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ABSTRACT

This review of the literature looks at writing disabilities in the context of special education services provided within regular classrooms. A definition of learning disabilities as well as a discussion of effects of left and right brain dominance and of the steps of the writing process begin the paper. Among the findings of the research synthesis are: that semantic encodings are better retained than phonemic unrelated word encodings; that many students with learning disabilities have poor word knowledge; that specific writing errors can be associated with variations in brain dominance; that strategy training can be useful; and that teachers may have limited influence in changing attitudes and reducing writing apprehension. The final section provides a critique of the methodology of the studies reviewed. (Contains 11 references.)
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Understanding Writing Disabilities

Jacqueline M. Duer

Introduction

Issues of public importance are those services provided to the learning disabled student. Since P.L. 94-142 mandated a free and appropriate learning environment for all special education students, these students no longer find themselves in the self-contained classroom but in the regular classroom. This, in turn, creates a problem for the regular classroom teacher not trained in special education because they do not understand the causes of individual disabilities; they are often unable to treat them. Although this mandate involves all types of learning disabilities in all types of classrooms, this paper will explore writing disabilities and their organic causes. In order for a teacher to teach learning disabled students, it is necessary to understand the basis for their disability. Although this paper specifically deals with writing disabilities, it is necessary to explore those special education terms that will prove helpful and are commonly accepted. The following was devised by the National Advisory Committee on Handicapped Children (1968) (cited in Reid and Hresko, 1981):

Children with special learning disabilities exhibit a disorder in one or more of the most basic psychological processes involved in understanding or in using spoken or written languages. These may be manifested in disorders of listening, thinking, reading, writing, spelling or arithmetic. They include conditions which have been referred to as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, development alaphasia, etc. They do not include learning problems which are primarily due to visual, learning or motor handicaps, to mental retardation, emotional disturbance or to environmental disadvantage. (p .4)

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There are many differences of opinion on how to interpret this definition and evaluate a learning disabled student. Reid and Hresko (1981) list five characteristics which professionals should use to diagnose a learning disability: "1. difficulty in school learning; 2. uneven performance across a variety of tasks; 3. physiological correlates; 4. disruptions in basic psychological processes; and 5. exclusion from any other previously established categories of disability." An initial distinguishing factor would be an unexplainable difficulty in school learning. An uneven performance across a wide variety of tasks may be, for example " a student having superior skills in reading and yet be unable to understand mathematical calculations (Reid and Hresko, 1981, p.5) Also, to diagnose a student as learning disabled, he or she must be excluded from all other exceptionalities. Two distinguishing factors faced by L.D. students are physiological correlates and difficulties in basic psychological processes. Physiological correlates consist of a disorder of basic processes as a result of brain dysfunctions. Minimal brain dysfunction is defined by Reid and Hresko(1981) as "an inability to demonstrate that damage to the brain has occurred and suggests a malfunction of the central nervous system."(p.5)

Problems in basic psychological processes contain such disorders as perceptual motor- functions, attention deficits, memory, language and emotionality. It is from these organically based disorders that we diagnose writing disabilities. These organically based disorders stem from hemispheric deficiencies in the brain. Fadley and Hosler distinguish "the right hemisphere as one that involves a range of nonverbal integrative functions including holistic perception, space and form perception, directional orientation, visual imagery, and other such activities." (1979, p.10) Right brain dominance can be characterized by the following:

- 1) Recognition and understanding (comprehension) of non-verbal sounds with minor ability in language.
- 2) Integration of complex motor- coordination and sensitivity to sensory into relating to movement.

- 3) Recognition of shapes, form-space relationships, behaviors of objects and people and meaning in nonverbal spatial information.
- 4) Intuition and insight.
- 5) Perceptual Gestalt and holistic perceptions and awareness.
- 6) Inventive, creative, and improvisatory abilities.
- 7) Recognition and synthesis of musical perception and rhythmic activity.
- 8) Artistic abilities and appreciation.
- 9) Simple calculation.

(Fadley and Hosler, 1979, p.14)

Fadley and Hosler distinguish "the left hemisphere as one that appears to be 'prewired' genetically to organize language, to store language information, to learn values and to provide the seat of socialization capabilities." (1979, p.10) The left hemisphere can be characterized by the following:

- 1) Control of speech and gestures related to speech.
- 2) Reception, storage, language structure and syntax and verbal meaning.
- 3) Awareness and organization of time and serialization of perception and information
- 4) Consciousness of time and passing time in logical sequence and subsequently objective thought, order and logic.
- 5) Social values and comprehension of values deemed appropriate in the culture, social aggression, competition, religious beliefs and attitudes.
- 6) Understanding socialization into typical or normal behaviors of the culture.
- 7) Concept of social or political authority, assertion toward social ascendance and philosophical thought.

8) Higher math and complex mathematical concept formation.

(Fadley and Hosler, 1979, p.13)

It is in deficiencies in the left hemisphere that we find the core of writing disabilities.

Writing difficulties are often a result of a student's inability to process and synthesize information. Most students suffer from deficiencies in perceptual motor skills which include visual, auditory or kinesthetic perceptions, as well as visual and auditory memory or recall. Because writing is a motor skill, many times a student's inability in one motor skill filters and effects other motor skills. Writing difficulties can be divided into three categories: handwriting, spelling and composition. All three acts consist of visual-kinesthetic-auditory language linkage. A child is involved in all aspects of learning when he or she watches someone write, then copies, listens and then tries to synthesize information. A disability in any motorprocess, metacognitive or organizational skill, or visual memory skill will result in great difficulties for a student.

Alley and Deshler (1979) describe a writing disabled student as one "whose paper is one with poor organization, limited word pool, a high frequency of mechanical errors and limited monitoring of writing errors." (p.107) They believe this causes the student to depend on classmates for notes, use tape recorders and try to keep all the written work to a minimum. Because students are often not held accountable for their work, they are passed through school without ever gaining any true writing skills.

Handwriting and spelling disabilities are results of visual/perceptive disabilities. To overcome these difficulties a student must work from recognition to partial recall to total recall. This is a process where a student will learn to revitalize words and letters according to those rules that apply to handwriting and spelling skills.

It is a great deal more difficult for an individual to learn visual/perceptive skills and apply them to writing. In order to write

creatively and coherently one must learn to picture things in his/her mind and place them on paper in an organized and understandable fashion. This sounds impossible! How is one to teach someone to use his or her imagination as well as basic writing skills? Gerald Gearheart (1981) believes it is "a matter of teaching a student to progress from experience to auditory language to written language." (p.255)

Gearheart (1981) states "that once a student is able to put in writing oral expression and sees he can write, he must move through a progression consisting of four steps- concrete description, concrete imaginative, abstract descriptive and abstract imaginative." (p.255) When working with a student, Gearheart comments that it is important to start with the initial concrete description. This consists of showing the student common objects and having he or she write the names of the objects, how they are used, their relationship to other objects and eventually creating a meaningful sentence with ideas. The next step, concrete imaginative, would try to pull the student from ideas based on inference or imagination, for example, changing a sentence from Mary ran home to Mary ran home quickly after school yesterday. It is difficult for these students to make assumptions they cannot see.

Gearheart claims that the next two steps are ones which the student may be able to discuss, but written work may obviously be at the concrete-descriptive level. The third level, abstract-descriptive level, deals with the time sequence and diarylike writing or listing of events. This may create a great deal of confusion for those with metacognitive disabilities. The fourth step may be beyond the grasp of many L.D. students. Abstract imaginatives incorporate figures of speech and imaginative settings into a story. (pgs. 256-7) For students with writing difficulties, this may be the appropriate way for them to develop true writing skills, but in order for a teacher to understand how to adjust lessons for these students, he or she must thoroughly understand the disability. By understanding the basis for the problem and the hemispheric deficiencies from which a student suffers, a teacher

can then adjust his or her program to enhance these deficiencies. The following studies research the relevance of hemispheric dominance and its relationship to choosing appropriate teaching strategies for writing difficulties.

Synthesis of Research

H. Lee Swanson and John E. Obrzut's study, "Learning Disabled Readers' Recall as a Function of Distinctive Encoding, Hemisphere Processing and Selective Attention," tests the assumption that learning disabled children have limited word knowledge and structure. The study was conducted upon the review of past research and the basis of new hypotheses. Swanson and Obrzut base their research on those aspects which explain the disabled readers hemispheric processing." (1985, p.409) "One model, selective attention, suggests that learning disabled students are less capable than non-disabled students in dividing their attention between the two hemispheres." (Obrzut, Hynd, Obrzut and Pirozzolo, 1981 cited in Swanson and Obrzut, 1985, p.409) Also non-disabled students and disabled students differ in attentional capacity. "Finally, the amount of word knowledge activated from long-term memory may influence disabled readers hemispheric processing." (Swanson and Obrzut, 1985, p.409) Swanson and Mullen proposed "a word referent hypothesis" that viewed learning disabled children as failing to activate word features in semantic memory that presumably regulated their level of word encoding and focus hemispheric processing." (cited in Swanson and Obrzut, 1985, p.409)

Swanson and Obrzut's present study "extends the word referent hypothesis by determining the extent to which word knowledge contributes to ability group differences in the hemispheric processing." (1985, p.409) Swanson and Obrzut form hypotheses about recall, a child's organization skills, ear symmetry and selective attention and attentional capacity based on prior research. Subjects chosen for the experiment were twelve non-disabled and twelve learning disabled boys. All learning disabled boys were receiving special assistance and had specific reading and writing difficulties. Non-disabled readers were matched as closely as possible, and all children were selected from upper-middle class schools.

A dichotic tape was developed for the study by a university speech center and consisted of eight word pairs. "Each list of words contained twelve monosyllable pairs that represented eight semantically related words, phonemically related words and structure related words." (Swanson and Obrzut, 1985, p.410) Word lists were recorded by a male speaker with an intensity level of loud conversational speech. "Lists were taped with a 3-second interstimulus interval and following each word list there was a 60-second interstimulus interval." (Swanson and Obrzut, 1985. p.410)

The dichotic experimental procedure was conducted in a quiet room and all auditory stimuli was presented through a stereo tape recorder and earphones. Each subject was directed to listen to words spoken to either left or right ear, as well as told specifically remember by groups, rhymes or letters. Subjects were also asked to free recall words in any order, and their responses were recorded in the sequential order given.

The degree of a subject's laterization was determined by subtracting right ear performance from left ear performance. "This laterality coefficient has been shown to provide an index in the assessment of developmental variation in recall." (Jones, 1983 cited in Swanson an Obrzut, 1985 p.412) Swanson and Orbuzut found that a Duncan Multiple Range Test indicated a significant REA (right-ear advantage) for phonemically organized words compared to structurally organized word." (1985, p.412) In contrast a test of simple effects indicated that orientating instructions resulted in a LEA (left-ear advantage) for disabled children on the structurally organized words. Swanson and Obrzut feel "these results support their hypotheses and the information processing model of hemispheric asymmetry in that encoding processes influence what information can be processed." (1985, p.412)

The common finding in the information processing studies is that semantic encodings are better retained than phonemic unrelated word encodings: primarily due to the more distinctive features which contribute to long-term memory. "Semantic features show that non-disabled readers had higher organization scores than

learning disabled readers, ($F(1,22)=10.42$ $p<.01$).” (Swanson and Obrzut, 1985, p.413) The analysis shows no ear advantage exists between the two ability groups, but support is found for the notion that ability group differences occur in the amount of word features that can be effectively activated from long-term memory.

Similar findings were found in selective attention and structural features comparisons. Swanson and Obrzut believe that “the investigation tested the assumption that learning disabled children have limited word knowledge structures and such limitations influence hemispheric processing.” (1985, p.414-5) The results also show that orientating instructions influences ear asymmetry and recall. The effects of instruction were much more pronounced for learning disabled students. Swanson and Obrzut find it most important “that word knowledge influenced the quality of their memories.”(1985, p.415) Their findings suggest that disabled readers and writers poor word recall may be due to an inability to activate a “word referent” or word knowledge structure in semantic memory. Swanson and Obrzut base these findings on their own research, as well as the assumption that “directed encoding involved the matching of incoming information against a featured representation of that information in long-term memory.” (1985, p.415) The results of this research should enable teachers to devise plans to work with those disabled students who need to expand their word knowledge to provide them with opportunities to read and write more efficiently.

Richard Sinatra's study “Styles of Thinking and Literacy Proficiency for Males Disabled in Print Acquisition” examines “the difficulty for educators regarding the balancing of literary skills with styles of thinking for students with severe disabilities in print acquisition.” (Sinatra, 1988, p.33) Disabled readers and writers are met with growing difficulties when advancing through school. When faced with those assignments requiring concept and content acquisition, students' problems are compounded. Sinatra's study “discusses the literacy levels and styles of thinking of such a group of youths and attempts to document their thinking behavior and literacy proficiency in a case study approach over time.”(1988, p.33)

Sinatra reviews the literature and findings of other researchers and thus provides a theoretical rationale. He reviews literature that has revealed learning and literacy disabled groups as having characteristic trends. Various groupings of WISC-R and WAIS profiles with learning disabled and academically proficient students have been made to form hypotheses about their cognitive styles according to Galvin. (cited in Sinatra, 1988, p.34) Following the same rationale Kaufman (cited in Sinatra, 1988, p.34) indicated that focusing on the processing differences relating to the left and right hemispheres would result in a greater understanding of the Weschler test results.

Sinatra, following this theory "has attempted to locate, assess and track a clearly defined group of literacy disabled subjects, to determine their patterns of verbal and spacial processing, and to determine what specific patterns of mental processing and literacy proficiency remain constant over time." (Sinatra, 1988, p.35) Sinatra chose fourteen right-handed males and studied them over a four year period. Those chosen had been previously diagnosed as learning disabled with either average or better scores in the verbal or performance scales and through testing have been found to be severely disabled in spelling or reading or both. "Right handedness insured to a relative degree of certainty that language processing would reside in the left hemisphere." (Milner cited in Sinatra, 1988, p.35) According to Sinatra's research the "inclusion of males only was consistent with the beliefs of brain researchers who assert that men have a greater degree of brain lateralization, with spacial processing confined to the right hemisphere and verbal processing to the left." (Sinatra, 1988, p.36)

The fourteen males were evaluated after the age of 16 with formal and informal testing. These tests consisted of the Weschler Adult Intelligence Scale, Wide Range Achievement Test, Durrell Analysis of Reading Difficulty, Stanford Diagnostic Reading Test, Space Thinking and a spelling test of twenty words designated for use at the third grade level. These tests were compared to two tables. One table provides the standard deviations from the mean of specific tests. The second table compared previous WISC-R scores to

those newly administered WAIS scores. The significance was determined through t-tests.

The first table, with an average of five years separating the testing periods, shows a general increase in all scores. "The achievement scores of Reading, Spelling and Arithmetic improved no more than one grade level over the five year period, but intellectual capacity remained relatively stable, actually showing a slight increase over time." (Sinatra, 1988, p.40)

The second table is more revealing due to the use of tests. Information and Vocabulary, two of the three Acquired Knowledge Abilities reflected a significant decrease in scores (information $p < .05$) and tests revealed no significant differences. Sinatra concludes that not only is the learning disabled student's problem with retaining acquired knowledge a hindrance, but also "the hemisphericity issue in mental functioning to acquire knowledge." (1988, p.45) Since reading and writing, by their very nature, require a good amount of serial processing, learners who are weak in the left hemisphere processing mode may find reading and writing extremely difficult through the years of schooling. "This suggests that learning and reading disabled males who have measured strengths in right hemispheric processing modes need reading and writing approaches that capitalize on right hemisphere," (Symmes, Rapport, 1972; Wittelson, 1976&77; Kaufman, 1979, cited in Sinatra, 1988 p.45) Sinatra asserts that his study has proven that literacy learning styles of disabled groups can be developed and planned to capitalize on hemispheric processing.

Joan Hogge's study, "Understanding the Writing Process Through Brain Hemisphere Neurology," explores the impact of hemispheric dominance on writing abilities and offers suggestions on how to enhance any hemispheric deficiencies. On notice of difficulties for different students in different modes of writing in her freshman class, Hogge was intrigued as to what caused individualization of problems. Hogge believes that "a student's inability to utilize a particular mode of writing can prevent completion of a clear coherent written product." (1985, p.2) Hogge asserts that each area of "the brain functions more holistically to

spatial orientation and creative inspiration of synthesis." (Hogge, 1985 p.3). This creates many questions for the classroom teacher, such as what can be done for a student if several areas of the brain are deficient.

"The study involved six subjects each of whom was tested for four hours before being instructed for eight hours." (Hogge 1985, p.4) Hogge developed specific writing problems which provided for evaluation relating to specific hemispheric dominance. Hogge recorded behavior of subjects during their writing sessions and kept notes on casual conversations and attitudes.

The subjects were "tested by Weinberg's Symbol Language Battery and were diagnosed according to his Lexical Paradigm- a classification system which ranks specific developmental learning disorders found in children by hemispheric location." (Hogge 1985, p.5) A Xenon Blood Study Flow Chart was used to verify the location of the deficiency and validate a diagnosis of the problem. The six subjects- two males and four females- ranged in age from nineteen to forty and were all of normal intelligence.

The original use of the Symbol Language Battery consisted of administering a writing assignment of three-to-seven lines telling what he or she did last night. This allows the examiner to evaluate skill tasks important to writing. Through evaluation of prevalent deficiencies in writing, Hogge was able to identify and label groups. "She split the six into three groups: L>R group, L+R:I group those with logical, organizational and verbal capacity difficulties and L2 +R*I those experiencing difficulties in emotional and visiospatial capacity." (Hogge, 1985, p.8-9) The students were then tutored privately for eight hours and retested using the same instrument. Hogge provides examples of students' original writing samples and those after the exercises specifically designed to stimulate their deficiencies. The writing of the L>R group (both males) indicated problems in ordering. Exercises such as, "Comic strips cut into sections and students reassembling segments or filling in the bubbles of an empty cartoon and providing a title. "Students were also instructed to reassemble articles from magazines that had been cut into individual sentences, as well as classifying different

groups of pictures from the sports page into categories with related characteristics." (Hogge, 1985, p.10) According to Hogge, although both subjects had different specific problems, the activities enabled them to rewrite their essays in a much more sequential pattern and both showed great improvement from the original.

The writing of the L2&R1 group showed major deficiencies in right hemisphere functions such as, word differentiation, poor synthesis of ideas or sense impressions and over description. "Exercises for this group were designed to stimulate sensory perception by touching objects and writing sensory descriptions of those objects: discussions were held to help them understand and differentiate the meaning of words." (Hogge 1985, p.14) Word discussions were generated through student activity in word association. When given three words, students would write ten words for each. The words chosen were those they believed to have the same or similar meaning to the originals. After discussing the clusters, subjects were required to arrange the words into a pattern or visual poem. These exercises seem to provide a great improvement in the subjects' final copies, which were descriptive as well as specific.

The final group, L+R:l, were characterized as having inner speech deficiency. "Weinberg's definition of his term consists of words in the left hemisphere not calling forth the pictorial meaning of the right hemisphere, thus logic is impaired." (cited in Hogge, 1985, p.19) It is a difficulty in clearly articulating one's thoughts. "Exercises utilized pictures which subjects were forced to act out or verbally describe and thus strengthen the ability of the left hemisphere to logically express pictures in the right." (Hogge, 1985, p.20) Subjects also created their own comic strip in narrative form in a logical sequence. They were then required to write a narrative paragraph from the original comic strip work. Writing appeared to be more focused after the activities but was still almost impossible to comprehend due to large amounts of punctuation, spelling and syntax errors.

The results of the study "corroborate Weinberg's hypotheses referring to specific errors associated with brain dominance."

(Hogge, 1985, p.20) Although time was limited, Hogge believes that "the evidence is encouraging a need for further research; the Xenon bloodflow studies parallel the surface writing problems of subjects and that exercises that address particular deficiencies can alter writing behavior in some writers." (1985, p.25)

Karen Harris, Steve Graham and Sally Freeman's study, "Effects of Strategy Training on Metamemory among Learning Disabled Students" explores "the effects of strategy training and differing strategy use conditions on the development of a specific metacognitive skill among learning disabled children." (1988, p.332) Because many learning disabled students have difficulty in metacognitive and cognitive skills, they also have a problem with recall or memory skills. A problem with recall skills will also cause problems in spelling, reading and writing. Harris, Graham and Freeman believe "that cognitive and metacognitive skills require specific teaching strategies." (1988, p.333) This study explores strategy training specifically dealing with spelling instruction and the L.D. students' problem of predicting accuracy on a particular task. "The purpose of this study was to conduct analyses to examine further the results of strategy training and differing strategy use in the Graham and Harris (1985) study." (1988, p.333)

The study attempts to answer the following questions: "Do students in the strategy training conditions evidence greater metamemory skill than those in a control (freestudy) condition? Given strategy training, does one or more of the study conditions facilitate metamemory to a greater extent than others? Does metamemory improve over time and experience with predicting? Does metamemory account for a significant increment in the explained portion of variability in spelling performance after accounting for that portion of variability due to both general spelling achievement level and study condition?" (Harris, Graham and Freeman 1988, P.333) The subjects of the study were forty fourth grade students enrolled in local school districts in northern and central Indiana. Of the forty subjects, thirty-two were male and eight were females.

Two tests were given to the subjects, a dictated word test and test of written spelling. After these tests, "students were randomly assigned to one of the four study conditions: directed study, student-controlled, teacher motivated and free-study." (Harris, Graham, and Freeman, 1988 p.334)

Then Harris, Graham and Freeman had students participate in a twenty-minute training session. This training, formulated by Graham(1985), consisted of five steps: "a)say the word b)write and say the word c)check the word d)trace and say the word and e)write the word from memory." (Harris, Graham, and Freeman. 1988, p.334) The training involved modeling, practice and assistance, and demonstration of proficiency.

After the training sessions students were given a written list of fifteen words. One-half were given list A and the other half were given list B. Using the five step strategy previously learned, students were given thirty minutes to study for a spelling test. Students also predicted the number of words they believed they would spell incorrectly.

In the directed-study condition, "the instructor verbally guided the study behavior of students." (Harris, Graham, and Freeman, 1988 p.335) Each step was verbalized by the instructor and if the class did not perform correctly the class did not move ahead. "Those students assigned to the teacher-monitored group were asked to independently use the word study strategy." (Harris,Graham and Freeman, 1988, p.335) The instructor provided assistance when necessary. "Subjects in the student controlled group were instructed to use the word-study strategy independently, subjects in the free-study group were simply told to study the list of words." (Harris, Graham, and Freeman, 1988, p.335) The only assistance the latter two groups received was the annunciation of spelling words upon request.

Harris, Graham and Freeman calculated scores "according to the students prediction of how many words would be spelled correctly on the dictated-word test." (1988, p.335) The accuracy score was computed by subtracting the number of words spelled correctly from the number of words the subject predicted would be

The subjects chosen for the study were forty-nine students (eleven to twelve yrs. old) who could read at the third grade level. They were split into two groups; twenty boys and five girls in the L.D. experimental group and twenty boys and four girls in the L.D. control group.

The instructional program used to test students was the Purdue Creative Thinking Program. "The program was a language oriented training program developed to train creativity in written expression."(Jaben, 1983 p.264) The test consisted of three sections: fluency, the ability to generate ideas; flexibility, ideas in different categories; and originality, unique ideas. The Purdue Creative Thinking Program was used as an independent treatment variable. The test consists of audio tapes and printed exercises to foster divergent thinking. Before instruction, subjects took the subtests of the Torrance Tests of Creative Thinking. Students in the experimental group participated in the Purdue Creative Thinking Program. After their participation in the Purdue program subjects were instructed to take form B of the Torrance tests.

The analysis was based on "the Torrance Tests as dependant variables, the pretest as covariables and probability was set at .05."(Jaben, 1983, p.265). Jaben found the results to show:

That Purdue Creative Thinking Program was effective in stimulating the scores of the subjects in the experimental group on verbal fluency, verbal originality and total verbal creativity scores. The L.D. experimental group adjusted mean was significantly greater ($p < .001$) than that of the control group.(1983, p.265)

Jaben has proven through her study that the Purdue Creativity Thinking Test is an asset in teaching L.D. students writing skills.

Dan Donlan and Sylvia Andretta's study "Determining the Independence of Dispositional and Situational Writing Apprehension" explores a different type of writing difficulty than previous studies. There are two types of writing apprehension. Dispositional writing apprehension is associated with poor attitudes toward school and overall low achievement. Situational writing apprehension occurs when one or more of the following variables are present:

spelled correctly. Harris, Graham and Freeman found "that prediction accuracy improved all subjects from session one to session two, also through an analysis of covariance those subjects in a teacher-monitored group were significantly better than the prediction accuracy of the free-study group." (1988, p.334-5)

A regression analysis was also performed to determine the portion of variation in performance on the dictated-word test that was accounted for by spelling achievement, study group assignment and metamemory skills. (Harris, Graham, and Freeman, 1988, p.336) The three predictor variables, TWS scores, study group assignment and prediction accuracy scores, accounted for 75% of the variation in performance on the dictated-word test. "The regression analysis shows significant increase in all subjects performance." (Harris, Graham, and Freeman, 1988, p.335)

Although Harris, Graham and Freeman predicted "that prediction accuracy would be most accurate in the teacher-monitored condition and poorest in the directed-study condition, there was little difference among all four conditions." (Harris, Graham and Freeman, 1988, p.336) Subjects in the teacher-monitored group were more accurate in their predictions than were subjects in the free study group. "As expected prediction accuracy as highest in the teacher-monitored condition, followed by student-controlled, then directed study and finally the free study group." (Harris, Graham and Freeman, 1988 p.337) This study may prove more valuable in long-term use, especially in the area of spelling.

Twila H. Jaben's study "The Effects of Creativity Training on Learning Disabled Students' Creative Writing Expression" compares two different creativity tests as ways of improving learning disabled students' reading and writing skills. This study is not exploring specific hemispheric deficiencies but ways of enhancing these deficiencies. The purpose of the study is to examine the effects of creativity training on learning disabled students' creativity in written expression. Jaben specifically tries to answer "whether students who have participated in the Purdue Creative Thinking Program attain greater written expression scores on the Torrance Tests of Creative Thinking."(1983, p.264)

- 1) high conspicuousness
- 2) intensity of proposed intensity scheme
- 3) novelty of a particular writing assignment
- 4) ambiguity of directions for writing
- 5) prior experience

(Donlan and Andretta, 1987, p.1)

The purpose of Donlan and Andretta's study is to test the theoretical assertion that situational and dispositional apprehension are independent. Specifically, they are trying to "determine whether teacher intervention in the form of experimentally manipulated variables could significantly change the level of students' dispositional apprehension." (Donlan and Andretta, 1987, p.1)

The study consisted of the creation of two classroom interventions - apprehension reducing and apprehension producing. Seven student teachers and one secondary education supervisor were utilized in the study. The treatment lasted six weeks with six writing assignments per class. Maintenance was kept through logs and supervisor observation. The Writing Apprehension Test was administered before and after treatment.

The student teachers implemented the two classroom interventions into similar classes. In the A.R. classroom students papers were:

- 1) submitted in masked fashion. (low conspicuousness)
- 2) Papers were evaluated in a binary fashion - 1,3+5 and numbers 2,4+6 marking specific problem areas. (low evaluation)
- 3) Explain early relationship of each new writing assignment. (low novelty)
- 4) explain in detail the purpose of the assignment. (low ambiguity)

(Donlan and Andretta, 1987, p.7)

In the A.P. classroom papers were given with the following characteristics:

- 1) required students to submit papers with names clearly visible on top.
- 2) evaluate papers completely, marking each error.

- 3) Providing no transition between writing assignments.
- 4) minimal directions given.

(Donlan and Andretta, 1987, p.7)

Donlan and Andretta hypothesized that this type of classroom design would result in " a growth in WAT scores in the A.P. group and the number of students experiencing dispositional apprehension would be higher in the A.P. group and lower in the A.R. group." (1987, p.5)

The WAT was scored for both pretest and posttest. Results were based on 266 student scores and the pretest was subtracted from the posttest to obtain growth scores. "An ANOVA failed to reject the null hypotheses at the .05 level for the entire twelve classrooms as a whole." (Donlan and Andretta, 1987, p.10) In addition, a chi-square failed to reject hypotheses. Student teachers' diaries did determine that student behavior was markedly different in each group.

There were many limitations in the study and it would have been better under more heavily controlled conditions. "The results show that teachers may have a limited influence in changing attitudes and reducing apprehension which often affects the quality of work."(Donlan and Andretta, 1987, p.12) The study was valuable but did not show any considerable results in changing behavior; it did provide a basis for teachers to work within their own classrooms to reduce apprehension.

Conclusions

H.Lee Swanson and John Obrutz's experimental study "Learning Disabled Readers' Recall as a Function of Distinctive Encoding, Hemisphere Processing and Selective Attention" reviews right brain and left brain dominance relating directly to reading and writing disabilities. The study correlates directly with recall and memory measurement through right ear and left ear or hemispheric processing. The study clearly defines the problem it chooses to focus on through the exploration of past research on hemispheric dominance and a review of current research on learning disabled students' abilities to activate word features in semantic memory (word referent hypothesis). The problem defined is significant because it will enable the teacher to understand students' disabilities and provide help accordingly. All hypotheses are clearly stated, but there are no operational definitions provided which results in confusion for the reader.

The methodology of the research was briefly described because it only consisted of twenty-four boys following the instructions of a tape recorder. All boys were from middle-upper class schools. This seems to leave out a great percentage of those who are less fortunate. Due to socioeconomic status, these children may have had more strategy training and academic support at home than others and, therefore, may have performed better than the average learning disabled student.

There were no samples, and techniques for analyzing seemed insignificant. Simple subtractions of incorrect from correct words were dictated into tables through an ANOVA. The results were presented quite thoroughly but were very difficult to understand. There was too much statistical information piled together with little explanation. It caused reading to become tedious and often resulted in a loss of interest.

Overall it was a very efficient study. The research provided the proper support for the conclusions which directly related to the previous stated hypotheses. Unfortunately, although the findings were significant, it seems that restriction of sex, age and socioeconomic status put limitations on the study's validity.

Richard Sinatra's experimental study "Styles of Thinking and Literacy Proficiency for Males Disabled in Print Acquisition" also explores

the basis for learning disabled students' difficulties with literacy skills. He clearly defines this problem as one which L.D. readers and writers must face increasingly through school. He also addresses the issue of teacher adjustment to mainstreamed L.D. students. The problem is also significant because without understanding the causes for learning disabilities it is impossible to accommodate them.

Sinatra provides a review of past literature which leads him to the theoretical rationale that hemispheric dominance may be the cause of these literacy difficulties. Sinatra chooses right-handed males as his subjects because they show a more distinct brain dominance and this insured left hemisphere dominance. He clearly states his hypotheses which are based on his belief that a deficiency in literacy skills is due to minor malfunctions in the brain. He fully describes his method of research which consisted of scaling a group of standardized tests over a four year period. Sinatra provides a thorough definition of all the tests and has been able to prove his hypothesis through results measured through t-tests. The study would have been more significant if it actually tested strategy training which concentrated on brain dominance. Sinatra also did not test any females or left-handed males with writing disabilities. It would have been interesting to compare results. Although his findings will provide teachers with information to help those students with left brain dominance and deficiencies in literacy skills, it does not grant additional information for others who are reading and writing disabled.

Joan Hogge's study "Understanding the Writing Process Through Brain Hemisphere Neurology" explores brain dominance and ways to teach based on an individual's deficiencies. The problem is clearly stated; working from a review of literature, Hogge evaluates subjects by examining right brain and left brain characteristics. From this information she determines how to enhance learning through knowledge of brain deficiencies.

Her study is limited because she provides only six subjects from a particular area, and she is truly only testing Weinberg's Symbol Language Battery and his hypothesis and suggestions about deficiencies in the hemispheres. The problem she approaches is significant to any teacher of writing disabled students. She divides her subjects according to hemispheric dominance after testing them with the Symbol Language

Battery. She then administers those exercises that will enhance the learning of those with specific deficiencies and finds that all have been successful. She also uses the Xenon Blood Flow Chart. The study corroborates all of Weinberg' hypotheses, but information was biased. Tests were administered in the form of writing samples which were checked by one researcher. Mood and attitude are considered but are based only on the researcher's opinion; this makes it very difficult to form an objective view. The study was extremely interesting and easy to understand because all operational definitions were fully defined, but it does not seem to be objective or factual research. It is difficult to believe that all were more successful after strategy training. It seems to be the type of research that an individual would have to do on his or her own to fully understand the results.

Karen Harris, Steve Graham and Sally Freeman's experimental study, "Effects of Strategy Training on Metamemory Among Learning Disabled Students" is based on enhancing the deficiencies prevalent in learning disabled students with reading and writing difficulties. The study reviews previous literature and research on strategy training and states clearly the research questions it is trying to answer. Definitions are provided for easy understanding. The study also clearly defines its hypothesis which does not prove as accurate as they believed it would. The methodology of the research is similar to that of Swanson and Obrutz but is much more detailed and controlled. A study four(study conditions) x two(sessions) analysis of covariance with repeated measures was used to examine the results of strategy training. Sources of error were greatly controlled, and the study was more diverse than others because it dealt with forty students. Unfortunately, this was also a limitation because all students were from school districts in northern and central Indiana. The results are clearly stated and support conclusions and hypotheses. This was an interesting study because it provided ideas for implementation when working with L.D. students. It was also a thorough piece of research.

Twila Jaben's experimental study "The Effects of Creativity Training on Learning Disabled Students' Creative Written Expression" finds its purpose in an exploration of the Purdue Creative Thinking in reference to fluency, flexibility, and originality. The hypothesis is significant because if accurate it will provide teachers with new methods of instruction for

readers and writers. The forty-nine subjects were of a specific age group -- eleven to twelve. The group consisted of forty boys and nine girls. They were previously tested by standardized tests to evaluate their level of disabilities. With probability set at .05 all results were measured in separate analyses. The two groups supported the hypotheses that Purdue Creative Thinking Program would be significant in stimulating the scores on The Torrence Creativity Tests. The procedure was described rather thoroughly, but the writing assignments were not shared, although one example was provided. It would have been a more relevant or significant study if the actual tests had been given more description. It is often difficult to evaluate writing in a study because of the large number of outside variables that cannot be researched and considered. Often they are successful in affecting the output of the subject. The study was interesting and somewhat helpful, but it did not provide enough information about the research to be beneficial to the classroom teacher.

The final study dealt with a completely different type of writing difficulty which was not directly related to hemispheric differences. Dan Donlan and Sylvia Andretta's study "Determining the Independence of Dispositional and Situational Writing Apprehension" deals specifically with the differences between dispositional and situational writing apprehension. The study's review of literature and theoretical rationale give it a clearly defined purpose and hypothesis, which was to determine if situational and dispositional apprehension can be manipulated. The procedure is fully described but has many limitations. There was a significant time limitation because the study used student teachers. Using student teachers can also be a limitation due to their inexperience. The curriculums were different in schools so it was difficult to provide a large scale comparison. Some student teachers did not keep proper records and one dropped out. In the classroom which was to be apprehension reducing, students became sloppy and lazy and provided poor quality. The formation of the analysis was met with great difficulty and was also not very accurate.

Data was analyzed through ANOVA, and a chi-square was used to determine differences in the number of students changing attitudes. The entire study was presented clearly and efficiently, and it was difficult to understand. Unfortunately, due to the many limitations, the study

rejected the hypothesis and determined that teachers may have little effect on attitudes toward writing. Perhaps under more controlled circumstances, the study could have been successful.

The studies were helpful in determining the origins of disabilities in reading and writing. Some also provided suggestions for the classroom. Although many were unable to prove their hypotheses, they were quite informative and helped one to understand the meaning of hemispheric dominance and the importance of proper research procedures.

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