an important role in the initial acquisition of decoding skills (Fox & Roth, 1980; Liberman & Shankweiler, 1979; Stanovich, 1982). The ability to decode both rapidly and accurately is a prerequisite for comprehension. Consequently, it is only when decoding becomes automatic that attention is freed for the higher order skills necessary for thinking about the meaning of the text (LaBerge & Samuels, 1974; Samuels, 1981; Stanovich, 1982). Rapid reading with comprehension indicates that automatic decoding has been attained.

Recent research has also shown deficiencies in learning-disabled students' ability to compare and evaluate related information. One must successfully comprehend the reading material before comparisons and evaluations can be made. Failure to use metacognitive strategies can detract from comprehension. Metacognition refers both to what a person knows about his or her cognitions (in the sense of being aware of them in some way) and to the ability to control (monitor) these cognitions when choosing among alternative activities, planning, monitoring, and changing activities.

Comprehension Monitoring

Reading comprehension involves many cognitive and perceptual skills. A major component is the ability to monitor one's level of understanding while reading. Paris and Myers (1981) refer to comprehension monitoring as "mental pulse-taking" that is important because it is a measure of progress towards a reading goal and a signal for comprehension failures. According to Paris and Myers (1981) there are three distinct aspects of comprehension monitoring: evaluation, planning, and regulation.

The evaluation component involves checking one's current state of knowledge while reading. Evaluation provides answers to questions such as, "Does this make sense? Do I understand this word? Do these ideas fit with previous information?" If the answer to any of these questions is negative, then the reader must generate a plan to rectify the comprehension problem, or alternatively, change the original goal.

The planning component involves the recruitment and selection of corrective strategies. Once a plan is selected, either planfully or automatically, the reader must implement the final aspect of comprehension monitoring which is the regulatory behavior. Examples of regulatory behavior are rereading, using contextual information, looking up words in a dictionary or requesting help. Successful monitoring involves both reflecting on one's comprehension and implementing regulatory behavior. Monitoring should be flexible and adaptive so that one can generate alternative plans to solve the task. Comprehension monitoring implies an awareness of the goals of reading, as well as the formation of strategies for meeting the goals (Paris, 1981).

Deficiencies in metacognition, particularly comprehension monitoring, have been observed among young and poor readers (e.g., Baker & Brown, 1984; Owings, Person, Bransford, Morris, & Stein, 1980). Some evidence suggests that LD students are less apt than normal students to monitor their comprehension while reading (Bos & Filip, 1934; Kaufman, 1981; Paris & Myers, 1981). A confounding variable that has too often been ignored in this research is the child's level of decoding skill. In other words, LD students are often reported to be production deficient in general comprehension ability, when, in fact, their low performance on comprehsnsion tests may be due to inadequate decoding when reading text above their identified reading level. A test of this hypothesis can be conducted by manipulating reading difficulty level. That is, have students

read texts below, on, and above their identified instructional reading level. If, in fact, the lack of comprehension monitoring is the result of high decoding demands, rather than ability or production deficits in the child, then it should be evident for normally-achieving students as well.

Research Hypotheses

The present study will examine the extent to which comprehension monitoring skills are affected when used in more and less complex reading levels by reading-disabled/learning-disabled students and normally-achieving students.

The primary research hypotheses to be tested in the present study are as follow:

1. RD/LD and NA students will perform with similar success on comprehension monitoring behaviors when reading materials at or below their Instructional Reading Level (IRL).
2. RD/LD and NA students will show similarly poor comprehension monitoring behaviors when the reading difficulty level exceeds their respective Instructional Reading Level.

CHAPTER II

REVIEW OF RELATED RESEARCH

Research on the comprehension monitoring skills or reading-disabled/learning-disabled students spans many disciplines. A summary of research related to the questions of the present study includes the areas of information processing, schematic structures, reading, comprehension, and learning disabilities.

Information Processing in Readers

Information-processing theory was originally described in its most complete form by Atkinson and Shiffrin (1968). One aspect of this theory is that the human mind is a linited-capacity processor. That is, the reader can selectively direct attention to any particular subprocess, but only by diverting attention from deeper levels of analysis (LaBerg & Samuels, 1974). The problem of limited processing capacity is especially critical for the less-skilled reader. Many of the necessary subskills are not well learned and, therefore, demand considerable attention (Adams, 1980).

Given that the less-skilled reader is bound to encounter many visually unfamiliar words, it is important to consider what is involved in the decoding process. An example provided by Adam (1980)

exemplifies some of the processes.

> First, the reader must parse the letter string into sets of one or more letters that correspond to phonemic units. Notably, there may be more than one apparent way to do this (e.g., nowhere vs. nowhere). In addition, she or he must look for graphemic markers, such as final e's, that might modify the phonemic significance of any of these sets. Next, the sounds corresponding to each graphemic set must be generated. Even if the graphemic string has been correctly segmented, this process may depend on trial and error as a graphemic set may signify more than one pronunciation (e.g., through vs. rough). Moreover, to do the job right, the reader cannot focus exclusively on one graphemic set at a time, the pronunciation of a graphemic unit may vary with both its position in the word (e.g., ghost vs. rough) and its graphemic environment (e.g., city vs. call). Next, these sounds must be blended together, and this, in itself, may be hard for some children (Savin, 1972). Having thus translated the printed word into a spoken correspondent, the reader must check to see that the result makes sense in the larger context of the sentence. If not, the process must be reiterated. (pp. 15-16)

In short, the process of sounding out a word can be very complicated. If the child must focus attention on the structural properties of words, she or he may lose the meaningful dimensions of the passage (Craik & Lockhart, 1972; LaBerge & Samuels, 1974).

Schema-Theoretic View of the Reading Process

At the heart of reading is the process of comprehension. In recent years, there has begun to emerge a new perspective on reading that centers on the process of the thoughtful acts of the readers. This view, called "schema-theoretic," has influenced recent conceptions of comprehension instruction. A schema theory is a theory

about knowledge. It is a theory about how knowledge is represented. and how that representation facilitates the use of the knowledge in particular ways (Rumelhart, 1980). According to schema theories, all knowledge is packaged into units. These units are called schemas. Embedded in knowledge schemas is information about how the knowledge is to be used. The central function of schemas is to construct an interpretation of an event, object, or situation; that is, to comprehend the event. The total set of schemas instantiated at a particular moment in time constitutes our internal model of the situation we face at that time. In the case of reading a text, the model of the situation is depicted by the text. The primary activity associated with a schema is the determination of whether it gives an adequate account of some aspect of our current situation. If a promising schema fails to account for an aspect of a situation, one has the options of accepting the schema as adequate despite its flawed account or of rejecting the schema as inadequate and looking for another possibility. Therefore, the fundamental processes of comprehension are taken to be analogous to hypothesis testing, evaluation of a goodness to fit, and parameter estimation. Thus, a reader of a text is presumed to be constantly evaluating hypotheses that offer coherent accounts for the various aspects of the text. To the degree that a particular reader fails to find such configurations, the text will appear disjointed and incomprehensible.

There are two basic directions of activation for schemas. These are usually referred to as "top-down" and "bottom up" activation.

These two directions correspond to what Bobrow and Norman (1975) have called "conceptually-driven" and "data-driven" processing. Conceptually-driven activation moves from whole to part. For example, the presentation of the FACE schema would transfer to MOUTH, NOSE, EYE, EAR, and so on, subschema. Data-driven activation moves from part to whole. For example, if the activation of the FACE schema led to the activation of the PERSON schema, we would say that the activation of the PERSON schema was data-driven (refer to Rumelhart, 1980 for a more detailed explanation).

For the skilled reader, top-down and bottom-up processing is occurring continuously as one proceeds through the text. The reader is, therefore, able to make optimal use of the information on the page, the redundancy of the language, and the contextual environment with minimal effort. The top-down processes ensure that the lower order information that is consistent with the reader's expectations will be easily assimilated. Meanwhile, the bottom-up processes ensure that the reader will be alerted to any information that is novel or that does not fit her or his ongoing hypotheses about the content of the text (Adams, 1980).

The efficient operation of such a system depends as much on the reader's knowledge base as on the information in the written text. If the reader is lacking any critical skill or piece of knowledge, the flow of information through the system will be obstructed. In these cases, the reader must find a way to compensate. One option is to direct extra processing energy to the difficulty until it is

resolved. For example, the reader may pause and articulate a difficult word. Alternatively, the reader may rely on top-down processes to evade the problem. For example, the reader may use contextual information to infer the meaning of an unfamiliar word. Both of these solutions are normal and adaptive and are regularly used by skilled readers. Thus, one kind of difficulty that we might expect to observe among beginning readers is a failure to adopt either of these strategies. However, an equally serious problem may arise if one or the other of these strategies is applied to the extreme.

Relying too heavily on top-down processing precludes an effective balance between information that the reader should bring to the text and that which the text should bring to the reader. To the extent that guesses are based on prior guesses, the individual is not reading in any fruitful manner.

In the long run, the alternative strategy of focusing attention on means to overcome difficult text may be more adaptive. For the less skilled reader, an immediate benefit of instruction in letter-to-sound correspondences is that it provides a means toward identifying words that are in the student's listening vocabulary but are usually unfamiliar. However, the danger in using this strategy is that comprehension may consequently suffer.

Defining Reading Comprehension

The concept of reading comprehension has changed radically over the past few years, along with the methods of studying it (see

Johnston, 1983 for a review). It is hypothesized that knowledge is stored in schematic structures and that comprehension involves the process(es) of forming, elaborating, modifying, or integrating the knowledge of structures (Rumelhart, 1977). Reading comprehension is considered to be a complex behavior which involves the conscious and unconscious use of a wide variety of strategies, including problem-solving strategies designed to build a model of the meaning which the writer is assumed to have intended. According to Johnston (1983), the model is constructed using schematic knowledge structures and the various cue systems which the writer has given (e.g., words, syntax, macrostructures, social information) to generate hypotheses which are tested using various logical and pragmatic strategies. In addition to the need for reasoning processes, good readers monitor the progress of their comprehension and use repair strategies when necessary. This requires that they decide upon the purpose for reading, take conscious control of the reading process, and instigate the appropriate alternative strategies. In a review by Rosenshine (1980), it was argued that reading comprehension entails seven distinct but related skills--recognizing sequence, recognizing words in context, identifying the main idea, decoding detail, drawing inferences, recognizing cause and effect, and comparing and contrasting.

Reading Level Design

A new research design has evolved for examining correlates of reading disability. This design, referred to as the "reading level

design," matches reading-disabled children with younger, normally-achieving children at the same level of reading achievement, and then compares levels and patterns of performance on assorted reading tasks (Backman, Mamen, & Ferguson, 1984). The reading level design represents an attempt to overcome some of the difficulties of interpretation encountered in previous research that matched subjects on chronological age.

In the previous research, learning-disabled subjects have typically been matched for chronological age with normal readers. Differences between the groups on nonreading measures (such as cognitive and linguistic tasks) have been presumed to reflect deficits causally related to the reading failure of the learning-disabled group. However, such between group differences are ubiquitous and span any number of behavioral domains (Rourke, 1978). Even more problematic is the determination of differences that could be attributed solely to the lower level of reading achievement in the learning-disabled group. For example, learning-disabled children may be found to be worse than their chronological age matches in phonemic segmentation or syntactic or morphophemic knowledge. However, each of these deficits could be a consequence of reduced experience with written language rather than a cause of poor reading ability.

Previous research designs have made interpretations of deficits on reading tasks difficult. If learning-disabled and age-matched

normal children read the same material, the material will be less difficult for the normally-achieving group. Thus, the error analysis will yield many errors for the disabled group and few errors for the normal group. An alternative is to have learning-disabled and normal subjects read material at individually adjusted levels of difficulty. However, in this situation the groups will read different material, making direct comparison impossible. The reading level design has the advantage of permitting direct comparisons of the reading processes of disabled and normal children for materials that correspond to each group's reading achievement.

In summary, the rationale for the reading level design assumes that matching older learning-disabled children with younger children on the basis of reading level provides an alternative control group to chronological age matches, because differences due to experience with written language, stages in the reading acquisition process, or difficulty of task material are minimized. A finding to no differences found on the variables measured would support the view that learning-disabled children are not qualitatively distinct from younger normal readers but simply are delayed in their acquisition of reading and related skills (e.g., Satz & Sparrow, 1970). In contrast, if the learning-disabled group exhibits lower levels of performance on the variables measured, then it might be argued that learning-disabled readers are qualitatively different from younger normals in the sequence and rate of their development. This latter conclusion

would be compatible with a deficit interpretation rather than a reading lag interpretation of the RD/LD child (e.g., Rourke, 1976).

Review of Research on Comprehension Monitoring Skills

Comprehension monitoring implies some awareness of goals and strategies for meeting these goals. The failure of learning-disabled children to spontaneously use strategies has resulted in the conclusion that learning-disable children are production deficient or inactive learners. The production deficiency hypothesis had its origins in the works of Flavell (1970). Flavell described a developmental sequence for the acquisition of proficient strategy use among normally developing children. At early stages of strategy development, some children do not spontaneously use an appropriate strategy for an assigned task. When given brief instruction, however, they show the ability to use the strategy and their performance on the task improves. Given the children's responsiveness even to minimal instruction, Flavell assumed that the children were not learning a new skill; rather, instruction reminded them to produce a skill already in their repertoire.

Barclay and Hagan (1982) selected this type of strategy deficit--production deficiency--to explain the poor academic performance of children described as learning disabled. Torgesen (1977, 1980) proposed a similar explanation characterizing learning-disabled students as "inactive learners." These authors reasoned that success

in school depends at least in part on the effective use of learning strategies. In keeping with this view, they attributed aspects of learning-disabled students' academic failures to a disinclination to produce strategies despite having the competencies necessary to do so (for a detailed explanation, see Torgesen & Licht, 1983).

While there has been an abundance of research in the area of LD children's lack of strategy usage, there has been very little research in the area of LD children's use of comprehension monitoring skills. Most comprehension monitoring research has been done with good and poor readers not classified as RD/LD.

Smith (1975) suggested poor readers often concentrate on decoding individual words and do not try to construct the meaning of sentences. Also, young and poor readers seem to be less aware of the existence and value of techniques for regulating comprehension (Myers & Paris, 1978).

Paris and Myers' study (1981) examined comprehension monitoring of good and poor readers. In their study, the subjects were 32 fourth graders who were then divided into two subgroups of "good" and "poor" readers based on an achievement score. Each group was asked to read two stimulus passages and answer the corresponding sets of comprehension questions.

The conclusion of Paris and Myers' (1981) study was that "comprehension monitoring . . . is less accurate in poor readers than good readers and is related to the typically inferior comprehension

and recall of these (poor readers) children" (p. 13). The authors did state that the goal of decoding and pronouncing words may have taken precedence over comprehension evaluation and regulation in poor readers.

The stimulus passages were, according to Paris and Myers' research, "appropriate for their reading level." The poor readers were given a third-grade reading passage; and the good readers were given a fifth-grade reading passage. However, an examination of the grade-equivalent reading scores obtained from the achievement scores showed that the mean of the poor reader group was 2.8 (SD = .68, range = 1.0-3.4), and the mean of the good reader group was 5.4 (SD = 3.6, range = 4.8-6.2). This means that more than half of the poor readers (mean = 2.8) were reading above their reading level when asked to read third-grade reading material, while more than half of the good readers (mean = 5.4) were reading below their reading level when asked to read fifth-grade reading material. In addition to which the range of reading ability for the poor readers was two years (1.0) below the third-grade assessment reading materials, while the range of reading ability for the good readers was only four months (4.8) below the fifth-grade assessment reading materials. Therefore, the test was not equally hard for both groups.

The present examination of comprehension monitoring strategies of NA and RD/LD children draws from the Paris and Myers' (1981) study. The comprehension monitoring measures used in this study are similar

to the measures in the Paris and Myers' (1981) study. However, instead of comparing good and poor readers, the present study will compare NA and RD/LD matched on reading level.

Construction of appropriate, quantitative measures of comprehension monitoring is difficult since many checking behaviors may be subtle or covert; repetitions do not always reflect deliberate attempts at monitoring and correcting the meaning. The frequency of monitoring will be compared in two situations--spontaneous and directed monitoring. In the spontaneous monitoring condition the children will orally read passages and their spontaneous substitutions, repetitions, and self-corrections will be recorded. In the directed monitoring condition new stories will be presented and they will be asked to underline any words that they do not understand.

The comprehension monitoring measures used in the Paris and Myers' (1981) study are similar to the probes used by classroom teachers to check students' ongoing comprehension monitoring of school texts. Students are asked to read aloud, seek assistance for anything they do not understand during the reading process, and answer subsequent comprehension questions concerning what they have just read.

CHAPTER III

METHODS

Subjects

Fifty-four students in grades two through seven were recruited from the elementary and middle schools of Anne Arundel County Public School System for participation in this study. Chronological ages of the children ranged from eight years one month to 14 years no months. Anne Arundel County is located in the eastern part of Maryland. The county encompasses the state capital of Annapolis and is located along the Chesapeake Bay. While all of the subjects live in the eastern part of the United States, they are a heterogeneous sample in that the students come from various ethnic backgrounds and socioeconomic levels. Anne Arundel County School System was chosen as the system from which to draw subjects due to its accessibility to the researcher, as well as its heterogeneous composition of students.

Ten school principals were contacted for participation in the study. Seven principals consented to participate. Those who did not participate in the study either did not have students that met the RD/LD criteria or explained that school routine did not allow for the unobtrusive removal of children from classroom instruction for testing, or that the students were already too involved in county curriculum extras (field trips, swim programs, musical performances).

The subjects were recruited through a letter of introduction and a frief summary of the study. The principal, teacher specialist, or classroom teacher distributed the letters to the parents. Permission for each child to participate in the study was returned to the classroom teacher (see Appendix A).

Two samples of students were identified for participation in the study. Reading-disabled/learning-disabled (RD/LD) students were identified first by the school principal with the assistance of the reading and/or special education teacher(s). Once the instructional reading levels of the RD/LD students were ascertained by the researcher and verified by the school reading specialist, the normal-achieving/instructional-reading level matches (NA/IRLM) were selected by the principal and classroom teacher.

Reading-disabled/learning-disabled (RD/LD) students. Twenty-four reading-disabled/learning-disabled (RD/LD) students (12 seventh graders and 12 fifth graders) participated in the study. Locating RD/LD students who fit the criteria to be described further in this section was difficult. However, once the children were identified their parents were receptive to having the children participate in the study.

All participating RD/LD students were first identified as being learning and second, identified to have their primary disability in the area of reading. The students were identified as learning disabled according to state regulations and were participating in a special education resource program. State guidelines are consistent

with federal criteria which require that (1) LD students exhibit a significant discrepancy between ability and school achievement in one or more academic areas, and (2) that the discrepancy is not the primary result of a visual, hearing, or motor handicap, mental retardation, emotional disturbance, or environmental, cultural, or economic disadvantage.

The RD/LD students were specifically identified as reading-disable/learning-disabled by the Anne Arundel County assessment team, and the school special education/reading specialist. The county assessment team is responsible for identifying the specific areas in which a student exhibits a learning problem. This information is then used to form an Individual Educational Program (IEP) for each LD student. Only LD students whose IEP's indicated the primary learning problem in the area of reading were included in this study.

To verify students' IQ the most recent Full Scale IQ score from the Wechsler Intelligence Scale for Children-Revised (WISC-R) was obtained from each student's psychological file. Students with IQs below 85 were excluded.

The 12 seventh-grade RD/LD students consisted of six boys and six girls, all attending the same middle school. The chronological age range was 12 years 3 months to 14 years with the mean age being 13 years 2 months. All had and were receiving additional remedial services (reading and/or speech) in the schools. Six of the students were late in starting kindergarten or had repeated a grade. Sex and race compositions and instructional reading levels of these subjects

are shown in Table 1. Two students initially selected for the study were not included. One student moved away from the area after the initial testing; the second student was mainstreamed out of the resource room program after her IEP annual review.

Table 1

Sex, Race, and Instructional Reading Level (IRL) of Seventh-Grade RD/LD Students and Their NA/IRLM Students

Characteristics	Seventh-Grade RD/LD N	NA/IRLM N
Sex		
Female	6	6
Male	6	6
Instructional Reading Level		
Third Grade	1	1
Fourth Grade	1	1
Fifth Grade	8	8
Sixth Grade	2	2
Race		
Caucasian	8	9
Black	3	3
Other	1	0

The fifth grade was chosen as the earliest grade level at which to identify RD/LD students for this study. This decision was based on the reasoning that fifth-grade RD/LD students were expected to be reading at the third-grade reading level (i.e., State Guidelines require that students be reading at least two years below grade level

to be identified as learning disabled). Students with a reading level below third grade often do not have a sufficient reading vocabulary to begin reading and comprehending longer reading selections and content textbooks (Science and Social Studies) such as those used in the present study. The use of fifth graders also enabled comparisons of the present results with those of previous research (e.g., Curtis, 1980; Paris & Myers, 1981; Stanovich, 1986).

The 12 fifth-grade RD/LD students included in this study consisted of four females and eight males, sampled from five different elementary schools. The age range was 10 years 4 months to 12 years 2 months with the average age being 11 years 3 months. Six of the students had waited to start kindergarten or had repeated a grade. All students were receiving special services during the present school year, and 10 of the students had received special services previously. Sex and race compositions and instructional reading levels of these subjects are shown in Table 2.

Normally-achieving/instructional-reading level match (NA/IRLM) students. Once the RD/LD students were identified and their instructional reading levels ascertained, the school principal and classroom teachers selected the normal-achieving/instructional-reading level matched (NA/IRLM) students. Each principal secured parental permission differently. Some principals sent the informed consent form home with the child, others mailed it, and others chose to contact the parent by phone prior to sending home the informed consent form. Accordingly, it was not possible to determine the numbers of NA/IRLM children whose parents did not consent for participation.

Table 2

Sex, Race, and Instructional Reading Level of Fifth-Grade RD/LD Students and Their NA/IRLM Students

Characteristics	Fifth-Grade RD/LD N	NA/IRLM N
Sex		
Female	4	4
Male	8	8
Instructional Reading Level		
Second Grade	1	1
Third Grade	9	9
Fourth Grade	2	2
Race		
Caucasian	9	7
Black	2	2
Other	1	3

The NA/IRLM students were normally achieving on-grade in all areas of the school curriculum as determined by report cards, teacher reports, current scores on the California Achievement Test, Slosson IQ or Cognitive Abilities Test. Students with IQs below 85 were excluded. Whereas the county used the Wechsler Intelligence Scale for Children-Revised to determine the RD/LD students, the Slosson IQ was used by the county to test the IQs of normally-achieving children.

The 12 students selected as reading level matches for the seventh-grade RD/LDs were matched on sex and reading level. The matched students came from four different grades ranging from third

through sixth, with the average grade being fifth. All 12 student matches for the seventh-grade RD/LDs attended the same elementary school. The students ranged in age from 8 years 8 months to 13 years, with the average age being 10 years 7 months. None of the students were receiving special services in reading or speech during the present academic year, while one student had received special services (speech) in a previous year. All of the students had started kindergarten at the appropriate age and none of the students had ever been retained. Sex and race compositions and grade level of the subjects are shown in Table 1.

The 12 students selected as reading level matches for the fifth-grade RD/LDs were selected from the schools attended by their RD/LD matches. As shown in Table B-2, the students were matched on sex and instructional reading level. The subjects were selected from grades two, three, and four, with the average grade being third. The students ranged in chronological age from 8 years 1 month to 10 years, with the average age being 8 years 11 months. One of the students had received special services (speech) in previous years and was still receiving speech services. All of the children began kindergarten at the appropriate age and none of them had ever been retained. Sex and race compositions and grade level of these subjects are shown in Table 2.

A third set of comparison groups was used in the present study to examine the relative effects of reading differences on same age reading-disabled/learning-disabled and normally-achieving children.

This analysis called for an additional group of fifth-grade normally-achieving students. Of the 12 fifth-grade NA students, six were included as NA/IRLM students for the seventh-grade RD/LDs, and six were recruited specifically for this comparison. The 12 fifth-grade NAs were all reading on the fifth-grade instructional reading level. Their ages ranged from 10 years 3 months to 11 years 1 month, with average age being 10 years 8 months. All of the students began kindergarten at the appropriate age and none of the students had ever been retained. One student was receiving special services this year (speech), and three students had received special services in previous years. Sex and race compositions and grade level of these students are shown in Table 3.

Design

The purpose of the study was to examine and compare RD/LD and NA/IRLM students' comprehension and comprehension monitoring performance under the different levels of reading difficulty. This study employed a two-factor analysis of variance design with reading status (two levels; RD/LD versus NA) as a between-subjects factor and reading difficulty level (four levels; below, on, one year above, two years above instructional reading level) as a within-subject factor (see Table 4).

The "reading level design" (Backman, Mamen, & Ferguson, 1984) used in the present study matches reading-disabled children with younger, normally-achieving children at the same level of reading

Table 3

Sex, Race, and Instructional Reading Level of Fifth-Grade RD/LD Students and Fifth-Grade Normally-Achieving Students

Characteristics	Fifth-Grade RD/LD N	Fifth-Grade NA N
Sex		
Female	4	4
Male	8	8
Instructional Reading Level		
Second Grade	1	0
Third Grade	9	0
Fourth Grade	2	0
Fifth Grade	0	12
Race		
Caucasian	9	10
Black	2	2
Other	1	0

achievement. The comparison of groups of children of different ages but similar reading skill has recently become increasingly frequent (Beech & Harding, 1984; Snowling, 1981; Stanovich, Nathan, & Vala-Rossi, 1986). The design provides an alternative control group to chronological age matches, since differences due to experience with written language, stages in the reading acquisition process, or difficulty of task material are minimized. As Bradley and Bryant (1978) argue, when 10-year-old poor readers are found to perform more poorly on a cognitive task than normally progressing six-year-olds, it

Table 4

Reading Level Design

Reading Group	Level of Reading Difficulty			
	1 Year BELOW Reading Level	ON Reading Level	1 Year ABOVE Reading Level	2 Years ABOVE Reading Level
RD/LD	Task 1[a] Task 2[b]	Task 1[a] Task 2[b]	Task 1[a] Task 2[b]	Task 1[a] Task 2[b]
NA/IRLM	Task 1[a] Task 2[b]	Task 1[a] Task 2[b]	Task 1[a] Task 2[b]	Task 1[a] Task 2[b]

[a]Task 1 was the directed underlining task.

[b]Task 2 was the spontaneous monitoring task

is difficult to argue that the six-year-olds are superior because they have been exposed to more print than the ten-year-olds.

Instruments Used for the Initial Screening Assessments

The results obtained from a "reading level design," such as the one used in this study, may vary depending on whether the student matching is done with a reading comprehension test or a word recognition test (see Backman, Mamen, & Ferguson, 1984; Das, Bisanz, & Mancini, 1984; Stanovich, 1988 for discussions). The present research will use a reading-instructional level match which is based on both decoding ability and reading comprehension ability. Given that this is how children are identified and labeled in the school setting, the

results from an instructional reading level match would be relevant to clinicians in the field, generalizable to a larger population and more readily replicable.

Screening test of decoding ability. Decoding ability was assessed using the Graded Word Lists section of the Reading Diagnosis Kit (Miller, 1974). The words and oral paragraphs used in the inventory were formulated from several series of basal readers and graded English literature textbooks at the secondary level and are similar to the types of reading material that children encounter in the elementary grades.

The Graded Word Lists consisted of 25 words per grade level. As the child read a list orally, his word recognition errors were recorded using the error symbols recommended by Silvaroli (1969) and Paris (personal communication, June 25, 1990). Errors are recorded when the child repeats, substitutes, omits, or needs teacher assistance in pronouncing a word.

Each student read a minimum of three graded word lists. The student read graded word lists one grade BELOW his instructional reading level, ON his instructional reading level, and one grade ABOVE his instructional grade level. The purpose of this assessment was to determine the approximate independent reading level at which to have the student begin the graded oral reading paragraphs as well as to determine the highest garde level at which the student could pronounce all 25 words on the list, and the grade level at which the student failed to read 50% of the words.

Screening test of instructional reading level. The subject's instructional reading level was assessed using the Graded Paragraph section of the Reading Diagnosis Kit (Miller, 1974). The Graded Paragraph section consists of reading selections written at each grade level. The paragraphs included in the inventory were formulated from several series of basal readers and graded English literature textbooks at the secondary level. The student read the graded paragraphs orally. Word recognition (decoding) errors were recorded using the symbols recommended by Silvaroli (1969). After each oral selection the child was asked to answer five comprehension questions about what he had just read. The questions dealt with the facts, inferences, and vocabulary contained in each selection.

The instructional reading level was determined as the grade level at which the student could read with at least 95% accuracy in word recognition and with at least 75% comprehension accuracy. However, it was found during the initial screening sessions that the RD/LD students could answer 75% of the comprehension questions with less than 95% accuracy in word recognition. According to Miller (1986), comprehension is most fundamental to reading proficiency. Therefore, the student's ability to answer the comprehension questions was used as the primary determiner of the reading level (see Miller, 1986, p. 195 for further justification). In addition, all 24 RD/LD students' instructional reading level was confirmed with the student's most recent score on the Woodcock Johnson Psychological Educational Battery Tests of Achievement.

Cognitive Levels Test. The Cognitive Levels Test (CLT) (Algozzine, Eaves, Mann, & Vance, 1988) was administered to provide an identical measure of cognitive functioning for both populations of students. Given that the RD/LD students' cognitive measure had been determined by the WISC-R and the NA students cognitive measure had been determined by the Slosson or Cognitive Ability Test, the present study included an additional cognitive measure administered to all subjects. Although the CLT is a relatively new test, it has been normed on a national sample of 1500, is highly reliable, and correlates highly with socres obtained from WISC-R. The CLT was chosen to provide a common cognitive measure for the two populations.

Procedure for the Initial Screening Assessments

The screening assessments were administered individually by the researcher in a quiet room in the student's school building. The session was informal and lasted approximately one hour. The screening instruments were administered in a single sitting for all students, with the exception of the seventh-grade RD/LDs. These subjects required two sittings (each on a separate day) totaling approximately one and one-half hours because a single class period (50 minutes) was not sufficient to complete all screening instruments. The CLT was administered during the first sitting, with the informal reading assessments being administered during the second sitting.

The tasks were described to the students as reading activities that were part of a study involving how students in various grades

process information. The students were told that their performance on the tasks would not affect their classroom grades or future placement in classes. At the end of Session One the students could choose either a package of Starbursts or M&Ms as a "thank you" for participating in the study and putting forth their best effort.

Tasks, Materials, and Measures for the Comprehension and Comprehension Monitoring Assessments

Session Two was administered approximately two weeks after Session One and included two tests of comprehension monitoring (directed underlining and spontaneous monitoring) and the administration of comprehension questions.

Reading passages. Reading passages for the comprehension and comprehension monitoring measures were taken from the Barnell Loft (1990) Specific Skill Series. This series is designed to develop eight reading skills. Each skill is developed through a series of 12 units of progressive difficulty from first-grade reading level through twelfth-grade reading level. The present study used the Getting the Main Idea skill units (Book B/second grade through Book F/sixth grade) from the series. The main idea skill was chosen because it is one of the seven comprehension skills covered in most reading curriculums (Rosenshine, 1980). Each booklet consists of 25 units with four or five short passages per unit. Unit 13 from each booklet was used in this study, which was presumed to be appropriate for the students'

ability levels given that the students were midway through the academic year.

Tasks and measures of children's comprehension monitoring. The two comprehension monitoring tasks were (1) a spontaneous monitoring task and (2) a directed underlining task. For the spontaneous monitoring task the students were asked to read two passages aloud. The two passages were the first and second story from Unit 13 of Getting the Main Idea (Loft, 1990) from each identified grade level booklet. Each story was present individually on an 8 x 11 inch index card. The spontaneous word recognition errors made by the student were recorded by the researcher on a master copy of the story. The number of word recognition errors made at each grade level was totaled.

The second comprehension monitoring task was the directed underlining task. For this task the students were asked to read two passages silently to themselves and to underline any words that they were unable to pronounce or any words or phrass that they did not understand. The two passages were the third and fourth passages from Unit 13 of Getting the Main Idea skill units from each identified grade level booklet. Each passage was presented individually on an 8 x 11 index card. The number of underlines (one per word or phrase) made at each grade level was totaled.

The comprehension task. Eight comprehension questions were asked at each grade level (four comprehension questions during the spontaneous monitoring task and four comprehension questions during the directed underlining task). Therefore, each child answered eight

comprehension questions at each level of reading difficulty, which yielded a minimum score of zero and a maximum score of eight correct. One main idea question and one fact question were asked for each of the two passages for each monitoring measure (spontaneous and directed underlining) at each grade level.

The main idea question asked what the paragraph mainly told, followed by four multiple choices. The one fact question for each passage was written by the researcher. The fact question was written at the literal level and began with the asking words "who, what, where, or when." The answer to the fact question was always clearly stated in the paragraph and was easily decodable (e.g., How many chimpanzees were there in the training program? Answer "forty").

Reading rate measure. A rate measure was included in this study, given that one's reading rate should increase with decoding ability. The rationale for this view is that if a student is able to decode words automatically, conscious processing space should, therefore, be freed from focusing on word recognition, and the student would be able to read for meaning.

The rate measure used in this study was a Curriculum-Based Measurement (CBM) modeled after a rate measure suggested by the University of Minnesota Institute for Research on Learning Disabilities (IRLD) as reported by Dino, Mirkin, and Chiang (1982). A Curriculum-Based Measurement relies on rate samples to assess academic skills. The rate measure consists of a list of words from the student's curriculum which the child is asked to read in one minute.

For this study each child's reading teacher was asked to supply the researcher with a list of 60 vocabulary words that had been previously taught during the school year. The words were then typed double-spaced and listed in columns on a separate sheet of paper.

Procedures for the Administration of the Comprehension and Comprehension Monitoring Tasks

The reading tasks were administered to individual children in a quiet room of their school. The sessions were informal and lasted approximately one hour. The tasks were described to the students as reading and memory games. The students were told that they had worked very hard during the previous session and had done a nice job. They were told that if they put forth the same effort today and completed all the tasks requested that they would again have a choice of treats. It was further clarified that they did not have to answer everything correctly, but rather that they put forth their best effort on all tasks.

The spontaneous monitoring task was presented first so that the instructions to monitor by underlining would not contaminate the spontaneous self-corrections of the student. For the spontaneous monitoring task the student was asked to read stories aloud. He was told to read the stories carefully and to try to remember what he had read because he would be asked two questions about each story. After the student had read the story aloud, the card was placed face down

on the table. The student was then given an 8 x 11 inch index card on which the main idea question and the four possible answers for that selection were printed. The main idea question and four possible answers were then read aloud to the student by the researcher.

After selecting his answer for the main idea question, the card was placed face down on the table. The student was then asked the fact question. All student answers were recorded by the researcher on the response sheet. The response sheets were typed copies of the story selections and corresponding main idea and fact questions for each unit at each grade level.

The student read two selections one grade level below his identified instructional level, two selections on his instructional reading level, two selections one grade above his instructional reading level, and two selections two grades above his instructional reading level. Therefore, each student read a total of eight selections.

Following the first series of stories and subsequent questions, the student was told that in the next activity instead of reading the stories aloud, he would read the stories silently to himself. The student was told that it helps to pay attention to what the story means and to the parts of the story that do not make sense. Therefore, while he is reading the story to himself, he is to underline any of the words in the story that he is unable to pronounce or any words or phrases in the story that he does not understand. The student was told that when he had finished reading the story to himself, that the

researcher would ask some questions about the story he had just read. The student was asked if he had any questions about what he was to do. The student was then given a pencil and the first story selection. A 3 x 5 inch copy of each individual story was given to the student to read silently and to underline on as needed. When the student had finished reading and underlining, the story was returned to the researcher. The student was then given an 8 x 11 inch card on which was typed the main idea question and the four possible answer choices. The main idea question and four choices were read aloud to the student by the researcher. After selecting his answer for the main idea question, the card was placed face down on the table. The student was then asked the fact question. All student answers were recorded by the researcher on the response sheet. The response sheets were typed copies of the story selections and corresponding main idea and fact questions for each unit at each grade level.

The student read silently two selections one grade level below his identified instructional level, two selections on his instructional reading level, two selections one grade above his instructional reading level, and two selections two grades above his instructional reading level. Therefore, each student read a total of eight selections.

After the student had read four stories, a prompt to remember to underline was given (i.e., "Now be sure to underline any words you have difficulty pronouncing or any words or phrases that do not make sense."). The number of words or phrases underlined was totaled for each grade level (phrases counted as "one").

The final activity was the reading rate measure. The student was given a list of 60 words. The student was told that it was important to read the words carefully. The student was to begin reading the list when told to do so, that he would read for one minute and at the end of one minute he would be told to stop. The vocabulary word list was given to the student, and he was told to "begin." The student was timed using a watch with a sweep second hand. On the master vocabulary list, the researcher drew a line through any mispronounced words. Self-corrected words were also coded. After one minute, the student was asked to "stop." The number of words read correctly was recorded.

CHAPTER IV

RESULTS

The purpose of this study was to examine the reading comprehension and comprehension monitoring behaviors of reading-disabled/learning-disabled (RD/LD) students and their normal-achieving instructional reading level matches (NA/IRLM) at different levels of reading difficulty. Preliminary *t* tests analyses were performed on the children's comprehension accuracy and word recognition errors for the screening assessment passages given at on-grade difficulty levels. The results of these analyses showed that there were no differences between RD/LD and NA/IRLM students on the accuracy of responses to the on-grade-level comprehension questions. However, there were differences between the RD/LD and NA/IRLM groups on word recognition errors. The primary analyses of the study focused on three different sets of comparison groups. One comparison set included seventh-grade RD/LD students and their normal-achieving/instructional reading level matches (NA/IRLM). The average instructional reading level of the seventh-grade RD/LD group was fifth grade. The second comparison set included fifth-grade RD/LD students and their normal-achieving/instructional reading level matches. The average instructional reading level of the fifth-grade RD/LD group was third grade. A third comparison set included fifth-grade RD/LD students and fifth-grade NA students reading at the fifth-grade level.

Group (2: RD/LD versus NA) by reading difficulty (4: below, on, one year above, two years above instructional reading level) comparisons were performed separately for the three dependent measures: (1) the number of comprehension questions answered correctly at each difficulty level (min. = 0, max. = 8), (2) the number of oral miscues made on the spontaneous monitoring task at each difficulty level (min. = 0, max. = 47), and (3) the number of words/phrases underlined on the underlining monitoring tasks at each difficulty level (min. = 0, max. = 9).

Performance on the Comprehension Questions

The students were asked eight comprehension questions at each of the four levels of reading difficulty. Two factor repeated measure measures analyses of variance (ANOVAs) were performed on the comprehension performance of each set of RD/LD versus NA/IRLM (or NA) comparisons. Tables B-4, B-5, and B-6 in Appendix B show the mean reading comprehension scores that were entered into these analyses.

The analysis of the seventh-grade RD/LD versus the NA/IRLM comparisons yielded a significant main effect for difficulty level, $F(3,66) = 7.18$, $p < .001$, but not for group, $F(1,22) = .14$, $p < .714$, or for the group x reading difficulty level interaction, $F(3,66) = .85$, $p < .474$. The same results were found for the analysis of the fifth-grade RD/LD versus the NA/IRLM comparisons; namely, a significant main effect for reading difficulty level, $F(3,66) = 18.59$, $p < .001$, but no effect for group, $F(1,22) = 2.84$, $p < .106$, or for the

group x reading difficulty level interaction, $F(3,66) = 1.92$, $p < .134$. Similarly, the analysis of the fifth-grade RD/LD versus the fifth-grade NA comprehension score comparisons also yielded a significant main effect for difficulty level, $F(3,66) = 13.28$, $p < .001$ but not for the group, $F(1,22) = 3.25$, $p < .085$, or for the group x reading difficulty level interaction, $F(3,66) = .06$, $p < .981$.

Performance on the Directed Underlining Monitoring Tasks

In the directed underlining tasks the students were asked to read the story passages silently and to underline any of the words in the story that they were unable to pronounce or any words or phrases that they did not understand. Each underlined word or phrase (a group of words connected with a single line) was scored as "one underline." The students read two story passages at each of the four levels of difficulty. The number of underlines was totaled for each student at each reading level and then averaged for the group. The means of the two groups were then compared using reading status (i.e., group x reading difficulty level two-factor repeated measures analyses of variance.

Tables B-7, B-8, and B-9 in Appendix B show the means and standard deviations of the directed underlining scores. The ANOVA performed on the underlining scores of the seventh-grade RD/LD versus NA/IRLM groups yielded a significant main effect for reading difficulty level, $F(3,66) = 7.78$, $p < .001$, but no main effect for group,

$F(1,22) = 3.11$, $p < .092$, or for the group x reading difficulty level interaction, $F(3,66) = .97$, $p < .411$. The analysis of the fifth-grade RD/LD versus the NA/IRLM comparisons yielded significant effects for reading difficulty level, $F(3,66) = 4.10$, $p < .010$, and for the group x reading difficulty level interaction, $F(3,66) = 3.38$, $p < .023$, but no main effect for group $F(1,22) = 3.63$, $p < .070$. Least Significance Difference (LSD) tests performed on the means contributing to the interaction effect showed that fifth-grade RD/LDs underlined greater numbers of words/phrases at two grades above their instructional reading level, b ut not at lower difficulty levels, than did NA/IRLM subjects ($p < .001$). As can be seen in Table B-8, fifth-grade RD/LDs underlined on the average more than three times as many word/phrases in the two-grades-above-instructional-reading level condition than did the NA/IRLMs.

The analysis of the fifth-grade RD/LD versus the fifth-grade NA comparisons yielded a significant main effect for reading difficulty level, $F(3,66) = 12.05$, $p < .001$, but no main effect for group, $F(1,22) = .21$, $p < .654$, or for the group x reading difficulty level interaction, $F(3,66) = .74$, $p < .531$.

Performance on the Spontaneous Oral Monitoring Tasks

In the spontaneous monitoring tasks, the students were asked to read the story passages aloud. The students read two story passages at each of the four levels of difficulty. The spontaneous oral

reading miscues were coded and totaled for each student at each level of reading difficulty (range 0-47) and then averaged for the group.

The means of the comparison groups were compared using group (2) x reading difficulty level (4) two-factor repeated measures analyses of variance. Tables B-10, B-11, and B-12 in Appendix B show the means and standard deviations of the error miscue scores that were entered into the analyses of variance.

The ANOVA performed on the spontaneous monitoring scores of the seventh-grade RD/LD versus NA/IRLM groups yielded significant main effect for group, $F(1,22) = 20.28$, $p < .001$, and reading difficulty, $F(3,66) = 41.70$, $p < .001$, and a significant group x reading difficulty interaction, $F(3,66) = 3.63$, $p < .01$. LSD tests performed between the means of the seventh-grade RD/LDs and their NA/IRLMs at each difficulty level showed that the seventh-grade RD/LDs made more oral reading miscues at all four levels of difficulty (below grade level, $p < .05$; on grade level, $p < .001$; one year above grade level, $p < .001$; two years above grade level, $p < .001$).

The ANOVA performed on the fifth-grade RD/LD versus the NA/IRLM comparisons also yielded significant main effects for group, $F(1,22) = 9.78$, $p < .005$, and for reading difficulty, $F(3,66) = 56.68$, $p < .001$, and a significant group x reading difficulty interaction, $F(3,66) = 4.76$, $p < .005$. LSD tests performed on the means contributing to the interaction effects showed that RD/LDs made more oral reading miscues at three of the four levels of difficulty than did their NA/IRLMs (on

grade level, $p < .05$; one year above grade level, $p < .01$; and two years above grade level, $p < .001$).

The analysis of the fifth-grade RD/LD versus the fifth-grade NA comparisons yielded a significant main effect for reading difficulty level, $F(3,66) = 78.11$, $p < .000$, and for group x reading difficulty level interaction, $F(3,66) = 3.60$, $p < .018$, but no main effect for group, $F(1,22) = 1.42$, $p < .245$. The LSD tests performed on means contributing to the interaction effect showed that the fifth-grade RD/LDs made more oral reading miscues than fifth-grade NAs ($p < .001$) at the two year above reading difficulty level but not at the other reading difficulty levels.

Analyses of Reading Miscue Types (Nonsense, Repeats, and Self-Corrections)

In addition to the analyses of the total n umber of spontaneous reading miscues, separate analyses were performed on each of three types of oral miscues. Nonsense miscues occurred when a student substituted a nonsense word for a real word. Repeat miscues occurred when a student either repeated the word he was trying to decode or repeated the phrase preceding a difficult word. Self-correction miscues occurred when a student read a word incorrectly and then self-corrected with the correct word. The means for the three error types are shown in Tables B-13 through B-21 in Appendix B.

Group (2) x difficulty level (4) repeated measures analyses of variance were performed on the scores for each error type.

Analyses of nonsense errors. The ANOVA of the nonsense errors made by the seventh-grade RD/LDs versus their NA/IRLMs yielded a significant main effect for reading difficulty, $F(3,66) = 8.97$, $p < .001$, and marginally significant effects for group, $F(1,22) = 3.36$, $p < .081$, and for the group x reading difficulty interaction, $F(3,66) = 2.23$, $p < .093$. The LSD tests performed between the nonsense miscues of the seventh-grade RD/LD and their NA/IRLMs at each difficulty level showed that the RD/LDs substituted nonsense words as an oral readin g miscue more than their NA/IRLMs at both of the ahove-grade-difficulty levels ($p < .05$).

The ANOVA performed on the fifth-grade RD/LD versus their NA/IRLM yielded a significant effect for reading difficulty, $F(3,66) = 8.02$, $p < .001$, but not for group, $F(1,22) = .01$, $p < .928$, or for the group x reading difficulty interaction, $F(3,66) = .57$, $p < .639$. Similarly, the analysis of the fifth-grade RD/LD versus the fifth-grade NA comparisons yielded a significant main effect for reading difficulty level, $F(3,66) = 12.04$, $p < .001$, but not for group, $F(1,22) = 3.37$, $p < .080$, or for the group x reading difficulty level interaction, $F(3,66) = 1.21$, $p < .314$.

Analyses of repeat errors. The ANOVA of the repeat errors among the seventh-grade RD/LDs versus their NA/IRLMs yielded a significant main effect for reading difficulty, $F(3,66) = 3.96$, $p < .012$, but no main effect for group, $F(1,22) = .07$, $p < .790$, and no group by reading difficulty interaction, $F(3,66) = 1.15$, $p < .336$. The ANOVA performed on the fifth-grade RD/LD versus the NA/IRLM comparisons

yielded significant main effects for group, $F(1,22) = 6.27$, $p < .020$, and reading difficulty, $F(3,66) = 3.43$, $p < .022$, but no effect for the group x reading difficulty interaction, $F(3,66) = 1.23$, $p < .306$. The analysis of the fifth-grade RD/LD versus the fifth-grade NA comparisons yielded a significant main effect for reading difficulty, $F(3,66) = 10.57$, $p < .001$, but not for group, $F(1,22) = 1.03$, $p < .322$, and no group x reading difficulty level interaction, $F(3,66) = .50$, $p < .682$.

Analyses of self-correction errors. The ANOVA of self-correction errors among the seventh-grade RD/LDs versus their NA/IRLMs failed to yield significant effects for group, $F(1,22) = 3.40$, $p < .079$, reading difficulty, $F(3,66) = 1.26$, $p < .294$, or for the group x reading difficulty interaction, $F(3,66) = .28$, $p < .837$. The ANOVA performed on the fifth-grade RD/LD versus the NA/IRLMs comparisons yielded a significant main effect for reading difficulty, $F(3,66) = 3.97$, $p < .011$, but not for group, $F(1,22) = .70$, $p < .413$, and no group x reading difficulty interaction, $F(3,66) = 1.08$, $p < .362$. The analysis of the fifth-grade RD/LD versus the fifth-grade NA comparisons yielded a significant main effect for reading difficulty, $F(3,66) = 8.88$, $p < .001$, but not for group, $F(1,22) = .00$, $p < .959$, or for the group x reading difficulty level interaction, $F(3,66) = .03$, $p < .993$.

Performance on the Reading Rate Task

In the reading rate task the students were given a list of 60 words to read aloud within one minute. The total number of words read correctly was totaled and then averaged for each group of students. The means and ranges for each set of students are reported in Table B-22 in Appendix B. As can be seen from the table, the NA/IRLMs for the fifth-grade RD/LDs averaged the most words read correctly within one minute ($x = 35.8$), with the seventh-grade RD/LD students averaging the least number of words read correctly within one minute ($x = 21.5$).

Performance on the Cognitive Levels Test

The Cognitive Levels Test was given for the purpose of providing a common IQ score for both populations of students. The means and ranges for each set of students are reported in Table B-23 of Appendix B.

CHAPTER V

DISCUSSION

The primary purpose of this present study was to examine the extent and qualities of reading comprehension monitoring behaviors exhibited by normally-achieving and reading-disabled/learning-disabled students.

Previous investigators have found learning-disabled children to be production deficient (Barclay & Hagan, 1982). That is, the LD child is assumed to have strategic skills such as those used for reading comprehension monitoring but fails to apply them at appropriate times and in appropriate settings. Accordingly, these children have been characterized as "inactive" learners (Torgesen, 1977, 1980). A production deficiency/inactive learner view of learning disabilities would be supported by evidence that without instruction learning-disabled students are less likely to produce task appropriate strategies than their normally-achieving peers (Gelzheiser, Cort, & Shepherd, 1987). The alternative hypothesis tested here is that the LD children are just as active in producing comprehension monitoring strategies as their normally-achieving peers when the materials read by these two populations are equated for reading difficulty.

The present study was designed to test the following hypotheses: (1) that LDs and NA/IRLMs alike show strategic comprehension monitoring

behaviors for reading materials on or below their instructional reading level (IRL), and (2) that both LD and NA/IRLM children show declines in reading comprehension accuracy with increasing level of text difficulty due to the added decoding demands of the text.

These hypotheses were tested by comparing the performances of seventh- and fifth-grade RD/LD children reading at fifth- and third-grade levels, respectively, with younger NA children whose identified reading levels were comparable to those of the LDs. In sum, it was expected, in the present study, that RD/LD and NA/IRLM students would perform with similar success and with similar difficulty depending on the difficulty level of the text relative to the groups' instructional reading levels.

In addition to comparing older and younger children's reading at comparable difficulty levels, an additional comparison focused on same-age RD/LD and NA children (fifth-grade) reading text below, on, and above their identified reading levels. Here, again, it was argued that when equating reading difficulty the comprehension monitoring strategies of these groups would be comparable.

Three overall findings emerged from this study. In contrast to hypothesis one, it was found that RD/LDs generally made more errors on the comprehension monitoring tasks than their NAs even when reading difficulty was controlled. This finding is consistently apparent in the oral spontaneous monitoring task and also appears in the fifth-grade RD/LD versus NA comparisons of the underlining tasks. A second

general finding is that the RD/LDs make different types of errors, and subsequently these errors are indicative of a different strategy usage than that used by their NA matches. This suggests that they are using different types of strategies than their NA matches. The finding that seventh-grade RD/LDs appear to use top-down conceptual strategies contradicts earlier research that RD/LDs are primarily engaged in decoding activities when reading. A third general finding is that the relatively high error rates of RD/LD students do not seem to put them at a disadvantage for comprehension as comprehension has been measured in the present study.

Interpretations of the Directed Underlining Task Results

Paris and Myers (1981) have discussed three different components of the comprehension monitoring process; namely, evaluation, planning, and regulatory behavior.

The directed underlining task used in this study assessed the student's use of the evaluation component, i.e., checking one's current state of knowledge while reading. In all three sets of comparisons significant main effect for reading difficulty was found. While two sets of comparisons (seventh-grade RD/LD versus NA/IRLM and fifth-grade RD/LD versus fifth-grade NA) failed to yield a significant main group effect on the directed underlining task, a significant group x reading difficulty interaction was found for the fifth-grade RD/LD versus NA/IRLM comparison at the two-year above reading level ($p < .001$).

However, it should be noted that the reliability of an underlining task is likely to be poorer than that of an oral reading task where the reader cannot disguise his errors. In the directed underlining task, the student decides how much to underline. For example, in the present study there were students who appeared reluctant to underline (perhaps they viewed underlining to signal their failure to comprehend), while others appeared eager to underline (perhaps they viewed underlining as an indication that they had "mastered" the task), while still others appeared to just forget to underline since this was not something they usually did during silent reading.

Interpretations of Spontaneous Monitoring Task Results

RD/LDs versus their NA/IRLMs. Two comparison groups (seventh-grade RD/LD versus NA/IRLM and fifth-grade RD/LD versus NA/IRLM) yielded a significant main group effect, main difficulty effect, and group x reading difficulty interaction effect.

These results show that at both the fifth- and seventh-grade levels, the RD/LDs make substantially more oral reading miscues (attempts to decode a word through the use of repetitions, self-corrections, and substitutions) than normally-achieving children even when the difficulty of the text is comparable for the comparison groups. For the last 10 years, research has focused intensively on the decoding/phonological processing abilities of learning-disabled students. It is now well established that dyslexic children

(learning-disabled children who exhibit a deficiency in reading) display deficits in various aspects of phonological processing (see Liberman & Shankweiler, 1986; Mann, 1986). Accordingly, Stanovich (1988) posits phonological deficits as the basis of the dyslexic performance pattern.

A third comparison of same-age children (fifth-grade RD/LD versus fifth-grade NA reading below, on, or above their own instruction reading levels) on the spontaneous monitoring task yielded slightly different results. This comparison yielded a significant group x difficulty interaction effect at the two-year above reading level of difficulty but not overall group effect. RD/LD students showed more errors than their same-age NA peers who were reading at higher difficulty levels. The absence of an overall group effect stems from the fact that fifth-grade NAs made many more oral reading miscues than did the younger students (NA/IRLM) who were matched with the fifth-grade RD/LDs. What this suggests is that when NA students reach an instructional reading level that does not have a controlled vocabulary and includes words that have irregular decoding patterns (above third grade), they make more decoding errors than students reading at an instructional reading level that has a controlled vocabulary and consists of words that follow regular decoding patterns as found in reading basals at the first, second, and third grades.

Nonsense, repeat, and self-correction errors produced by RD/LDs versus their NA/IRLMs. As sujmarized above, the RD/LDs made more than twice the number of oral miscues as their NA/IRLMs at nearly all

levels of difficulty (see Tables B-10 through B-12 in Appendix B). The oral reading miscues were further analyzed according to the type of miscue (nonsense, repeat, and self-correction) to determine whether the RD/LDs and their NA/IRLMs were making comparable kinds of miscues.

The miscue analyses enable an examination of strategy usage during the planning and regulatory stages of comprehension monitoring. The planning component involves the recruitment and selection of corrective strategies (Paris & Myers, 1981). There is a top-down processing approach to corrective strategies which is conceptually-driven activation that goes from whole to part (i.e., the student may use contextual information to infer the meaning of an unfamiliar word). The alternative approach is a bottom-up processing approach which is a data-driven activation that goes from part to whole (i.e., the student may pause and articulate a difficult word).

The use of repeats (when a student repeats either the word he is attempting to decode or the phrase preceding a difficult word) and self-corrections (when a student reads a word incorrectly and then self-corrects with the correct word) are examples of bottom-up corrective strategies in that the student is directing extra processing effort to the difficulty until it is resolved.

The use of substituting nonsense words may indicate a top-down corrective strategy in that the student makes no attempt to decode or sound out the word (i.e., the student does not direct any extra processing effort to decoding the word). Instead, the student may evade the decoding problem in an attempt to retain the meaning of

surroundin g contextual information. Although the insertion of nonsense words was interpreted in the present study to reflect deliberate top-down monitoring behavior, it is also possible that the use of nonsense substitutions served as a behavioral coping strategy unrelated to the comprehension process.

The miscue analyses of fifth-grade RD/LDs versus NA/IRLMs showed that the RD/LDs repeated more words and phrases than their NA/IRLMs at all levels of reading difficulty. In contrast, the miscue analyses of the seventh-grade RD/LDs versus their NA/IRLMs showed that RD/LDs substituted more nonsense words than did their NA/IRLMs at both of the above grade difficulty levels. These results suggest first that the planning component of the fifth-grade RD/LDs entails a primary focus on decoding and the recruitment and selection of a bottom-up data-drive corrective strategy. Therefore, the subsequent regulatory behavior involves the use of repetitions to further decode the word. Secondly, these results suggest that the planning component of the seventh-grade RD/LDs entail a primary focus on the recruitment and selection of a top-down (meaning derived) conceptually-driven processing approach. In this case, the subsequent regulatory behavior appears to focus largely on contextual information aided through the use of nonsense words (to avoid spending extra processing time on the decoding of the individual words). This is evidenced by greater numbers of nonsense corrections. Thus, the RD/LDs are not simply making more errors than the NAs, but rather are using a preponderance of different types of strategies than the NA matches.

Interpretations of the Comprehension Question Task Results

The results of the analyses of the children's comprehension task performance showed that although comprehension accuracy decreased as the reading material became more difficult, the accuracy of RD/LD children was comparable to that of their NA matches.

Interpretation of Reading Rate Measure Results

The reading rate task was administered in hopes to determine a level (words per minute) of decoding fluency. Unfortunately, the results of this task did not yield useful information. Each child's classroom teacher was requested to provide a list of 60 reading vocabulary words that had been taught in the fall semester. Given the emphasis on an integrated language arts program in Anne Arundel County, the vocabulary lists were taken from basal readers, novels, spelling lists, and seventh-grade content area textbooks. Therefore, the reading rate measure was neither equally easy nor equally difficult for all students. There were students who instantly recognized the words while other students reported that they had no recollection of ever seeing the words before. Therefore, it is difficult to draw any valid conclusions from these results.

Interpretations of the Cognitive Levels Test Results

The purpose of administering the Cognitive Levels Test was to obtain an index of intellectual ability common to both populations of

children. For the children included in this study, the IQ standard score ranges for learning-disabled students and the normal-achieving students are comparable.

Conclusions

The RD/LD populations appear to engage in each of the comprehension monitoring steps (evaluation, planning, and regulation) described by Paris and Myers (1981). The RD/LDs made more comprehension monitoring errors and appear to rely on different types of strategies than the NAs. However, given the measure of comprehension used in the present study, the numbers and types of monitoring errors did not appear to put them at a disadvantage for comprehension.

The fact that fifth-grade RD/LD students showed a predominance of repeat errors (24%) in the oral monitoring tasks, whereas the seventh-grade RD/LDs showed a predominance of nonsense errors (14%) in the oral monitoring tasks suggest that between fifth and seventh grade, the regulatory behavior for RD/LD children appears to change from what is primarily a bottom-up strategy approach to what is primarily a top-down strategy approach. This conclusion, however, is based on the assumption that the substitution of nonsense words does in fact reflect a top-down comprehension monitoring strategy.

A possible explanation for this trend is that in fifth grade RD/LD students are still in contained classrooms where decoding remains a primary focus of instruction, i.e., reading skills are still being taught. By seventh grade, the RD/LD students are in a middle

school environment where support services are in the form of slower paced classes, and reading is a skill no longer to be learned in and of itself, but rather to be used as a tool to master other content areas.

The seventh-grade RD/LDs in this study were reading on the average of a fifth-grade level. Given that formal reading instruction has ceased, these students may never receive additional instruction in the use of the more advanced decoding skills (i.e., final stable syllables such as -ble, -tion; phonetic base words with three sounded vowels such as acoustic, treachery). As a result, these students appear to have adopted a predominantly top-down processing approach. As stated earlier, relying too heavily on a top-down processing approach causes one to lose the proper balance between the information that the reader should bring to the text and that which the text should bring to the reader. To the extent that guesses become based on prior guesses, the student soon ceases to be reading in a fruitful way. The fact that the seventh-grade RD/LDs may not receive additional reading phonics instruction suggests that these students may never master the needed decoding skills to adopt a complimentary top-down and bottom-up processing approach which is used automatically by skilled readers. Nevertheless, RD/LDs are strategic readers and do appear to use meaning as a basis for their monitoring behavior.

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APPENDIX A

LETTER OF INTRODUCTION AND CONSENT FORM

THE UNIVERSITY OF NORTH CAROLINA AT GREENSBORO
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Annapolis, Maryland 21401

January 1990

Study: Reading Comprehension Monitoring Skills of Children
Researcher: Jean Fryer Schedler, M.S.
University Advisor: Dr. Garrett Lange
Anne Arundel County Coordinator of Research: Dr. Timothy Dangel

Dear Parents:

Your child has been selected to participate in a reading comprehension monitoring research study. The study has been reviewed and approved by the University of North Carolina at Greensboro, as well as Anne Arundell County Public Schools. The principal researcher, Jean Fryer Schedler, M.S., is conducting the study in partial fulfillment of the requirements for a doctoral degree.

The purpose of the study will be to observe how your child's ability to monitor his understanding (comprehension) of the written text varies with different levels of reading difficulty. My motivation for this study is to begin to identify the conditions under which children succeed in the reading environment. The study will consist of students from various grades and with different reading abilities. The benefit to you and your child, is that the results of the individual reading assessments (word attack and comprehension monitoring) will be made available to you and your child's teachers in a conference format with the researcher after the study is completed if you so desire.

The study will consist of two one-hour sessions. The first one-hour session will include the following four activities: (1) the student will read approximately three lists of 20 words each; (2) the student will read approximately four one-paragraph stories and be asked to answer four comprehension questions about each; (3) the student will listen to approximately three one-paragraph stories be

read and then asked four comprehension questions about each; and (4) a 30-minute Cognitive Levels Test (Algozine, Eaves, Mann, & Vance, 1988) will be administered to establish the student's cognitive functioning level. The test is given orally with some drawing.

The second one-hour session, held several weeks later, will consist of the student reading several paragraphs written at different reading levels. Sometimes the students will be asked to read the paragraphs aloud and then answer some questions about what he/she has read. Other times, the students will be asked to read the paragraphs silently and underline any words they do not understand, and then be asked to answer some questions about what he/she has read. Since the focus of this study is to identify the conditions under which your child succeeds, these activities will be ended when the student is unable to answer the paragraph questions and/or has difficulty reading 25% of the words in the paragraph. The last activity of this session will be for the student to read for one minute from a list of 30 words taken from his current reading curriculum.

With the parents' consent, it is requested that your school's reading/learning disability specialist be permitted to review your child's school folder and provide the researcher with the following information: (1) your child's date of birth; (2) your child's score on his most recent Slosson Test, WISC-R, or CAT; and (3) your child's current instructional reading level.

This study is being done with the approval and cooperation of your school principal, reading/learning disability specialist and classroom teacher. Your child will meet with the researcher in the resource teachers' classroom or an empty room in your child's school. The study will be conducted during school hours, and the two one-hour sessions will be arranged with your student's classroom teacher so that your child does not miss any direct teaching time.

Participation is entirely voluntary with no penalty for non-participation. Your child may withdraw from the study or you may withdraw him at any time with no penalty to your child. Each child will be given a code number which will be unavailable to anyone except the researcher. Scoring will be done by the researcher. The master list, test results, and coded paragraph sheets will be kept in a locked file cabinet in my home office. When the study has been completed the researcher will schedule appointments to discuss a summary of the results upon request.

For your additional information, the researcher is Maryland State Certified in Elementary Education, Reading, and Special Education, and is presently working part-time as a Home-Bound Tutor for Anne Arundel County. If at any time you have questions about the study or your child's participation in the study, please feel free to call me (544-4985) at my home.

Thank you for your time and cooperation. I am looking forward to working with your child and will need to have you sign the attached permission form. You may return the attached permission form to your child's classroom teacher.

Sincerely,

Jean Fryer Schedler, M.S.

Permission Form for _____

I consent to my child's participation in the study on Reading Comprehension Monitoring Skills being conducted by Jean Fryer Schedler, M.S., doctoral candidate from the University of North Carolina at Greensboro. I understand that the study will be conducted in my child's school. I understand that all material will be handled in a confidential manner, that the student information requested from my child's folder will be made available to the researcher by the school, that participation is voluntary and that my child may withdraw from the study with no penalty to him/her.

Signed _____ Date _____

Relation to the student _____

_____ Check her and indicate your name and address if you would like to receive a grouped-summary of the results of the study.

NAME _____

ADDRESS _____

_____

_____

APPENDIX B

MEANS AND STANDARD DEVIATIONS

Table B-1

Means and Standard Deviations for Seventh-Grade RD/LDs and Their NA/IRLMs for the Comprehension Questions Task

Group	Below	On	1 Grade Above	2 Grades Above
Seventh-Grade RD/LDs				
Mean	7.000	6.250	5.833	5.000
S.D.	.739	1.215	1.337	1.758
NA/IRLMs for Seventy-Grade RD/LDs				
Mean	6.167	6.500	5.917	5.000
S.D.	1.642	1.087	1.379	1.651

Note: Maximum score = 8

Table B-2

Means and Standard Deviations for Fifth-Grade RD/LDs and Their NA/IRLMs for the Comprehension Questions Task

Group	Below	On	1 Grade Above	2 Grades Above
Fifth-Grade RD/LDs				
Mean	7.583	7.083	6.250	6.000
S.D.	.515	.793	1.422	1.044
NA/IRLMs for Fifth-Grade RD/LDs				
Mean	7.167	6.667	6.333	4.750
S.D.	1.193	.888	1.155	1.545
Difference Between Means	.416	.416	-.083	1.250**

LSD(2,66) = 1.06; $p < .01$**

Note: Maximum score = 8

Table B-3

Means and Standard Deviations of Fifth-Grade RD/LDs and Fifth-Grade NAs for the Comprehension Questions Task

Group	Below	On	1 Year Above	2 Years Above
Fifth-Grade RD/LDs				
Mean	7.583	7.083	6.250	6.000
S.D.	.515	.793	1.422	1.044
Fifth-Grade NAs				
Mean	7.167	6.500	5.667	5.333
S.D.	.835	1.168	1.614	1.614

Note: Maximum score = 8

Table B-4

Means and Standard Deviations for Seventh-Grade RD/LDs and Their NA/IRLMs for the Directed Underlining Task

Group	Below	On	1 Year Above	2 Years Above
Seventh-Grade RD/LDs				
Mean	.583	1.417	1.417	2.667
S.D.	.669	.996	1.240	2.774
NA/IRLMs for the Seventh-Grade RD/LDs				
Mean	.333	.417	1.167	1.500
S.D.	.492	.669	1.267	1.624

Note: Range 0-9

Table B-5

Means and Standard Deviations for Fifth-Grade RD/LDs and Their NA/IRLMs for the Directed Underlining Task

Group	Below	On	1 Year Above	2 Years Above
Fifth-Grade RD/LDs				
Mean	.333	1.250	1.417	2.833
S.D.	.651	1.422	1.929	1.946
NA/IRLMs for Fifth-Grade RD/LDs				
Mean	.750	.500	.917	.833
S.D.	1.865	.798	1.443	1.030
Difference Between Means	-.417	.750	.500	2.000***

LSD(2,66) = 1.86; $p < .001$***

Note: Range 0-7

Table B-6

Means and Standard Deviations for Fifth-Grade RD/LDs and Fifth-Grade NAs for the Directed Underlining Task

Group	Below	On	1 Year Above	2 Years Above
Fifth-Grade RD/LDs				
Mean	.333	1.250	1.417	2.833
S.D.	.651	1.422	1.929	1.946
Fifth-Grade NAs				
Mean	.500	.583	1.667	2.333
S.D.	1.168	.669	1.303	2.270

Note: Range 0-7

Table B-7

Means and Standard Deviations for Seventh-Grade RD/LDs and Their NA/IRLMs for the Spontaneous Monitoring Task

Group	Below	On	1 Year Above	2 Years Above
Seventh-Grade RD/LDs				
Mean	10.250	13.500	21.167	28.667
S.D.	3.467	5.649	8.473	11.734
NA/IRLMs for Seventh-Grade RD/LDs				
Mean	3.583	6.250	10.083	13.917
S.D.	2.021	3.934	6.626	7.549
Difference Between Means	6.667**	7.250***	11.084***	14.750***

LSD(2,66) = 5.25; $p < .01$**

LSD(2,66) = 6.83; $p < .001$***

Note: Range 0-47

Table B-8

Means and Standard Deviations for Fifth-Grade RD/LDs and Their NA/IRLMs for the Spontaneous Monitoring Task

Group	Below	On	1 Year Above	2 Years Above
Fifth-Grade RD/LDs				
Mean	4.667	8.000	11.833	22.500
S.D.	1.775	3.790	6.590	8.085
NA/IRLMs for the Fifth-Grade RD/LDs				
Mean	3.167	4.250	7.000	12.750
S.D.	3.070	2.301	4.156	7.362
Difference Between Means	1.500	3.750*	4.833**	9.750***

LSD(2,66) = 3.194; $p < .05$*

LSD(2,66) = 4.150; $p < .01$**

LSD(2,66) = 5.530; $p < .001$***

Note: Range 0-36

Table B-9

Means and Standard Deviations for Fifth-Grade RD/LDs and Fifth-Grade NAs for the Spontaneous Monitoring Task

Group	Below	On	1 Year Above	2 Years Above
Fifth-Grade RD/LDs				
Mean	4.667	8.000	11.833	22.500
S.D.	1.775	3.790	6.590	8.085
Fifth-Grade NAs				
Mean	2.833	7.167	12.000	16.167
S.D.	2.588	5.167	5.785	7.322
Difference Between Means	1.834	.833	-.167	6.333***

LSD(2,66) = 5.25; p .001

Note: Range 0-36

Table B-10

Means and Standard Deviations for Seventh-Grade RD/LDs and Their NA/IRLMs for Nonsense Errors in the Spontaneous Monitoring Task

Group	Below	On	1 Year Above	2 Years Above
Seventh-Grade RD/LDs				
Mean	.083	.333	2.500	3.333
S.D.	.289	.651	2.747	4.438
NA/IRLMs for the Seventh-Grade RD/LDs				
Mean	.000	.333	1.000	1.167
Difference Between Means	.083	.000	1.500*	2.166*

LSD(2,66) = 1.433; $p < .05$*

Note: Range 0-13

Table B-11

Means and Standard Deviations for Fifth-Grade RD/LDs and Their NA/IRLMs for Nonsense Errors in the Spontaneous Monitoring Task

Group	Below	On	1 Year Above	2 Years Above
Fifth-Grade RD/LDs				
Mean	.083	.000	.500	1.167
S.D.	.289	.000	.798	.835
NA/IRLMs for the Fifth-Grade RD/LDs				
Mean	.000	.000	.083	1.583
S.D.	.000	.000	.289	2.906

Note: Range 0-7

Table B-12

Means and Standard Deviations for Fifth-Grade RD/LDs and Fifth-Grade NAs for Nonsense Errors in the Spontaneous Monitoring Task

Group	Below	On	1 Year Above	2 Years Above
Fifth-Grade RD/LDs				
Mean	.083	.000	.500	1.167
S.D.	.289	.000	.798	.835
Fifth-Grade NAs				
Mean	.000	.417	1.250	2.167
S.D.	.000	.515	1.288	2.657

Note: Range 0-7

Table B-13

Means and Standard Deviations for Seventh-Grade RD/LDs and Their NA/IRLMs for Repeat Errors in the Spontaneous Monitoring Task

Group	Below	On	1 Year Above	2 Years Above
Seventh-Grade RD/LDs				
Mean	1.833	1.333	1.417	2.500
S.D.	2.250	1.875	2.644	2.576
NA/IRLMs for the Seventh-Grade RD/LDs				
Mean	1.083	1.583	2.167	3.000
S.D.	.900	1.443	2.290	2.558

Note: Range 0-8

Table B-14

Means and Standard Deviations for Fifth-Grade RD/LDs and Their NA/IRLMs for Repeat Errors in the Spontaneous Monitoring Task

Group	Below	On	1 Year Above	2 Years Above
Fifth-Grade RD/LDs				
Mean	1.417	2.000	2.583	3.333
S.D.	.900	1.279	1.975	2.640
NA/IRLMs for the Fifth-Grade RD/LDs				
Mean	.833	1.500	.833	1.667
S.D.	.937	1.883	1.193	1.969

Note: Range 0-9

Table B-15

Means and Standard Deviations for Fifth-Grade RD/LDs and Fifth-Grade NAs for Repeat Errors in the Spontaneous Monitoring Task

Group	Below	On	1 Year Abovw	2 Years Above
Fifth-Grade RD/LDs				
Mean	1.417	2.000	2.583	3.333
S.D.	.900	1.279	1.975	2.640
Fifth-Grade NAs				
Mean	.667	1.417	1.833	3.500
S.D.	.778	1.443	1.642	2.393

Note: Range 0-9

Table B-16

Means and Standard Deviations for Seventh-Grade RD/LDs and Their NA/IRLMs for Self-Corrections in the Spontaneous Monitoring Task

Group	Below	On	1 Year Above	2 Years Above
Seventh-Grade RD/LDs and Their NA/IRLMs				
Mean	2.167	2.500	3.000	2.833
S.D.	1.115	2.355	1.954	3.157
NA/IRLMs for the Seventh-Grade RD/LDs				
Mean	1.083	1.750	1.667	2.417
S.D.	.996	1.765	1.875	1.832

Note: Range 0-6

Table B-17

Means and Standard Deviations for Fifth-Grade RD/LDs and Their NA/IRLMs for Self-Corrections in the Spontaneous Monitoring Task

Group	Below	On	1 Year Above	2 Years Above
Fifth-Grade RD/LDs and Their NA/IRLMs				
Mean	.667	1.750	2.167	2.833
S.D.	.985	1.815	1.749	1.992
NA/IRLMs for the Fifth-Grade RD/LDs				
Mean	1.250	1.250	1.750	1.917
S.D.	1.215	1.138	2.221	1.084

Note: Range 0-7

Table B-18

Means and Standard Deviations for Fifth-Grade RD/LDs and Fifth-Grade NAs for Self-Corrections in the Spontaneous Monitoring Task

Group	Below	On	1 Year Above	2 Years Above
Fifth-Grade RD/LDs and Their NA/IRLMs				
Mean	.667	1.750	2.167	2.833
S.D.	.985	1.815	1.749	1.992
Fifth-Grade NAs				
Mean	.667	1.750	2.333	2.750
S.D.	.651	1.658	1.875	1.765

Note: Range 0-7

Table B-19

Means and Ranges for the Reading Rate Measure[a]

Group	Range	Average
Seventh-Grade RD/LDs	4 - 56	21.5
NA/IRLMs for Seventh-Grade RD/LDs	12 - 58	33.6
Fifth-Grade RD/LDs	8 - 49	22.9
NA/IRLMs for Fifth-Grade RD/LDs	5 - 59	35.8
Fifth-Grade RD/LDs	8 - 49	22.9
Fifth-Grade NAs	18 - 58	33.6

[a]Number of words read correctly in one minute.

Table B-20

Mean Standard Scores and Ranges on the Cognitive Levels Test

Group	Range	Mean
Seventh-Grade RD/LDs	72 - 100	87.33
NA/IRLMs for the Seventh-Grade RD/LDs	89 - 136	106.67
Fifth-Grade RD/LDs	74 - 127	90.92
NA/IRLMs for the Fifth-Grade RD/LDs	102 - 138	110.50
Fifth-Grade RD/LDs	74 - 127	90.92
Fifth-Grade NAs	97 - 141	111.50