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Student attributes, family influences, and school programming features as predictors of LD student reading achievement and school work habits outcomes

Friedt, Gary Robert, Ph.D.
The Ohio State University, 1989
STUDENT ATTRIBUTES, FAMILY INFLUENCES, AND
SCHOOL PROGRAMMING FEATURES AS PREDICTORS OF LD STUDENT
READING ACHIEVEMENT AND SCHOOL WORK HABITS OUTCOMES

DISSERTATION

Presented in Partial Fulfillment of the Requirement for
the Degree of Doctor of Philosophy in the Graduate
School of the Ohio State University

By

Gary Robert Friedt, B.A., M.S.

* * * * *

The Ohio State University
1989

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To My Mom and Dad
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This research aimed to identify factors which might affect the outcomes of students in specific learning disability (LD) programs from two central Ohio school districts. Two approaches were taken in undertaking this task. The first approach consisted of using a multidimensional model to explain LD student variation in school outcomes measures. The second approach involved using the same model to differentiate successful from non-successful LD students.

While there exists a large body of literature in the field of learning disabilities, studies focusing on the outcomes of educational programming for the learning disabled are relatively few. Since LD programs have been federally mandated, socially popular, and received considerable state and federal funds, there has been little interest in evaluating their effectiveness. Other hurdles have also existed to the evaluation of programs designed to facilitate learning among learning disabled students. "Learning Disabilities" is generally viewed as a
heterogeneous condition encompassing several subtypes (Haglin, 1986; Vogel, 1986). This heterogeneity naturally has complicated the designing of controlled studies. When one considers that programming options are prescribed by state standards and that special education services must be provided to all students identified as needing them, it becomes clear that opportunities for well controlled experimentally designed studies are limited.

However, it is important that outcome studies be conducted. Such research contributes to improving the effectiveness of program design and implementation and, with the compilation of data from a sufficient body of studies, will eventually provide the basis to improve our knowledge of the field. Studies examining student outcomes become even more important as the people of this nation are demanding greater accountability in our public schools. Also, there are two immediate benefits from outcome studies. They provide information about how a given program has accomplished its intended objectives and they promote self-reflection as to the utility of program practices by those responsible for implementing the programs.

It was the purpose of this study to explore LD student outcomes by generating a model which attempts to explain the variation in their performance. The model was also used to discriminate between those students who were determined to
be successful, as measured by standardized tests and teacher ratings, and those who were not. With this approach, all LD students deemed in need of services continued to be provided services. This approach also afforded program personnel the opportunity to identify components of their programs that might be important for success among certain segments of the LD population.

The first problem encountered in setting out to design a study of student outcomes was deciding how outcomes were to be defined (Rossi & Freeman, 1982). One method of gauging student outcomes has been through the use of standardized achievement testing (Tuckman, 1985). Some research has been conducted focusing on program outcomes in terms of student academic gains. Results utilizing this type of methodology with LD students have been generally pessimistic (Horn, O'Donnel, & Vitulana, 1983).

Methodologies which rely on academic gains often compare LD students with their non-LD peers. Comparison between LD and non-LD students is of questionable value. Professionals in the LD field often cite case studies in which selected LD students have made tremendous strides academically. However, in most analyses, these individual gains become buried in statistical averaging with LD students who have demonstrated little academic progress. This research effort intended to avoid the problems associated with averaging outcomes by attempting to explain the variation in
outcomes and by identifying factors that differentiate between groups of successful LD students and non-successful LD students.

Another important issue was to identify factors accounting for the variation in different outcome measures. Positive student performance on standardized achievement tests is not always strongly associated with success in the regular classroom as assessed by subject-area grades (Johnson, 1987). Some LD students with low reading test scores are able to experience success, as measured by earning academic grades of C or better in the regular classroom, while other LD students with higher reading comprehension test scores receive unsatisfactory marks in those same classes. This suggests that multiple factors might affect the success of LD students. Kavale and Forness (1986), adapting Carroll's (1963) model of school learning, proposed a schema in which three classes of variables affect school learning: student attributes, environmental influences, and instructional features.

The present study, utilizing the framework of Kavale and Forness (1986), attempted to identify potential factors which could represent their three component classification system of student attributes, family influences, and school programming features. A model consisting of these factors was then used for prediction. The intent was to investigate the relative contributions of the variables
selected and the classes they represent in predicting both academic achievement and work habit ratings of students with learning disabilities. The same model was also used to discriminate between successful and non-successful LD student groups. Student attribute variables considered in this study included the psychological processing scores of Verbal Comprehension, Perceptual Organization, and Freedom from Distractibility (Kaufman, 1975); achievement-ability discrepancy scores; and initial teacher judgments of student work habits. Family influences studied were family socio-economic status, parent involvement as measured by interactions with the school, and the school attendance records of the student. School programming features studied were the number of contact periods per week of LD program service for each student during a given year, the total length of time the student had received LD services, and the number of work habit objectives listed on the student's individual educational program (IEP) during a two year period.

This study differed from existing literature. A number of studies (Ackerman, Dykman, and Peters, 1977; Gottesman, Belmont, and Kaminer, 1975, Koppitz, 1976; Yule, 1973) have reviewed selected student attributes, such as differences in age, ability, initial achievement level, and motivational factors as they relate to achievement gains. Others (Beck, Lindsey, and Firth, 1981; Leinhardt, Zigmond,
and Cooley, 1981; Thurlow, Ysseldyke, Garden, and Algozzine, 1984) have looked at factors within the school structure as they correlate with student performance. Two studies (Badian, 1986; Satz, Taylor, Friel, and Fletcher, 1978) have analyzed family structure and other factors of the home environment as they relate to the success of learning disabled students. All of these studies failed to deal extensively with the notion that a combination of diverse factors might best account for school learning.

It is known that individual abilities or ability deficits influence school learning (Sattler, 1982), but so might expectations and motivational influences within a student's family. Family and motivational factors set the stage for learning which is acted out in the school setting. The quality of that setting will likely influence the outcome for the LD student. It is the combination of these factors that is of primary importance in determining whether the LD student achieves success in school.

The potential applications of this realization are evident. Once factors relating to the academic success of certain LD students are identified, further analysis can be conducted to identify specific critical components within those variables. And, taking a close view of those factors related to the LD students' success, intervention strategies can be modified to enhance further academic performance. Furthermore, an analysis of those students who
are not successful, but share some individual attributes with those who are, can be undertaken and efforts can be made to adapt the school or home environment to facilitate their academic performance. For example, let us assume that a high degree of parent involvement is one of the factors associated with academic success among LD students. Let us assume further that a group of less successful LD students may share a number of commonalities with the successful LD group, but there is limited parent involvement in their education. Strategies can be initiated to facilitate greater parent involvement such as having the teacher make home visits, sending home weekly progress reports, or making regular phone contact with the parents.

Horn et al. (1983) suggested that current academic intervention practices in special education may not be an appropriate option for some LD students. An analysis of those factors related to non-success could perhaps assist school districts in the identification of those students who might not profit from the typical academic remediation approach. As a result, a different educational intervention approach can be adopted for those students. This might necessitate an increased focus on prevocational training, social skills acquisition, or self-esteem enhancement for selected segments of the LD population.
CHAPTER II
REVIEW OF LITERATURE

The purpose of this study was to evaluate a model for predicting LD student reading comprehension scores and work habits ratings. The model included elements representing three distinct classes of variables. The classes of variables were student attributes, family influences, and school programming features.

In the review of literature the term "specific learning disabilities" is defined. Then problems associated with studying outcomes related to LD educational programming are discussed. A review is given of those variables identified in the literature that appear to be associated with successful performance in LD programs. Outcome considerations are then presented. The model to be studied in this research effort is then presented.

LD Definition

The Education of All Handicapped Children Act of 1975, PL 94-142, mandated a free and appropriate public education for all handicapped children. It required that programs be designed to meet the unique needs of each handicapped child. One handicapping condition recognized and defined
in PL 94-142 was specific learning disability. It is generally referred to as "Learning Disability" (LD). The act defined this condition as:

A disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which may manifest itself in an imperfect ability to listen, think, speak, read, write, spell or to do mathematical calculations. The term includes such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. The term does not include children who have learning problems which are primarily the result of visual, hearing, or motor handicaps, of mental retardation, of emotional disturbances, or of environmental, cultural, or economic disadvantage (Federal Registrar, December 29, 1977).

Outcomes for LD Students

A large body of literature has evolved prior to and following the enactment of PL 94-142 in the area of learning disabilities. However, a relatively small proportion of this literature has studied long term outcomes for the LD student. Those LD outcome studies that have appeared in the literature, have provided generally pessimistic results (Horn et al., 1983; Lerner, 1985; Spreen, 1982). Spreen (1982) found, as a group, outcome studies suggested that most children referred for special learning or reading disability programming do not catch up with their age peers after treatment. Rather, they fall further behind in time. Yet, Horn et al. (1983) reported that in most of the follow-up studies they reviewed, some LD students attained average or better outcomes. They reasoned that the obtained overall
negative results were due to the use of group statistics in evaluating success.

A current view in the learning disability field is that "Learning Disabilities" is complex and heterogeneous and is a lifelong condition (Haglin, 1986; Vogel, 1986). Several investigators have proposed the existence of subgroupings within the condition of learning disabilities (Dalby, 1979; Doehring, Hoshko, & Bryans, 1979; Fisk & Rourke, 1979; McKinney, Short, & Feagans, 1985). The indication of the Horn et al. (1983) review that some LD children attained better outcomes than others, might suggest that different success rates can be attributed to subgroupings of the generic term learning disabilities. This suggests that educational programming differentially affects groups of LD students within the classroom. It might also suggest that comparison of LD student progress to that made by peers without disabilities in studying student outcomes might not be appropriate. LD students might have a much different set of impediments to learning than do non-LD students. A viable alternative in studying LD student outcomes could attempt to explain variation in outcome results.

This approach has been utilized by some earlier researchers (Gage, 1969; Newborg, 1971) in determining which neurologically handicapped students receiving special education services earned higher academic grades in their regular classes. Newborg (1971) found that neurologically
handicapped students who had auditory-oral language disabilities, and were hyperactive, distractible, and easily upset were less successful than other groups of neurologically handicapped students. The term, "neurologically handicapped" has now been subsumed under the broader classification of LD (Ohio Dept. of Ed., 1982). More recently, McKinney, Short, and Feagans (1985) analyzed the achievement outcomes for various LD perceptual-linguistic subtypes and found differences in achievement scores between groups.

A number of factors appear to be associated with learning disabilities and the treatment of those disorders (Kavale & Forness, 1986; Lerner, 1985; Warner & Bull, 1986). Kavale and Forness (1986) grouped factors which contributed to school learning into three classes. Those classes were; student attributes, environmental influences, and instructional features. According to their view, student attributes included student abilities, aptitudes, and other individual difference variables. Environmental influences consisted of general family characteristics and educational environments. Instructional features involved those elements existing within the instructional process and program design. Research has suggested that variables contained within their classification system affect school learning. Kavale and Forness (1986) suggested that learning can be assessed within this type of classification system.
The variables which affect learning need to be given further study particularly among LD students.

Kavale and Forness (1986) then related this model to Carroll's (1963) variable of academic learning time. Academic learning time (ALT) was a function of the time the student actually spent on task divided by the time needed to learn the task. For the typical learner the time actually spent on task and the time needed are relatively equal. For the LD student, due to factors associated with his or her handicap, additional time for learning is usually required. Often, the time spent on task for the LD student is less than the time actually needed. Hence, inadequate learning takes place.

The framework of Kavale and Forness (1986) might have important implications for studying learning in the LD population. Elements representing the classes of student attributes, family influences, and school programming features might explain the school outcomes LD students attain. Additionally, certain aspects of the Kavale and Forness model might account for the fact that adequate learning takes place for some LD students but not for others. To consider their model, variables need to be selected which represent those three classes. The next sections identify potential variables for inclusion in a model of school learning which represent the classes of
student attributes, family influences, and school programming features.

Student Attributes

Psychological Processing

One type of student attribute researched in the learning disability field has been student psychological processing. Student psychological processing is a key term within the federal definition of specific learning disability (Lerner, 1985). The student with a specific learning disability has a disorder in one or more of the basic psychological processes. It was assumed that due to processing dysfunctions, the student has not been able to profit substantially from instruction without special education services. Individual differences in psychological processing of information might, in part, have accounted for differential benefit from LD services. Some educational programs might have been more beneficial to students demonstrating one type of processing deficit, while other approaches yielded more favorable results with individuals having other types of deficits.

Several investigators (Bannatyne, 1971; Clark & Frisbee, 1980; Kaufman & Kaufman, 1983; Kirby & Das, 1977) have proposed systems in which information processing styles might be considered when designing educational programs for the student with learning disabilities.
Bannatyne (1971, 1974, 1979) suggested that information processing strengths and weaknesses can be identified through the recategorization of Wechsler Intelligence Scale for Children (WISC) subtests. He proposed regrouping individual subtests into Spatial, Conceptual, Sequential, and Acquired Knowledge categories. With this recategorization of the WISC, various patterns of strengths and weaknesses in processing abilities emerged and could be interpreted. According to Bannatyne (1971), a successful treatment program remediated deficit processing areas by matching instruction to specific deficits and reinforcing deficit training through the child's intact areas or strengths.

Another information processing approach was proposed by Das, Kirby, and Jarman (1975). In their approach, information was conceptualized as processed in either a simultaneous or a successive fashion. When several features of the stimulus were being dealt with at the same time information was being processed simultaneously. Successive information processing required taking in information in a predominately serial or sequential fashion. Most school tasks are considered to be sufficiently complex as to require both abilities, but could be dependent more upon one than the other. Training in either form of processing should increase the level of school achievement. If one form was less susceptible to training, a moderate
level of success might be obtained by focusing training efforts on utilization of the other form (Kirby & Das, 1977).

Kaufman and Kaufman (1983), using the work of Das et al. (1975), devised a standardized intellectual assessment procedure, the Kaufman Assessment Battery for Children (K-ABC). This instrument was purported to measure sequential and simultaneous processing. Intelligence was defined in terms of an individual's style of solving problems and processing information. Sequential and simultaneous processing categories were analogous to Das et al.'s (1975) successive and simultaneous processing.

Based upon knowledge of processing strength, it has been recommended that intervention capitalize on the child's decided strength, but not exclude the weaker process (Kaufman & Kaufman, 1983). To give the individual a thorough grounding of skills, Kaufman and Kaufman (1983) have recommended that approaches which rely extensively on the weaker process or integrate both processes are interspersed with instruction featuring the stronger process. Extensive research using the K-ABC factors has not been conducted. Some preliminary findings, with small samples of LD children, suggested that as a group, they showed a decided strength in simultaneous processing (Gunnison & Kaufman, 1982). If this finding is supported by further research one possible consideration is that
increased reading gains with LD populations may be obtained by selecting instructional techniques which involve a preponderance of this processing ability. Clark and Frisbee (1980) reached a different conclusion. They found an interplay of processes was a more appropriate interpretation of their reading comprehension data. An over reliance on one processing ability might hinder the overall reading acquisition.

Joint factor analysis of WISC-R scores and K-ABC scores by Kaufman and McLean (1985, 1987) found significant correlations between the K-ABC simultaneous factor and the perceptual organization factor of the WISC-R. Similarly, the K-ABC sequential factor and the WISC-R freedom from distractibility factor were also significantly correlated. This was found with both normal (Kaufman & McLean, 1987) and LD (Kaufman & McLean, 1986) populations. Investigators concluded that the K-ABC factors corresponded to the WISC-R factors they most closely resembled. Since the K-ABC has an administration age maximum of twelve years and the WISC-R has one of sixteen years, a similar conclusion might be applied to students between the ages of 12 and 16 by use of WISC-R results.

Weltner-Brunton (1985) compared Kaufman (1975) WISC-R factor scores of Verbal Comprehension, Perceptual Organization, and Freedom from Distractibility with the Bannatyne (1979) WISC-R recategorization scores of
Conceptual, Spatial, and Sequential in predicting reading achievement gains on the Woodcock Reading Mastery Test (WRMT). She found Kaufman WISC-R factor scores and Bannatyne recategorized WISC-R scores to be comparable. Kaugman (1975) WISC-R factor scores accounted for 13% of the variance in WRMT change scores, while the Bannatyne recategorized scores collectively accounted for 17%.

These various processing scores appear to share similarities. Research investigating one or more of these processing systems might lead to a discovery of meaningful differences in information processing abilities among high achieving and low achieving LD students. This can help explain why a program's instructional approaches might best have served a particular group of LD students, yet have been relatively ineffective for another group.

**Ability - Achievement Discrepancy**

The existence of ability-achievement discrepancies has been a major focus in eligibility comparison to their measured ability, LD students significantly underachieve in one or more academic areas. An evaluation team must document the existence of an ability-achievement discrepancy to determine eligibility for LD placement.

Some studies looking at LD student outcomes have reviewed the magnitude of the ability-achievement discrepancy measured prior to placement and related them to
the student's current achievement levels. Yule (1973) found persistent deficits in basic skills over time when LD children were defined by the discrepancy between IQ and academic performance. Those individuals exhibiting the largest discrepancy made the least amount of progress and required longer periods of intervention. The issue of ability and achievement discrepancies has also been discussed by Cone and Wilson (1981), Horn et al. (1983), and White and Wigle (1986). Those students demonstrating the most severe discrepancy between measured ability and achievement may be the most likely to be identified for treatment, but be the least likely to make progress with treatment (Horn et al., 1983). Hence, when relative gains in comparison to peers have been used as the outcome criteria, few gains appear to be made.

Other studies have not looked at ability and achievement discrepancies per se but have focused on outcomes in which initial achievement levels were compared with terminal achievement levels. Studies by other investigators (Ackerman, Dykman, & Peters, 1977; Gottesman et al., 1975; Koppitz, 1976) had obtained results similar to the ability and achievement discrepancy studies. The least improvement was made by students with the lowest entry level achievement scores.
Work Habits

Another variable related to school performance was the LD student's orientation to task. This has also been referred to as student work habits, classroom adaptive behavior, attention to task, perseverance, and task persistence. Carrol (1963) considered perseverance as a primary variable in any school learning. In order for learning to be successful, a learner had to be willing to persevere for the amount of time necessary for learning to take place for that individual's specific ability levels.

As a group, LD students tended to display maladaptive behaviors that impair academic progress (McKinney & Feagans, 1983). Salend and Lutz (1984) indicated that such classroom behaviors as displaying proper work habits, interacting positively with peers, and obeying classroom rules were more important than academic competence for successful integration in regular education classes. The higher incidence of off-task behavior among LD students, in comparison to peers without disabilities, has been documented at the elementary level (Feagans & McKinney, 1981) and among adolescents (Bender, 1985).

Fewer studies had looked at on-task behavior in relation to differential success rates for school learning of various LD students. Gage (1969) and Newborg (1971) found that among neurologically handicapped students who had
received special tutoring services, a pattern of hyperactivity, distractibility, and emotional overlay was more consistently associated with the lowest success rates on school grade indices. They defined emotional overlay as overreacting to situations, not profiting from punishment, and becoming easily upset. Supportive data for the impact of classroom behavior on school learning has also come from studies using regression analysis. McKinney, Short, & Feagans (1985) predicted spring achievement scores from behavior ratings taken the previous fall and found those behavior ratings accounted for 36% of the variance. The variance explained by the behavioral ratings was largely independent of IQ. In another study, McKinney and Speece, (1983), found that classroom behavior and IQ accounted for significant amounts of variance in predicting reading scores when LD students were placed in special education. These findings would suggest that an LD student’s school behavior and approach to tasks should be considered in a multifaceted model that attempts to account for differences in learning.

**Family Influences**

The success or failure of the LD student in school might be related to a number of family factors. Factors such as family socio-economic status, parent involvement in the student’s educational program, and the importance the
family places on education can influence the success a given LD student experienced with special education programming. Family environmental factors have consistently been identified as a source of variance in school learning (Marjoribanks, 1979).

**Socio-Economic Status**

A variable used in general educational achievement outcome studies has been socio-economic status. The socio-economic status variable has not been studied to any degree with the LD population.

Initial preview of the federal definition for specific learning disability (U.S. Office of Education, December 29, 1977) suggests socio-economic status would not be related to the school success of LD students. Low socio-economic status appears to be an exclusionary criterion in the identification of students as specific learning disabled. The federal definition states that the LD student's learning deficits should not be primarily due to such factors as environmental, cultural, or economic disadvantage.

School identification practices, however, would suggest otherwise. Students from families of low socio-economic status are substantially represented in LD programs. Morrison, MacMillan, and Kavale (1985) noted a strong association between students identified as learning disabled
and their socio-economic status. Others (Houck, 1983; Ysseldyke & Algozzine, 1983) have questioned the discriminatory nature of this exclusionary criteria. If other components of the LD definition have been met, determination of environmental, economic, or cultural disadvantages becomes irrelevant. When considering the outcomes of LD programming, however, there might be considerable merit in determining if environmental disadvantage has contributed to the non-success of LD students on various school outcome criteria. Having a learning disability and being economically disadvantaged might be a significant deterrent to academic success even with special education services.

Parent Involvement

All LD students receiving special education services are required to have an Individual Education Program (IEP) that is reviewed at least annually (PL 94-142). The IEP process requires school districts to actively seek parental input in the development and review of the IEP. Parental input and assistance in educational activities can provide support and enrichment (Lerner, 1985). IEP conferences can be a bridge between the home and the school providing an opportunity to enhance student progress by establishing jointly agreed upon objectives and coordinating the efforts of teacher and parent. In these conferences, parents can
gain an understanding of the nature of the student's problem and become more sensitive to the impact of the disability throughout the student's educational career.

In an evaluation of a large city school district's tutoring program, Gage (1969) and Newborg (1971) found a consistent positive relationship between parent awareness of the disability and the student's success in school. As parent awareness of the disability increased, so did the percent of tutored students who were achieving successfully in school. Parental awareness of the disability was based upon information and judgments provided by tutors, classroom teachers, and permanent records (Gage, 1969).

Parental involvement has also been considered an important variable in general education studies. In a review of criteria that make some schools more effective than others, Robinson (1985) identified parent involvement as one of those criteria. Parents of students in effective schools were found to be more interested and concerned about their children's school work than were the parents in non-effective schools. Involved parents took part in activities directly related to improving the student's performance in school.

Bodner-Johnson (1986), utilizing a parent interview approach, studied the correlates of parental factors with the reading achievement scores of deaf students. Two home variables accounted for 23% of the variance in achievement
scores. These variables were the adaptation of the parent to the deaf handicap and the parent's press for achievement as assessed by expectations for academic and occupational achievement.

This literature tends to support the contention that parental involvement in a student's educational program positively influences academic achievement. School records documenting parent involvement could well be a predictor of academic success among LD students as well.

School Attendance

Another indicator of parental involvement and cooperation could be the extent to which the student attended school. Ohio law (Ohio Revised Code Sec. 3313.64) charges parents with the responsibility for insuring that their child attends school. Excessive absences are viewed as detrimental to educational progress and are reported to authorities so legal action can be taken to ensure the child attends school regularly.

Surprisingly, with the perceived importance of school attendance codified in compulsory attendance laws throughout the country, few studies have compared absence rates to school achievement. Sullivan and McDaniel (1983) found that LD students averaged 10% missed classroom contacts due to their absences from school, while non-
handicapped students averaged 9% absences. No direct comparison of student achievement and absence rate was made in their study. Using an entire school population, one study did make such a comparison (Monk, 1984). The rationale for studying absence rates was that absences reduce the amount of schooling time and disrupt the sequence of learning. The more absences there are, the greater the number of disruptions. Monk (1984), comparing eighth grade math performance on Regent Tests of high and low absence groups, found that the quantity of student absences was negatively related to student performance.

Carrol (1963) proposed a model of school learning where the degree of learning was dependent, in part, upon the time spent on-task in light of the time actually needed to learn the task. Absence rates could be considered an indirect measure of time spent on-task. Carrol's model suggested that the student having academic difficulties needed greater time to learn and that learning must be properly sequenced. The student who spends less time learning than the amount of time necessary for that person to learn will not be successful and will learn less than the student who spent adequate time learning the task. Also, local school policies tend to require the student to make up work missed during absences. This places an added burden on the student who regularly misses school. The student not only has to complete current assignments, but must also complete missed
assignments within a reasonable period of time. If the student failed to make up missed school work, not only was the time to learn reduced, but the sequence of instruction was also disrupted.

Such indices of the home environment as parental involvement, socio-economic status, and school attendance potentially impact on school learning for the LD student. Yet, to a large extent, these issues have not been addressed in the LD literature.

**School Programming Features**

The literature has, for the most part, not provided much in the way of consistent findings on how broad classroom characteristics relate to LD students' achievement outcomes. However, key characteristics of effective schools have been reported. Some of these samples have contained representation from handicapped populations. The characteristics of effective schools reported by Bickel and Bickel (1986) included educational leadership, orderly school climate, high achievement expectations, systematic monitoring of student performance, and an emphasis on basic skills. In addition, effective teachers have been found to actively structure the learning process and the management of time by utilizing such things as signals for academic work to maintain student attention (Berliner, 1984).
Extent of LD Services

Extent of participation in the LD program has been identified as one school programming variable that might influence the LD student's achievement outcome. Extent of participation can be viewed as an indicator of the amount of time when basic skills are emphasized and student performance has been closely monitored. Federal guidelines for the education of the handicapped (Federal Registrar, September, 1977) requires that a continuum of programming options be available for handicapped students. Determination of an appropriate option for a specific individual is based on the concept of least restrictive environment. To the maximum extent appropriate, the LD student is to be educated in the regular classroom setting. The student is removed from the regular classroom setting only when that setting is no longer appropriate in meeting his or her educational needs. Thus, service for LD students might range from spending a limited amount of time with an LD teacher, to spending a major part of the day in the LD program. In Ohio, the maximum number of students permitted to be present in a class at any one time has been established at twelve (Ohio Dept. of Ed., 1982). This enables the LD teacher to provide more assistance to the students and to monitor students more closely than the general education teacher can.
The extent of LD service has been given limited research attention. Thurlow, Ysseldyke, Garden, and Algozzine (1984), using quantitative measures of active academic responding time, found that service level did not affect the LD student's opportunity to learn. Weltner-Brunton (1985) found intensity of LD programming to be a weak predictor of reading achievement gains on the Woodcock Reading Mastery Test (WRMT).

Factors associated with the LD program such as reduced number of students, a class structure that focuses on individual needs, and the development of IEPs which clearly state expectations for the individual student in the form of annual goals and objectives are similar to characteristics identified in effective schools research. One finding supportive of this contention (Morsink, Soar, Soar, & Thomas, 1986) reported greater student attention and on-task behavior among LD students when they were in the special education classroom than when they were in the regular education classroom setting. These findings lead to the postulation that greater exposure to the LD program's organizational structure will lead to substantial academic improvements.

Duration of LD Services

The number of months a student spends in the LD program might be related to the student's level of success.
Ito (1980) found LD students receiving brief resource room intervention of two to six months showed greater maintenance of their academic gains when returned full time to the regular class than did students receiving intervention of a longer duration, 6-10 months. It was hypothesized that the LD group receiving the shorter duration intervention might have been the group with less severe learning problems.

Beck, Lindsey, and Firth (1981) reported somewhat different findings. Self-contained LD students enrolled two or more years in an LD program made greater math achievement gains than those enrolled for one year in an LD program. No significant differences were reported on reading achievement measures. Another study (Weltner-Brunton, 1985) found duration of LD programming not to be a significant predictor of reading achievement. The issue of duration of LD services needs to be given further attention.

**IEP Focus on Work Habits**

Each handicapped student receiving services must have an Individual Education Program (Federal Register, September, 1977). An individual educational program (IEP) is a written document which states the student's present level of performance, his or her annual goals and short-term instructional objectives, and the special education program and related services to be provided to the student (Ohio
The IEP is constructed by a team consisting of the classroom teacher, one other staff member, and the child's parent. This document is intended to be written in a manner that reflects the unique educational needs of the handicapped student. It specifies educational goals and objectives based upon evaluation information of the student's present level of performance. The IEP is reviewed on at least an annual basis by the parent, teacher, and at least one other member and updated as the student's educational needs are perceived to have changed. Annual goals and short-term instructional objectives statements in the IEP might be a source of information for determining the program's emphasis on developing appropriate school work habits for a particular individual.

Berliner (1984) has indicated that effective teachers manage student behavior and help students maintain attention to task. A review of a student's IEP could indicate a particular program's focus on attentional skills and study habits. Educational programs that emphasized these areas might provide students with the skills needed to perform well in school settings.

**Outcome Measures**

Outcome measures used in LD follow-up studies have consisted of essentially three types (Horn et al., 1983). Most frequently used outcome criteria have involved some
type of academic achievement measure. Other identified outcome measures have included measures of vocational or educational attainment and indices of behavioral/emotional functioning.

Bickel and Bickel (1986) indicated that an emphasis on only academic achievement scores overlooks other important aspects of the school curriculum, which should be used in making judgments as to the effectiveness of a school or program. The strategies that are worthwhile in meeting basic skills achievement goals might or might not be related to other measures of success such as improved social skills or work habits. Rather than regarding intervention as a means of achieving discrete, academic goals, it is necessary to view them in terms of a longitudinal perspective related to the individual's development throughout his or her life. Academic achievement needs to be considered within a context of how those skills are utilized on a daily basis. An evaluation using some work related or behavioral outcome in addition to academic achievement would address the current research criticism pointed out by Bickel and Bickel (1986) and be consistent with goals specified for LD programs in Ohio Rules for the Education of Handicapped Children (Ohio Dept. of Ed., 1982, p. 71). Those standards state, "An educational program shall be developed that is: designed to provide skills leading to independence as an adult based on the evaluation of each child, developmentally sequential,
and designed to provide objectives leading to one or more occupational skills." A subset of occupational skills and independence skills considered in this research involved the LD student's acquisition of appropriate work habits. Thus, an index beyond normal academic skills achievement areas should be an equally viable outcome measure. This study considered a rating of student work habits completed by the LD teacher as the additional outcome measure.

**Statement of Problem**

The primary purpose of this study was to determine the ability of a proposed model, and components within that model, to predict reading achievement scores and work habits ratings of LD students after they had received special education services. An important aspect of this research was that the predictors of reading and work habits were assumed to reflect three diverse classes of variables. Student attributes, family influences, and school programming features were viewed as essential elements to school learning for LD students. Each was assumed to make contributions to the model. This is consistent with the views of Lerner (1985) and Kavale and Forness (1986), that the academic success of LD students is related not only to their abilities, but also to environmental influences and the instructional processes which act upon the student.
Another aspect of this research was that the proposed multidimensional model was used to predict two different outcome measures considered important for successful school performance. One outcome measure consisted of standardized group reading comprehension achievement scores reported as normal curve equivalents. The other outcome measure consisted of a locally developed work habits rating scale completed by the student's LD teacher.

In addition to evaluating the model's ability to predict outcome measures, a second type of analysis was considered. That analysis involved determining the ability of the model to discriminate functions between the high and low achieving LD students and LD students with good and poor work habits. It also involved identifying those functions which were important to group assignment.

**LD Outcome Model**

In this study three classes of variables, student attributes, family influences, and school programming features, were perceived to influence student school outcomes. The classes of family variables and school programming features were considered in an additive relationship to student attributes. Each class when successively added to the student attributes class was hypothesized to increase the power of the model in
accounting for variation in the outcome measures.
The proposed model was: LD outcomes = function of (student
attributes + family influences + school programming features).

Student attribute elements used in the study were
Kaufman's WISC-R factors of Verbal Comprehension (VC),
Perceptual Organization (PO), and Freedom From
Distractibility (FD), a measure of reading underachievement
identified as Reading Discrepancy (RD), and an index of the
student's ability to focus on the task called Initial Work
Habits (IWH).

These variables were chosen since they were consistent
with a number of the elements Carroll (1963) identified in
his model of school learning. Three student attributes
were viewed as critical to school learning. One was the
ability to understand instruction, a combination of general
intelligence and verbal ability. The WISC-R factor of
Verbal Comprehension is considered an assessment of verbal
ability and hence was used to represent this aspect.
Another element was aptitude for learning the task. The
WISC-R factor scores of Perceptual Organization and Freedom
from Distractibility are viewed as measures of aptitude for
learning. A third element in Carroll's model of school
learning was student perseverance, the amount of time the
learner was willing to engage in learning. According to
Carroll (1963), underachievement could be defined in terms
of limited perseverance. Underachievement was viewed as
"a state of affairs which results whenever perseverance is less than some reasonable value, whenever the quality of instruction is poor, whenever time allowed for learning has not been sufficient, or whenever some combination of these conditions has occurred."

The Reading Discrepancy Score (RD) computed for LD students, was an index of underachievement. It was computed by determining the difference between the LD student’s measured general ability and his or her measured reading achievement. Other indices of student perseverance were reflected in other variables selected for this study. The LD student’s Initial Work Habits (IWH) rating score (Appendix A) was incorporated into the model. Also, the FD factor score has some relationship to perseverance. Sattler (1982) indicated that this factor score measures the ability of the student to remain undistracted.

The class of family influences consisted of indices of Parent Involvement (PI), School Attendance (AT), and Socio-Economic Status (SES). Family influence variables selected attempted to represent those aspects of family-environmental variables mentioned by Lerner (1985) and Kavale and Forness (1986) as factors contributing to school learning for LD students. Following the student attributes variables PI and AT were incorporated into the proposed model. They were viewed as direct measures of family expectations related to school success. Robinson (1985)
pointed out that parent involvement in the educational process was a critical factor in distinguishing effective schools from those that were not effective. SES was the last family influence to be added to the model. It was viewed as an indirect, summary variable (Garber, 1988). As such it was considered in a secondary position to the other family influences.

The last class of variables to be considered in the model was school programming features. School programming features included the IEP Focus on Work Habits (IEPWH), Duration of LD Services (DS), and Extent of LD Services (ES). IEPWH was the first school programming feature added since it identified the extent to which the LD educational program focused on work habits thought to be deficient. The other two school programming features, Duration of LD (DS) Services and Extent of LD Services (ES), were seen as indices of what Carroll (1963) termed as opportunity or time allowed for learning. DS was a count of how long the student had received LD services at the time the outcome measures were taken. ES was a measure of the number of periods of instruction the student received from the LD program during the two years being studied. These school programming features were seen as being consistent with the viewpoints espoused by Lerner (1985) and Kavale and Forness (1986), indicating that school environmental factors and instructional features were important for academic success.
Aims of the Research

The aims of this study were to:

1) Determine if the variables assumed to represent the class of student attributes shared a common factor; those representing the class of family variables shared a different common factor; and those assumed to represent the class of school programming features shared a third common factor.

2) Determine whether the student attributes class consisting of WISC-R factor scores of Verbal Comprehension, Perceptual Organization and Freedom from Distractibility, and the variables Reading Discrepancy, and Initial Work Habits significantly predicted standardized reading comprehension test scores and final work habits ratings for LD students.

3) Determine if the addition of the family influences of Parent Involvement, School Attendance, and Socio-Economic Status to the student attributes class significantly enhanced the model's ability to predict standardized reading comprehension test scores and final work habits ratings for LD students.

4) Determine to what extent the model consisting of student attributes and family influences is enhanced by incorporating school programming features of IEP Focus on
Work Habits, Duration of LD Services, and Extent of LD Services in predicting reading comprehension test scores and final work habits ratings for LD students.

5) To identify the function or functions within the model that significantly discriminate between high achieving and low achieving LD students as grouped by reading comprehension scores.

6) To identify the functions or functions within the model that significantly discriminate between high rated and low rated LD students as grouped by work habits ratings.
CHAPTER III
METHODOLOGY

Sample

The subjects comprising this sample consisted of 125 students selected from two neighboring school districts of similar size from Central Ohio. Each district had a general school population of approximately 2500 students. One district was classified as a small city school and the other was rural in nature comprised of two villages and surrounding agricultural areas. During the 1987-1988 school year approximately 23% of the student population in the small city district qualified for the federally subsidized lunch program, while 24% qualified for this program in the rural school district.

All students selected for this sample had been identified prior to their inclusion in the study as having a specific learning disability, according to criteria established by the state of Ohio (Ohio Dept. of Education, 1982). These students received LD program services for portions of two years or longer between September 1981 and June 1988. The sample consisted of ninety males and thirty-five females. Forty-seven students qualified for the federal free school lunch program and seven students
qualified for the federal reduced lunch program. This combined total of fifty-four students represented 43% of the LD sample. The remaining seventy-one students either did not qualify for lunch subsidy or did not complete the forms necessary to make a determination as to lunch subsidy qualification.

Students in the sample were identified as LD by their respective school district's multifactored evaluation team. Evaluation teams, at a minimum, consisted of a certified school psychologist and a classroom teacher. An LD teacher and school nurse participated on a majority of the evaluation teams. The subjects were selected from existing school records, based on the following criteria:

1) Evidence of diagnosis of LD as specified in an evaluation team report.

2) Evidence of placement in an LD program as determined by the existence of Individualized Education Program plans (IEP's), class rosters, and a reporting by the district of the student's name on their annual federal child count taken in December of each school year.

3) The availability of group standardized reading comprehension scores provided during the time period September 1983 to June 1988.

4) The availability of results from the WISC-R.

5) Evidence of an Initial Work Habits rating sheet completed by the student's LD teacher at the beginning of
the study. The work habits rating sheet was a locally developed instrument completed on an annual basis by the LD teachers for each student he or she served.

The 125 LD students included in this study had full scale IQ scores on the WISC-R ranging from 70 to 136 (M=92.62, SD=10.76). Students at the lowest end of the WISC-R range had been given other measures of intelligence at the time of qualifying for the LD program that exceeded the score obtained on the WISC-R. All students had taken the grade appropriate level of either the Iowa Test of Basic Skills (Hieronymus, 1982) in the rural school district or the California Achievement Test (Harris and Wennerholm, 1978) in the small city school district. Students in this sample had been in the LD program for portions of two years or longer during the period of this study. A school year was considered to be nine months in length. At the end of the two years of the study students ranged in age from 8 years 8 months to 17 years 4 months. The average age of the students was approximately 13 years 6 months. Actual time in LD placement ranged from 11 months in the program to 72 months (M=33.06, SD=16.64). Over the two year period, sampled students averaged between 2.5 weekly LD instructional contacts to a maximum of 25 instructional contacts (M=14.81, SD=6.75). The length of each contact varied somewhat. At the elementary level an instructional contact ranged from 30 to 60 minutes in length. At the
middle school and high school level, instructional contacts were the length of one class period. Depending upon the building schedule, a class period ranged in length from 42 to 50 minutes.

**Collection of Information**

All information used in this study was archival in nature and utilized information the two school district's routinely maintained on LD students. Student records were reviewed and information was selected pertaining to the aims of this research project. The researcher was an employee of both school districts. Only employees of the school districts gathered data from student files to be used in this study.

**Measures**

**Measures of Information Processing**

To identify student information processing style, Kaufman (1975) factor scores were computed for the three factors of Verbal Comprehension, Perceptual Organization, and Freedom from Distractibility. These factor scores were computed from results of each student's WISC-R (Wechsler, 1974) test administered most closely to the time the study began. Kaufman (1975) factor scores were selected as the measure of processing style since WISC-R scores needed for their computation were readily available and the district
school psychologists would on occasion use these factor scores in their interpretation of the results. Additionally, research conducted by Kaufman and McLean (1986, 1987) suggested these factor scores had similarities with K-ABC sequential and simultaneous processing scores. Weltner-Brunton (1985) also pointed out the similarities between the Bannatyne recategorized WISC-R scores and the Kaufman WISC-R factor scores.

The Verbal Comprehension (VC) factor consisted of the sum of each student's scale scores from the WISC-R subtests of general information, similarities, vocabulary, and comprehension. The Perceptual Organization (PO) factor included the sum of each student's WISC-R picture completion, picture arrangement, block design, and object assembly scale scores. Freedom from Distractibility scores were the sum of scale scores for WISC-R arithmetic and coding subtests. Kaufman (1975) included digit span in the Freedom from Distractibility measure. Since this was an optional subtest, only 64 of the 125 students had been given the digit span subtest. A two subtest version was computed. This was considered an Abbreviated Freedom from Distractibility (AFD) measure.
Reading Discrepancy

Reading discrepancy score was a second type of student attribute indicator. It was considered potentially important in explaining school learning outcomes based upon the research of Yule (1973) and the review commentary of Horn et al. (1983).

The reading discrepancy score was computed from information available at the time the student was initially evaluated or re-evaluated for LD services. The evaluation or re-evaluation results used were those more closely associated in time with the student's initial standardized group achievement test administration. The discrepancy scores were computed on the basis of procedures identified by the Ohio Department of Education (1982). All students used in this sample had been given the WISC-R and one of the following individually administered achievement tests: Woodcock Reading Mastery Test (Woodcock, 1973), Peabody Individual Achievement Test (Dunn & Markwardt, 1970) or the Kaufman Test of Educational Achievement (Kaufman, 1984). The following formula was used to compute these scores. The student's WISC-R full scale IQ score was subtracted by 100 and divided by the standard deviation for the IQ test, which in this case was 15. The student's standard reading comprehension score was subtracted from the mean standard score for that test and divided by the standard deviation for the reading test. After this, the
derived IQ score was divided by the derived achievement score. Results of this computation yielded a discrepancy score. Positive scores indicated that a discrepancy between ability and achievement existed. Zero or negative scores indicated no discrepancy existed in achievement expectations based upon the assessed ability (Ohio Dept. of Ed, 1982). The reading comprehension discrepancy scores for students selected for this study ranged from 0 to 2.7 ($M=0.77$, $SD=0.60$).

**Initial Work Habits**

Due to Carroll's (1963) model of school learning stating the importance of perseverance to student outcomes, and the research of McKinney & Speece (1983) pointing out the relationship between academic achievement and classroom behavior, an index of student work habits was used in this research. A rating of Initial Work Habits (IWH) was done by the LD teacher two years prior to the student taking the standardized reading comprehension test. The rating form was locally developed. A rating form can be found in Appendix A. The rating consisted of six questions. Each question was judged on the basis of a 4 point scale. A score of 4 was considered very good and a score of 1 was considered poor. The scores on the six items were aggregated, yielding a possible range in scores from 6-24 ($M=11.05$, $SD=3.24$).
Family Influences

Socio-Economic Status

To determine if a relationship existed between socio-economic status and LD student outcomes and index was devised using information on file related to the student's eligibility for the federally free and reduced lunch programs. Three categories existed. A score of 2 indicated the student received a fully subsidized free lunch, a score of 1 indicated the student received a reduced price lunch. A score of 0 indicated the student did not participate in the federally subsidized lunch program. Sometimes older students chose not to complete the forms. Records were reviewed to determine if younger siblings had completed a form. If an application was on file for any of the siblings, this information was used to determine the student's status. The subsidy criteria were established by the federal government prior to the beginning of each school year. Qualifying income levels for the 1987-1988 school year are reported in Appendix B. Occasionally a student's free/reduced lunch status changed from one year to the next. When that occurred the student was assigned the higher score. Student scores on the free/reduced lunch criteria ranged from 0 to 2 (M=.8, SD=.96).
Parent Involvement

In consideration of the findings of Gage (1969), Newborg (1971), and Bodner-Johnson (1986) that parent factors were related to school achievement for handicapped students, a measure of parent involvement in the school program was used. Parent involvement was assessed by combining information from two sources. An annual survey was sent out each Spring. LD teachers were asked to judge the extent to which parents assisted their children with their school work. Judgments were reported on a 4 point scale, ranging from a 4, indicating a great deal of assistance, to a 1, indicating no assistance (See Appendix A). In addition, a record of the parent's attendance at parent-teacher conferences was used. This was ascertained by reviewing student IEPs for the years in question to determine if one or more parents attended the annual conference. Additionally, one point was awarded for parent attendance of at least one parent-teacher conference during the school year. During the two years of the study a score of 4 to 16 could be obtained. A 4 indicated the parent attended no conferences during the two school years and in the opinion of the LD teacher, provided no assistance with student school work. A score of 16 indicated a parent attended at least one parent-teacher conference each year, attended both annual review conferences during the two years, and in the opinion of the teacher, provided a great
deal of assistance to the student. Actual scores on this index ranged from 4 to 16 (M=11.05, SD=3.24).

School Attendance

Attendance records were utilized as a third family influences element. In consideration of Monk’s (1984) finding that absences were negatively related to test performance attendance data was used in the model to explain LD student outcomes. Student attendance records during the two years of the study were reviewed. The percent of attendance was computed by taking the total number of days the student attended during the two years and dividing it by the number of days his or her school was in session during that same period of time. A total number of days a student was in attendance could not be used because there were minor variations in the number of days each school was in session during a given year and at a given building. Percentages of days an LD student attended ranged from 69.5% to 100% (M=93.5, SD=5.14).

School Programming Features

Extent of LD Services

To determine the importance of school programming features have to school learning three programming aspects were considered for research purposes. The index Extent of LD Service (ES) determined the amount of service each
student received from the LD program per week. IEP records were reviewed to identify the daily extent of LD participation (i.e., placement in the LD program in one or more of the five major academic areas of reading, English, math, science, and social studies). This computation was then multiplied by 5 to determine the number of weekly school contacts with the LD teacher. Four to twelve LD students received services from the LD teacher in this special class/learning center model during any one instructional period. Some LD students participated fully in the regular education program for academic areas, but received individual/small group instruction services (tutoring) from an LD teacher. One to three students were served by the LD teacher at any one time in the SLD tutoring model. The student's LD tutoring participation was computed by determining, from the IEP and teacher reports, the number of times per week the student was receiving instructional services. Occasionally, the IEP of an LD student, who was served in either the special class or tutoring model, was modified during the school year to reflect a decrease or increase in service. When this occurred, LD participation was computed for each document. The results were computed and the sum divided by the number of IEP documents for that year to obtain a yearly average. The number of LD contacts per week ranged from 2.5 to 25 (M=14.81, SD=6.75).
Duration of LD Services

School records were reviewed to determine the number of months the student had received LD services. Duration of services was thought to be important based on findings of Ito (1980) that long term LD intervention was related to a low level of success one returned back to the regular classroom. The number of months were determined by counting from the date initial placement began in an LD program, according to IEP records, to the month in which the second year of group standardized achievement testing was given to the student. Since the school year is nine months in duration, students in the LD program were credited with 9 months for each complete school year they were in the program. Duration of LD services for the sample ranged from 11 months to 72 months (M=33.06, SD=16.64).

IEP Focus on Work Habits

The section of a student IEP listing individual short-term objectives was reviewed during the two year period. This was used to obtain an index of the IEP’s focus on work habits (IEPWH). A count was taken of the number of short term objective statements listing any of the following work habits; follow directions, complete assignments on time, make good use of time, work independently, use materials carefully, or work carefully and neatly. Rankings were assigned based upon the number of these statements written
on the IEP. A zero was assigned to any student who did not have a work habit listed on his or her IEP. A rank of one was assigned to those students having one statement and a rank of two was assigned to those students having two statements. To those students having three or more such statements a rank of 3 was given. Thus, scores ranged from 0 to 3 ($M=1.17$, $SD=.83$). Group sample statistics are reported in Table 1.

**Outcome Measures**

**Reading Comprehension Outcome Score**

The reading comprehension scores from the *Iowa Test of Basic Skills* (Hieronymus, 1982) for the rural school district and the *California Achievement Test* (Harris and Wennerholm, 1978), for the small city school district, were utilized as one type of outcome measure. Normal curve equivalent scores were reported. Normal curve equivalent scores were used because they were available in student school record files, are used to identify student gains for federal reporting practices, and are used to compare results from different tests (Hieronymus, 1982). Publisher recommended test levels for the typical student in grades 1 through 10 were utilized in this sample. Each LD student was given the grade appropriate level of the test. Normal curve equivalent scores for reading comprehension ranged from 1 to 99 ($M=22.83$, $SD=17.01$).
Table 1

Group Sample Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Min. Range</th>
<th>Max. Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (in mos.)</td>
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<td>26.42</td>
<td>104.00</td>
<td>209.00</td>
</tr>
<tr>
<td>WISC-R FS IQ</td>
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<td>10.76</td>
<td>70.00</td>
<td>136.00</td>
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<tr>
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<td>.60</td>
<td>.00</td>
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<tr>
<td>Socio-Economic Status</td>
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<td>.96</td>
<td>.00</td>
<td>2.00</td>
</tr>
<tr>
<td>Extent of SLD Services</td>
<td>14.81</td>
<td>6.75</td>
<td>2.50</td>
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</tr>
<tr>
<td>Duration of SLD Services</td>
<td>33.06</td>
<td>16.64</td>
<td>11.00</td>
<td>72.00</td>
</tr>
</tbody>
</table>

Note. Socio-Economic Status was coded 0=non-subsidized lunch, 1=reduced lunch, 2=free lunch. Extent of SLD Services was stated in terms of number of instructional contacts per week. Duration of SLD Services=number of months in program.
Final Work Habits Rating

The second outcome measure used was a locally developed work habits rating survey. This form was completed by the LD teacher at the end of the second year of the study. The teacher rated the student's performance for the year in several work habits areas. The survey consisted of six questions. Each question was judged on the basis of a 4 point scale. A score of 4 was considered very good and a score of 1 was considered poor. The scores on the six items were aggregated, yielding a possible range in scores from 6 to 24. This was the same rating form as used for Initial Work Habits (Appendix A), only administered two years later.

Data Analysis

Factor Analysis

Data analysis in this study consisted of several procedures. The first procedure, factor analysis, was conducted to determine the factor structure of the 11 variables. A three factor solution was attempted to determine if the factor structure for the variables was consistent with the three classes of variables they were assumed to represent. An oblique transformation was conducted using the Harris-Kaiser method (SAS, 1985).
Paired T-Test

A paired t-test was conducted to ascertain the comparability of the Freedom from Distractibility (FD) score (Kaufman, 1975) and an abbreviated version, Abbreviated Freedom from Distractibility (AFD), using the two subtest scores available through normal administration of the WISC-R. This procedure was done because 64 students in the sample had subtest scores on only two of the three subtests recommended for computation of this factor. In this analysis, data from the 64 LD students having scores on all three FD subtests of arithmetic, digit span, and coding were used. This score was computed by summing all three subtest scale scores, then determining the average. On the same 64 students, an AFD score was computed using only two of the three subtests scores, arithmetic and coding. These averages were then compared.

Hierarchical Multiple Regression Analysis

Hierarchical multiple regression analysis was used to determine the fit of three models in predicting both reading comprehension scores and final work habits rating scores. Previous research in predicting achievement outcomes with LD students (McKinney & Speece, 1983; Weltner-Brunton, 1985), with at risk students (Badian, 1986), and with deaf students (Bodner-Johnson, 1986) have utilized stepwise multiple regression procedures. However, Cohen and Cohen
(1975) point out serious problems with this procedure. The ad hoc order produced by a set of variables in one sample is not likely to be found in a different sample representing the same population. In addition, a large number of variables may invalidate results obtained by this procedure because of a serious inappropriate capitalization on chance.

In consideration of these concerns, a hierarchical multiple regression procedure was used in lieu of a stepwise format for predicting reading achievement and work habits outcome measures. Classes of variables were incorporated into the model, one class at a time. A change in the F value was computed each time an additional class of variables was added to the model. This statistic evaluated whether the improvement in R2 with the addition to the model was greater than 0 (Norusis, 1985).

One of the prevailing paradigms in the LD field is that of information processing (Torgenson, 1986). Learning disabled students are perceived to process information in a manner different from non-handicapped students, or are perceived to have deficits in one or more of the processing areas. The presence of a processing deficit is a primary component in the currently accepted definition for LD. Thus, processing measures were considered first in the model. However, Adelman and Taylor (1986) point out the desirability of a model going beyond a singular perspective. Following that line of reasoning, this study also considered
other perspectives in explaining school learning. The classes of family influences and school programming features were included in addition to student attributes in the model. The analysis involved computations which would clarify the extent to which the inclusion of classes of variables accounted for the variance in reading comprehension test scores and final work habits outcome measures. Analysis was done on student attributes alone, student attributes with family influences, and finally student attributes, family influences, and school programming features.

**Discriminant Function Analysis**

To consider the model's ability to discriminate groups of LD students experiencing various degrees of success, discriminant function analysis was used. Students were first rank ordered on the basis of their NCE score on a standardized reading comprehension achievement test. Then LD students were divided into four groups of approximately equal membership based upon a ranking of test scores. The top quartile composed group one. The second quartile composed group two. The third quartile made up group three. The fourth quartile was identified as group four. Four additional groups were developed on the basis of a final work habits rating scale completed by the student's LD teacher. Again scores were ranked ordered and students
were placed into groups reflecting quartile rankings similar to those specified for reading scores. Direct discriminant function analysis was then conducted. Group assignment was then reviewed to consider the contributions of variables in discriminating students on the basis of reading comprehension scores and final work habits ratings.
CHAPTER IV
RESULTS

Introduction

Data analysis involved several components. A correlation matrix was provided to identify the intercorrelations among variables. Factor analysis, using a three factor solution was used to determine if the elements contained within the model were representative of three distinct classes of variables. These classes were assumed to be student attributes, family influences, and school programming features. A paired-t test was conducted to determine the comparability of the measure Abbreviated Freedom from Distractibility with the Freedom from Distractibility measure as proposed by Kaufman (1975). Hierarchical multiple regression analysis was used to test the ability of the model consisting of student attributes, family influences, and school programming features to predict both reading comprehension scores and final work habits ratings. Analysis was conducted entering all student attributes into the equation first, family influences second, and school programming features last. The last analysis involved the use of discriminant function analysis to identify the abilities of the model to predict group
membership based upon reading comprehension scores and final work habits rankings for LD students. Again, the sequence of classes of variables entering the equation was: student attributes, family influences, and school programming features.

Correlation Among Variables

The correlation matrix is presented in Table 2. Those relationships between variables with an $r > .21$ were significant at the .01 level. The correlation between the student variable Initial Work Habits (IWH) and the school programming feature IEP Focus on Work Habits (IEPWH) was $r = -.45$. Fourteen relationships had absolute values between .22 and .38. Six of those involved the relationships between intelligence and intelligence related constructs as measured by the WISC-R. Those variables were Verbal Comprehension (VC), Perceptual Organization (PO), Abbreviated Freedom from Distractibility (AFD), and Reading Discrepancy (RD), the IQ-achievement discrepancy. VC also had significant correlations with the non-intelligence constructs of Parent Involvement (PI), Extent of LD Services (ES), and Duration of LD Services (DS). PO was significantly correlated with ES, and AFD had similar relationships with ES and PI. Other significant associations included the family influences of PI and School Attendance (AT). PI was also significantly related to the school programming feature of
DS, as was Socio-Economic Status (SES) with ES. None of these relationships were considered a near linear dependency. All variables were retained for further data analysis.

**Factor Analysis**

It was assumed that the eleven variables considered in the model were representative of three distinct classes. Factor analysis was used to test this assumption. A three factor solution with an oblique transformation was performed using the Harris-Kaiser rotation method (SAS, 1985). Inter-factor correlations were .416 between factor 1 and factor 2, .033 between factor 1 and factor 3, and .149 between factor 2 and 3. The rotated factor pattern, reporting standard regression coefficients, is listed in Table 3.

In the three factor solution, four of the five variables from the student attributes class loaded on factor 1. Verbal Comprehension, Perceptual Organization, Abbreviated Freedom from Distractibility, and Reading Discrepancy had their highest loadings on this factor. Standard regression coefficients ranged from .525 for Verbal Comprehension to .611 for Perceptual Organization. Of the first four variables, only Verbal Comprehension had a moderate loading on any of the other two factors, loading .306 on factor 2. One variable assumed to be representative
of the student attributes class, Initial Work Habits, did not load on the same factor as the other four variables. Initial Work Habits had its highest loading on factor three, as did two of the three school programming features, and had minimal loadings on the other two factors.

The three variables assumed to represent the construct of family influences loaded on factor 2. Factor scores were .445 for School Attendance, .495 for Parent Involvement and -.536 for Socio-Economic Status. One of the variables assumed to be a school programming features, Extent of LD Services (ES), also had its highest loading on this factor. The score for this variable on factor 2 was -.393.

The remaining two school programming features, Duration of LD Services and IEP Focus on Work Habits, had their highest loadings on factor 3. Factor loadings for these variables were -.403 and -.546 respectively. Extent of LD services loaded minimally on this factor. Initial Work Habits (IWH), an assumed student attributes variable, had the highest loading of all the variables on factor 3, at the level of .630.

Nine of the eleven variables loaded on the factors consistent with their classification. The two variables that did not, IWH and ES, were eliminated from the classifications of student attributes and school programming features respectively from further data analysis.
Table 2

**CORRELATION MATRIX of Variables Used in Predicting Outcomes**

<table>
<thead>
<tr>
<th></th>
<th>PO</th>
<th>AFD</th>
<th>RD</th>
<th>IWH</th>
<th>SES</th>
<th>PI</th>
<th>AT</th>
<th>ES</th>
<th>DS</th>
<th>IEPWH</th>
</tr>
</thead>
<tbody>
<tr>
<td>VC</td>
<td>.38*</td>
<td>.35*</td>
<td>.32*</td>
<td>-.14</td>
<td>-.20</td>
<td>.31*</td>
<td>.09</td>
<td>-.38*</td>
<td>-.22*</td>
<td>.09</td>
</tr>
<tr>
<td>PO</td>
<td>.31*</td>
<td>.38*</td>
<td>.03</td>
<td>-.10</td>
<td>.11</td>
<td>.03</td>
<td>-.24*</td>
<td>.17</td>
<td>.20</td>
<td></td>
</tr>
<tr>
<td>AFD</td>
<td>.24*</td>
<td>.10</td>
<td>.12</td>
<td>.25*</td>
<td>-.03</td>
<td>-.28*</td>
<td>-.15</td>
<td>.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RD</td>
<td>.15</td>
<td>-.02</td>
<td>.08</td>
<td>-.06</td>
<td>-.06</td>
<td>-.13</td>
<td>.01</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IWH</td>
<td>.07</td>
<td>.21</td>
<td>.15</td>
<td>.01</td>
<td>-.18</td>
<td>.45</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SES</td>
<td>-.20</td>
<td>-.10</td>
<td>.25*</td>
<td>-.13</td>
<td>.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.32*</td>
<td>-.18</td>
<td>-.24*</td>
<td>.07</td>
<td></td>
</tr>
<tr>
<td>AT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-.15</td>
<td>-.07</td>
<td>.08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.11</td>
<td>.04</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.17</td>
</tr>
</tbody>
</table>

**Sample Size=125**

**Note.** *=p>.01

VC=Verbal Comprehension. PO=Perceptual Organization.
Table 3

Oblique Factor Pattern for the Eleven Elements of the Model

<table>
<thead>
<tr>
<th>Variable</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal Comprehension</td>
<td>.525</td>
<td>.306</td>
<td>-.104</td>
</tr>
<tr>
<td>Perceptual Organization</td>
<td>.611</td>
<td>-.005</td>
<td>-.190</td>
</tr>
<tr>
<td>Abbreviated FD</td>
<td>.576</td>
<td>-.064</td>
<td>.166</td>
</tr>
<tr>
<td>Reading Discrepancy</td>
<td>.578</td>
<td>-.176</td>
<td>.108</td>
</tr>
<tr>
<td>Initial Work Habits *</td>
<td>.035</td>
<td>-.044</td>
<td>.630</td>
</tr>
<tr>
<td>Socio-Economic Status</td>
<td>.137</td>
<td>-.536</td>
<td>.199</td>
</tr>
<tr>
<td>Parent Involvement</td>
<td>.085</td>
<td>.479</td>
<td>.234</td>
</tr>
<tr>
<td>School Attendance</td>
<td>-.170</td>
<td>.445</td>
<td>.130</td>
</tr>
<tr>
<td>Extent of LD Services *</td>
<td>-.228</td>
<td>-.393</td>
<td>.043</td>
</tr>
<tr>
<td>Duration of LD Services</td>
<td>-.125</td>
<td>-.056</td>
<td>.403</td>
</tr>
<tr>
<td>IEP Focus on Work Habits</td>
<td>.139</td>
<td>-.035</td>
<td>-.546</td>
</tr>
<tr>
<td>Factor 1</td>
<td></td>
<td>.416</td>
<td>.033</td>
</tr>
<tr>
<td>Factor 2</td>
<td></td>
<td></td>
<td>.148</td>
</tr>
</tbody>
</table>

* denotes variables which did not have their highest loadings on the anticipated factor.
Comparison of AFD with FD

It was anticipated that an Abbreviated Freedom from Distractibility (AFD) factor score could be substituted as a measure of Kaufman's (1975) Freedom from Distractibility (FD) factor. The FD factor, as computed by the method recommended by Kaufman (1975), is obtained by summing the scale scores of the three WISC-R subtests of arithmetic, digit span, and coding. The AFD factor score used in this research was computed using only the arithmetic and coding subtest scale scores given under normal administration considerations of the WISC-R in obtaining a full scale IQ score. It was necessary to use an abbreviated version since results from the digit span subtest needed to compute the FD score were only available for 64 of the 125 students in this sample. Digit Span is an optional subtest on the WISC-R and was not consistently administered in the two school districts in which the sample was drawn. A paired t test, comparing mean AFD scores with mean FD scores for the 64 students given all three subtests was computed. The obtained difference score for comparison of the AFD and FD was 3.38 which was significant at the .01 level. Since the null hypotheses was not substantiated, AFD and FD were not considered equivalent measures. While AFD was not equivalent to FD, the two measures were highly correlated (r=.874). AFD score was retained as a processing score due to the high
correlation with FD and the fact that the information contained in AFD represents 2 of the 10 subtests composing measured intelligence for this sample of LD students. Because of this, it was determined that AFD included information that might influence a model predicting reading comprehension achievement scores or school work habits ratings. In addition, it loaded on the same factor as did the other elements representing the class of student attributes.

Regression Analysis for Reading Comprehension

The next phase involved predicting reading comprehension and work habits outcome measures through a series of multiple regression analyses. Each of the three classes of variables was added to the equation in a successive fashion. Student attributes was the first class of elements within the model to be analyzed. Table 4 identifies the class of student attributes as they predicted SLD student reading comprehension scores. The sum of squares values, R-squared values, F values, and probability levels are presented.

Twenty-two percent of the variance in reading comprehension scores is explained by the student attributes class of variables. Verbal Comprehension accounted for most of the variance, 17%, when considered as the first variable in the regression analysis.
Perceptual Organization scores and Abbreviated Freedom from Distractibility scores placed in the second and third positions in the model contributed little in explaining variation in reading comprehension scores. Reading Discrepancy was the fourth variable considered. It contributed significantly to the model, accounting for 4% of the variance.

The model was extended with the addition of the family influence variables. Student attribute variables were added in the same order as previously stated. The family influences of Parent Involvement, School Attendance, and Socio-Economic Status, followed in that sequence. Table 5 lists the results of that analysis.

By adding three variables from the family influences class to the student attributes, the amount of variance explained by the equation increased to 23.5%. The primary contributors were Verbal Comprehension, accounting for 17% of the reading comprehension score variance, Reading Discrepancy accounting for 4%, and Socio-economic Status accounting for 1.2% These variables were considered in the first, fourth, and seventh positions in the equation. An F test for change in $R^2$ (Norusis, 1985) was conducted to determine if the improvement when adding family influences to student attributes was significant. The improvement was found not to be significant at the .05 level.
The third regression analysis considered the same sequence of variables as before with the addition of the two school programming features of IEP Focus on Work Habits and Duration of LD Services respectively. Results of this regression analysis are depicted in Table 6.

The student attributes, family variables, and school programming features equation accounted for 24.1% of the variance in reading comprehension scores. From the student attributes class, Verbal Comprehension scores accounted for much of the variance in reading comprehension, 17.3%. Reading Discrepancy continued to be a significant contributor from that class as well, adding another 4% to the explanation of reading comprehension performance. No variable in the family variables classification contributed significantly. However, Socio-Economic Status did account for 1.2% of the variance. In the class of school programming features no variable significantly accounted for the variation in reading comprehension scores. The model with all three classes of variables continued to be significant at the .01 level. An F-test for change in $R^2$ was computed to determine if adding school programming features significantly improved reading comprehension score predictions over predictions made when only student attributes and family influences were considered. The improvement was not statistically significant.
In considering each class of variables as they were entered into the model, adding family variables to student attributes contributed little to enhancement of the model. The improvement of the student attributes and family influences over the student attributes equation was non-significant. The model's ability to predict reading comprehension scores improved another .6% when school programming features were added to the student attributes and family influences. Again this was a non-significant improvement.

Regression Analysis for Work Habits Rankings

Similar regression analyses were conducted with the three classes of variables as they explained the variance in ratings of LD student work habits. Each class of variables was analyzed as it was successively added to the model. An analysis of student attributes predicting Work Habits scores is presented in Table 7.

The class of student attributes when predicting work habits ratings accounted for only 4.5% of the variation, a non-significant level. Of this amount the Verbal Comprehension score was responsible for more than one half of the variation. Reading Discrepancy accounted for another 1.5% of the total variation explained by the
Table 4

**Student Attributes Predicting Reading Comprehension**

<table>
<thead>
<tr>
<th>Source</th>
<th>Df</th>
<th>Sum of Sq.</th>
<th>R-Sq.</th>
<th>F Value</th>
<th>PR&gt;F</th>
</tr>
</thead>
<tbody>
<tr>
<td>RC=f(VC PO AFD RD)</td>
<td>4</td>
<td>6852.77</td>
<td>0.221</td>
<td>8.52</td>
<td>.001***</td>
</tr>
<tr>
<td>VC</td>
<td>1</td>
<td>5362.98</td>
<td>0.173</td>
<td>26.68</td>
<td>.001***</td>
</tr>
<tr>
<td>PO</td>
<td>1</td>
<td>215.58</td>
<td>0.007</td>
<td>1.07</td>
<td>.303</td>
</tr>
<tr>
<td>AFD</td>
<td>1</td>
<td>6.36</td>
<td>0.000</td>
<td>0.03</td>
<td>.860</td>
</tr>
<tr>
<td>RD</td>
<td>1</td>
<td>1267.85</td>
<td>0.041</td>
<td>6.31</td>
<td>.013*</td>
</tr>
</tbody>
</table>

**Note.**  *p<.05  **p<.01  ***p<.001

RC=Reading Comprehension.  VC=Verbal Comprehension

PO=Perceptual Organization.  AFD=Abbreviated Freedom from Distractibility.  RD=Reading Discrepancy.
Table 5

**Student Attributes and Family Influences Predicting Reading Comprehension Scores**

<table>
<thead>
<tr>
<th>Source</th>
<th>Df</th>
<th>Sum of Sq.</th>
<th>R-Sq.</th>
<th>F Value</th>
<th>PR&gt;F</th>
</tr>
</thead>
<tbody>
<tr>
<td>RC=f(VC PO AFD RD PI AT SES)</td>
<td>7</td>
<td>7285.36</td>
<td>.235</td>
<td>5.14</td>
<td>.001***</td>
</tr>
<tr>
<td>VC</td>
<td>1</td>
<td>5362.98</td>
<td>.173</td>
<td>26.48</td>
<td>.001***</td>
</tr>
<tr>
<td>PO</td>
<td>1</td>
<td>215.57</td>
<td>.007</td>
<td>1.06</td>
<td>.304</td>
</tr>
<tr>
<td>AFD</td>
<td>1</td>
<td>6.36</td>
<td>.000</td>
<td>.03</td>
<td>.860</td>
</tr>
<tr>
<td>RD</td>
<td>1</td>
<td>1267.85</td>
<td>.041</td>
<td>6.26</td>
<td>.014*</td>
</tr>
<tr>
<td>PI</td>
<td>1</td>
<td>8.52</td>
<td>.000</td>
<td>.04</td>
<td>.838</td>
</tr>
<tr>
<td>AT</td>
<td>1</td>
<td>54.31</td>
<td>.002</td>
<td>.27</td>
<td>.606</td>
</tr>
<tr>
<td>SES</td>
<td>1</td>
<td>369.76</td>
<td>.012</td>
<td>1.83</td>
<td>.179</td>
</tr>
</tbody>
</table>

**Note.**  *p<.05  **p<.01  ***p<.001

RC=Reading Comprehension. VC=Verbal Comprehension.
PO=Perceptual Organization  AFD=Abbreviated Freedom from Distractibility. RD=Reading Discrepancy. PI=Parent Involvement. AT=School Attendance. SES=Socio-Economic Status.
Table 6

Student, Family, and School Variables Predicting Reading Comprehension Scores

<table>
<thead>
<tr>
<th>Source</th>
<th>Df</th>
<th>Sum of Sq.</th>
<th>R-Sq.</th>
<th>F Value</th>
<th>PR&gt;F</th>
</tr>
</thead>
<tbody>
<tr>
<td>RC=f(VC PO AFD RD PI AT SES IEPWH DS)</td>
<td>9</td>
<td>7471.08</td>
<td>.241</td>
<td>6.27</td>
<td>.001***</td>
</tr>
<tr>
<td>VC</td>
<td>1</td>
<td>5362.98</td>
<td>.173</td>
<td>29.68</td>
<td>.001***</td>
</tr>
<tr>
<td>PO</td>
<td>1</td>
<td>215.58</td>
<td>.007</td>
<td>1.05</td>
<td>.306</td>
</tr>
<tr>
<td>AFD</td>
<td>1</td>
<td>6.36</td>
<td>.000</td>
<td>.03</td>
<td>.860</td>
</tr>
<tr>
<td>RD</td>
<td>1</td>
<td>1267.85</td>
<td>.041</td>
<td>6.20</td>
<td>.014*</td>
</tr>
<tr>
<td>PI</td>
<td>1</td>
<td>8.52</td>
<td>.000</td>
<td>.04</td>
<td>.838</td>
</tr>
<tr>
<td>AT</td>
<td>1</td>
<td>54.31</td>
<td>.002</td>
<td>.27</td>
<td>.607</td>
</tr>
<tr>
<td>SES</td>
<td>1</td>
<td>369.76</td>
<td>.012</td>
<td>1.81</td>
<td>.181</td>
</tr>
<tr>
<td>IEPWH</td>
<td>1</td>
<td>180.47</td>
<td>.006</td>
<td>.88</td>
<td>.349</td>
</tr>
<tr>
<td>DS</td>
<td>1</td>
<td>5.24</td>
<td>.001</td>
<td>.03</td>
<td>.873</td>
</tr>
</tbody>
</table>

Note. *p<.05  **p<.01  ***p<.001  VC=Verbal Comprehension. PO=Perceptual Organization. AFD=Abbreviated Freedom from Distractibility. RD=Reading Discrepancy. PI=Parent Involvement. AT=School Attendance. SES=Socio-Economic Status. IEPWH=IEP Focus on Work Habits. DS=Duration of LD Services.
Neither of these variables individually was significant in accounting for the variance in work habits ratings.

When student attributes and family variables are entered into the equation, the addition contributed only another 1% in explaining the variance in work habits ratings. Of the three family variables Parent Involvement contributed the most at .6%. Neither the equation nor any variable accounted for a sufficient amount of the variance in work habits ratings to reach a level of significance. Results are listed in Table 8.

School programming features were then added to the model. The sequence of variables entered into the regression equation remained the same with the addition of the school programming features of IEP Focus on Work Habits and Duration of LD Services. Results are reported in Table 9.

With the inclusion of school programming features in the model the amount of variance explained by the model increased to 19.1%, an increase of more than 13%, and achieved a significance level of .01. Much of this increase was attributed to the inclusion of IEP Focus on Work Habits in the model. IEPWH accounted for 13.7% of the variance in Work Habits ratings and was significant
# Table 7

**Student Attributes Predicting Work Habits Ratings**

<table>
<thead>
<tr>
<th>Source</th>
<th>Df</th>
<th>Sum of Sq.</th>
<th>R-Sq.</th>
<th>F Value</th>
<th>PR&gt;F</th>
</tr>
</thead>
<tbody>
<tr>
<td>WH=f(VC PO AFD RD)</td>
<td>4</td>
<td>140.06</td>
<td>.045</td>
<td>1.28</td>
<td>.282</td>
</tr>
<tr>
<td>VC</td>
<td>1</td>
<td>73.436</td>
<td>.023</td>
<td>2.69</td>
<td>.104</td>
</tr>
<tr>
<td>PO</td>
<td>1</td>
<td>18.921</td>
<td>.006</td>
<td>.69</td>
<td>.407</td>
</tr>
<tr>
<td>AFD</td>
<td>1</td>
<td>.456</td>
<td>.000</td>
<td>.02</td>
<td>.898</td>
</tr>
<tr>
<td>RD</td>
<td>1</td>
<td>47.247</td>
<td>.015</td>
<td>1.73</td>
<td>.191</td>
</tr>
</tbody>
</table>

**Note.** WH=Work Habits. VC=Verbal Comprehension, PO=Perceptual Organization. AFD=Abbreviated Freedom from Distractibility. RD=Reading Discrepancy.
### Table 8

**Student Attributes and Family Influences Predicting Work Habits Ratings**

<table>
<thead>
<tr>
<th>Source</th>
<th>Df</th>
<th>Sum of Sq.</th>
<th>R-Sq.</th>
<th>F Value</th>
<th>PR&gt;F</th>
</tr>
</thead>
<tbody>
<tr>
<td>WH=f(VC PO AFD RD)</td>
<td>7</td>
<td>173.67</td>
<td>.055</td>
<td>.89</td>
<td>.514</td>
</tr>
<tr>
<td>PI AT SES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VC</td>
<td>1</td>
<td>73.436</td>
<td>.023</td>
<td>2.64</td>
<td>.107</td>
</tr>
<tr>
<td>PO</td>
<td>1</td>
<td>18.921</td>
<td>.006</td>
<td>.68</td>
<td>.410</td>
</tr>
<tr>
<td>AFD</td>
<td>1</td>
<td>.006</td>
<td>.000</td>
<td>.00</td>
<td>.988</td>
</tr>
<tr>
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<td>1</td>
<td>47.695</td>
<td>.015</td>
<td>1.72</td>
<td>.193</td>
</tr>
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<td>1</td>
<td>19.524</td>
<td>.006</td>
<td>.70</td>
<td>.403</td>
</tr>
<tr>
<td>AT</td>
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<td>7.626</td>
<td>.002</td>
<td>.27</td>
<td>.601</td>
</tr>
<tr>
<td>SES</td>
<td>1</td>
<td>6.461</td>
<td>.002</td>
<td>.23</td>
<td>.631</td>
</tr>
</tbody>
</table>

*Note.* WH=Work Habits. VC=Verbal Comprehension. PO=Perceptual Organization. AFD=Abbreviated Freedom from Distractibility. RD=Reading Discrepancy. PI=Parent Involvement. AT=School Attendance. SES=Socio-Economic Status.
beyond the .001 level. Duration of LD Services was a non-significant contributor.

Only when school programming features were added to the model did the model account for a significant amount of variance in the final work habits rating form. When the variable classes of student attributes and family influences were the sole members in the regression equation 5.5% of the variance was explained. This increased to 19.1% with the inclusion of school programming features. An F test indicated that school programming features was a statistically significant ($p < .01$) improvement over the model in which only student attributes and family influences were entered.

**Discriminant Function Analysis for Reading Groups**

The final analysis procedure consisted of identifying discriminant functions for group membership selection on the basis of first reading comprehension scores and second work habits ratings. Significant functions within the model are reported as well as the percent assignment to the correct group.

Students were ranked on the basis of their normal curve equivalent (NCE) scores and divided into four groups. Group 1 had NCE scores ranging from 1 to 10, Group 2 had scores ranging from 11 to 20, Group 3 had
scores from 21 to 30, and Group 4 had scores from 31 to 99. All 124 cases were included in the analysis.

Direct discriminant function analysis was performed using the nine variables from the classes of student attributes, family influences and school programming features in the model. Those elements were, Verbal Comprehension (VC), Perceptual Organization (PO), Abbreviated Freedom from Distractibility (AFD), Reading Discrepancy (RD), Parent Involvement (PI), School Attendance (AT), Socio-Economic Status (SES), IEP Focus on Work Habits (IEPWH), and Duration of LD Services (DS). The model correctly assigned 51.6% of the cases to the correct group. The model made good predictions with three of the four groups. Chance assignment for the four group classification of the dependent variable is 25% (Klecka, 1983). Fifty-eight percent of the cases were correctly assigned to the low achieving group (Group 1), 64.2% of the cases were correctly assigned to the moderately low achieving group (Group 2) while 59.4% of the cases were correctly assigned to the high achieving group (Group 4). Assignment to the moderately high achieving group (Group 3) was correct in only 27.3% of the cases respectively.

The model was then applied to a subset of the sample for purposes of testing the goodness of fit. A model tends to fit the sample from which it was derived better
Table 9

**Student, Family, and School Variables Predicting Work Habits Ratings**

<table>
<thead>
<tr>
<th>Source</th>
<th>Df</th>
<th>Sum of Sq.</th>
<th>R-Sq.</th>
<th>F Value</th>
<th>PR&gt;F</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHB=f(VC PO AFD RD)</td>
<td>9</td>
<td>618.891</td>
<td>.197</td>
<td>2.86</td>
<td>.005**</td>
</tr>
<tr>
<td>PI AT SES IEPWH DS)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VC</td>
<td>1</td>
<td>73.436</td>
<td>.023</td>
<td>3.05</td>
<td>.084</td>
</tr>
<tr>
<td>PO</td>
<td>1</td>
<td>18.921</td>
<td>.006</td>
<td>.79</td>
<td>.377</td>
</tr>
<tr>
<td>AFD</td>
<td>1</td>
<td>.006</td>
<td>.000</td>
<td>.00</td>
<td>.987</td>
</tr>
<tr>
<td>RD</td>
<td>1</td>
<td>47.695</td>
<td>.015</td>
<td>1.98</td>
<td>.162</td>
</tr>
<tr>
<td>PI</td>
<td>1</td>
<td>19.524</td>
<td>.006</td>
<td>.81</td>
<td>.369</td>
</tr>
<tr>
<td>AT</td>
<td>1</td>
<td>7.626</td>
<td>.002</td>
<td>.32</td>
<td>.575</td>
</tr>
<tr>
<td>SES</td>
<td>1</td>
<td>6.461</td>
<td>.002</td>
<td>.27</td>
<td>.605</td>
</tr>
<tr>
<td>IEPWH</td>
<td>1</td>
<td>428.524</td>
<td>.137</td>
<td>17.82</td>
<td>.001***</td>
</tr>
<tr>
<td>DS</td>
<td>1</td>
<td>.291</td>
<td>.000</td>
<td>.01</td>
<td>.913</td>
</tr>
</tbody>
</table>

**Note.** *p<.05  **p<.01  ***p<.001 VC=Verbal Comprehension. PO=Perceptual Organization. AFD=Abbreviated Freedom from Distractibility. RD=Reading Discrepancy. PI=Parent Involvement. AT=School Attendance. SES=Socio-Economic Status. IEPWH=IEP Focus on Work Habits. DS=Duration of LD Services.
than another sample from the same population (Norusis, 1985). All 86 students from one school district were used in this analysis of a subset of the sample. The model correctly assigned 48.4% of the cases in the subset. This continued to be an improvement over chance expectations.

Three discriminant functions were calculated on the data from the entire sample. Only the first discriminant function reached a level of significance ($P < .05$). This function accounted for 65.7% of the variance of the between group variability. This function separated both the extreme groups of high reading achievers (Group 4) from the low achievers (Group 1) and the extreme groups from the two moderately achieving groups (Groups 2 & 3). Table 10 presents the standardized canonical coefficients for the nine elements of the model. The strongest coefficients were associated with Verbal Comprehension (VC), Socio-Economic Status, Perceptual Organization (PO), and Parent Involvement (PI). The lowest achieving group had the lowest scores in Verbal Comprehension and Perceptual Organization, had the least amount of Parent Involvement, and was the second lowest group on the SES index. Conversely, the highest achieving group had the highest VC and PO scores, the most Parent Involvement, and had the highest rated SES status.
Discriminant Function Analysis for Work Habits Groups

Another discriminant function analysis was conducted using final work habits ratings as the grouping variable. LD students were again divided into four groups. Group 1 had ratings between 1 and 10, Group 2 had ratings between 11 and 14, Group 3 had ratings between 15 and 18, and Group 4 had ratings between 19 and 24. Of the 124 cases, 9 were dropped due to missing work habits rating scores. Direct discriminant function analysis was performed using the nine variables from the classes of student attributes, family influences and school programming features in the model. Those elements were, VC, PO, AFD, RD, PI, AT, SES, IEPWH, and DS. The model assigned 56.1% of the cases to the correct group. This was an improvement over the 25% chance group assignment. The model made good assignments for Groups 1, 2, and 4. Seventy-nine percent of the cases were correctly assigned to the lowest rated group (Group 1). Fifty-five percent of the cases were correctly assigned to the moderately low rated group (Group 2). 51.7% of the cases were correctly assigned to the highest rated group (Group 4). It was a poor discriminator for the moderately high rated work group (Group 3).

Again the model was used with the same subset of the sample to better estimate the goodness of fit of the model to the population. Due to missing data, the sample subset contained 79 cases. The model correctly classified
64.6% of the cases in the subset of the sample. Over eighty percent of the cases were correctly assigned to the lowest rated work habits group. Again this continued to be an improvement over chance expectations.

Three discriminant functions were calculated from the data from the complete sample. The first discriminant function was significant at the .01 level and the second discriminant function was significant at the .05 level. The third function was not a significant contributor to group assignment. The first discriminant function accounted for 51.43% of the variance of the between group variability. This function separated the lowest rated group in work habits (Group 1) from the other groups. The discriminant function included Parent Involvement (PI), Duration of LD Services (DS), and School Attendance (AT). The second discriminant function accounted for 34.2% of the variance of between group variability. It consisted of the variables IEP Focus on Work Habits (IEPWH), Abbreviated Freedom from Distractibility (AFD), and Perceptual Organization (PO). This function separated the highest rated work habits group (Group 4) from the others. Table 11 lists the standardized canonical coefficients for these variables.
Table 10
Standardized Canonical Coefficients in Predicting Reading Groups

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>VC</td>
<td>.806</td>
<td>.315</td>
<td>-.351</td>
</tr>
<tr>
<td>PO</td>
<td>.222</td>
<td>-.337</td>
<td>.263</td>
</tr>
<tr>
<td>AFD</td>
<td>.051</td>
<td>-.691</td>
<td>-.043</td>
</tr>
<tr>
<td>RD</td>
<td>-.545</td>
<td>-.002</td>
<td>.068</td>
</tr>
<tr>
<td>PI</td>
<td>.157</td>
<td>.068</td>
<td>.249</td>
</tr>
<tr>
<td>AT</td>
<td>-.018</td>
<td>-.006</td>
<td>-.519</td>
</tr>
<tr>
<td>SES</td>
<td>-.244</td>
<td>.361</td>
<td>.161</td>
</tr>
<tr>
<td>IEPWH</td>
<td>.232</td>
<td>.605</td>
<td>.462</td>
</tr>
<tr>
<td>DS</td>
<td>.118</td>
<td>-.272</td>
<td>-.398</td>
</tr>
<tr>
<td>Canonical R</td>
<td>.449</td>
<td>.296</td>
<td>.184</td>
</tr>
<tr>
<td>Eigenvalue</td>
<td>.252</td>
<td>.096</td>
<td>.035</td>
</tr>
</tbody>
</table>

Note. VC=Verbal Comprehension. PO=Perceptual Organization. AFD=Abbreviated Freedom from Distractibility. RD=Reading Discrepancy. PI=Parent Involvement. AT=School Attendance. SES=Socio-Economic Status. IEPWH=IEP Focus on Work Habits. DS=Duration of LD Services.
Table 11

**Standardized Canonical Coefficients in Predicting Work Habits Ratings**

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>VC</td>
<td>.106</td>
<td>-.441</td>
<td>-.722</td>
</tr>
<tr>
<td>PO</td>
<td>-.301</td>
<td>.474</td>
<td>-.267</td>
</tr>
<tr>
<td>AFD</td>
<td>.063</td>
<td>.423</td>
<td>.513</td>
</tr>
<tr>
<td>RD</td>
<td>.083</td>
<td>-.185</td>
<td>-.051</td>
</tr>
<tr>
<td>PI</td>
<td>.428</td>
<td>-.064</td>
<td>.572</td>
</tr>
<tr>
<td>AT</td>
<td>.096</td>
<td>.249</td>
<td>.043</td>
</tr>
<tr>
<td>SES</td>
<td>-.025</td>
<td>-.105</td>
<td>-.467</td>
</tr>
<tr>
<td>IEPWH</td>
<td>-.638</td>
<td>.679</td>
<td>.025</td>
</tr>
<tr>
<td>DS</td>
<td>-.421</td>
<td>-.633</td>
<td>.391</td>
</tr>
<tr>
<td>Canonical R</td>
<td>.489</td>
<td>.416</td>
<td>.285</td>
</tr>
<tr>
<td>Eigenvalue</td>
<td>.315</td>
<td>.210</td>
<td>.089</td>
</tr>
</tbody>
</table>

**Note.** VC=Verbal Comprehension. PO=Perceptual Organization. AFD=Abbreviated Freedom from Distractibility. RD=Reading Discrepancy. PI=Parent Involvement. AT=School Attendance. SES=Socio-Economic Status. IEPWH=IEP Focus on Work Habits. DS=Duration of LD Services.
The purpose of this research effort was to determine if a model consisting of student attributes, family influences, and school programming features would be a better predictor of LD student outcomes than a model consisting of student attributes alone. While this multidimensional model did not significantly improve upon explanations of reading comprehension performance by student attributes alone, the model demonstrated an advantage in explaining LD student work habit rating outcomes. In addition, elements of family influences were found to be important in discriminating between groups of high and low readers and groups of high and low rated students in work habits, while a school programming feature discriminated between groups of students based on work habits ratings.

Correlations and Factor Loadings of Variables

Several of the variables used in this study had significant intercorrelations. Many of these relationships were anticipated. The strong negative association between Initial Work Habits (IWH) ratings and
IEP Focus on Work Habits (IEPWH) was as expected. The higher a student was rated on IWH the less likely the student was to have objectives written in his or her IEP focusing on work habits (IEPWH). The negative relationship between Extent of LD Service (ES) and Verbal Comprehension (VC) also made intuitive sense. VC is viewed as a factor measuring verbal knowledge and comprehension and reflects the application of verbal skills (Kaufman, 1975). Therefore, the lower a student is rated in this ability, the more likely the student will be seen as academically disabled and the more likely the student had received more extensive services (ES) from LD program each week. The correlations between Verbal Comprehension (VC), Perceptual Organization (PO), Abbreviated Freedom from Distractibility (AFD), and Reading Discrepancy (RD) are consistent with the expectation that measures of intelligence and intelligence related measures (RD) would be interrelated. Sattler (1982) pointed out that the median intercorrelation between WISC-R subtests is .40. VC, PO, AFD, and RD contain various components of the WISC-R. The VC factor consists of four of the verbal subtests of the WISC-R, the PO factor scores represents four of the non-verbal subtests, and AFD is the sum of the other subtests generally used in computing a full scale IQ score that are not represented in the VC or PO factor score. Reading
Discrepancy (RD) reflected a ratio of the student's full scale IQ score on and his or her reading comprehension achievement score on one of three individually administered measures. Other relationships significant at the .01 level were Parent Involvement (PI) with Verbal Comprehension (VC) and PI with School Attendance (AT). VC, obtained in part through formal education and reflecting the application of verbal skills (Sattler, 1982) is consistent with a view that parent involvement with the school program (PI) might foster the acquisition of those verbal skills. The relationship between PI and AT also makes sense. A student who attends school regularly would be more likely to have a parent who becomes involved in their son's or daughter's educational program by attending parent-teacher conferences and assisting their child with homework.

It was anticipated that the eleven elements used in a model to predict LD student outcomes would consist of three distinct classes or factors. Student attributes, indices of abilities within the student, were expected to load on one factor. Four of the five student attributes did so. The one that did not, Initial Work Habits (IWH), most likely represented a student ability construct much different from general intellectual ability. The other four proposed student attribute elements not only were elements within the student, but also shared an
association with general intelligence. The three elements expected to reflect the external factor of family environment did so by having high factor scores on the second factor. None of the other elements of the model loaded on this factor. The third factor was more ambiguous in its interpretation. The three school programming features, IEP Focus on Work Habits (IEPWH), Duration of LD Services (DS), and Extent of LD Services (ES), reflect external aspects and were anticipated to load on the third factor. Two of them did so, IEPWH and DS. However, another element perceived to be a student attribute, IWH, had the highest loading of any of the elements on the third factor. An alternative explanation could be to view this third factor as a behavioral work habits factor. IWH and IEPWH are evident in this interpretation. DS might well reflect a length of stay in the program that is dependent upon the student's displayed pattern of work habits. The poorer the work habits, the earlier the student might have been identified as LD and the longer the student might need to be served in the LD program.

Comparability of FD and AFD

For the LD students in this sample only sixty-four students had been given the three WISC-R subtests of Arithmetic, Digit Span, and Coding needed to compute
Kaufman's (1975) Freedom from Distractibility score (FD). An Abbreviated Freedom from Distractibility score was computed using the two WISC-R subtest scores of Arithmetic and Coding that existed for all 125 LD students selected for this sample. When the AFD and FD scores were compared for the subset having all three scores they were found not to be equivalent measures. This posed an interpretive problem. The intention was to represent FD as a processing style in the model predicting LD outcomes. It was anticipated that FD, which shares similarities with the sequential processing style discussed in Kaufman and Kaufman (1983), would be a reasonable predictor of reading comprehension scores and work habits ratings. To remain free from distraction would appear to be an important ability for success on both of these outcome measures. Since AFD was not equivalent to FD, it was not possible to draw any such conclusions. AFD did not reach a level of significance in contributing to the general linear regression model, but did contribute to one of the discriminant functions for work habits ratings. Had FD been used, a stronger contribution might have been made to the model. Since AFD and FD were not found to be equivalent measures the practice of averaging arithmetic and coding subtests and interpreting that score as Freedom from Distractibility appears questionable.
The Regression Model Predicting Reading

An aim of this study was to determine the ability of the proposed model, representing three classes of variables, to predict reading comprehension scores. When student attributes were used alone to predict reading comprehension scores 22.1% of the score variance was explained. This equation was significant at the .001 level. When the class of family influences, was incorporated into the model the amount of variance explained by the model increased by 1.4%. While the addition of the family influences class of variables did not significantly improve the model's ability to predict reading comprehension scores, the variable SES (p=.179) became a weak predictor in the model. Family influences might play a role in predicting reading achievement in LD students, but the influence of the class of variables might be masked to some degree by the fact that Verbal Comprehension (VC) had a moderate (.306) loading on the same factor in which the three family variables had their highest loadings. Since VC was the first element in the model it might have accounted for some of the variance shared with the family influence variables. The model would also benefit from the use of more specific measures of family processes.

With the addition of school programming features the model accounted for 24.1% of the variance in reading
comprehension scores. This was an improvement, but a non-significant one. These results do not support the conclusion that a model using a diverse set of variables which consider environmental factors in both the home and school program, as well as student attributes, does a better job of predicting reading comprehension outcomes than student attributes alone. A student's verbal abilities and past reading achievement might well be the best predictors of current reading levels. However, an ecological perspective in looking at LD student learning should not be discontinued, based upon the results of this study. The indices selected for use in this study to reflect family influences and school programming features might need to be modified to better assess these variables. The SES index divided students into three classes, two of which represented low income levels. A more differentiated index might have increased the contribution of this factor. As Garber (1988) points out, SES is a summary variable that potentially represents several specific processes. Use of indices which measure one or more of these specific process might well increase the power of the set of family variables which influence learning. Or, a more detailed index of parent involvement might also increase the contribution of family influences in predicting reading scores. The parent involvement index had no indication of parental achievement
expectations, what kinds of assistance they were providing, or whether they allocated financial resources to seek after school professional tutoring.

Taking a within class view, of interest is the student attribute Reading Discrepancy (RD). RD made a unique contribution in explaining reading comprehension scores. This occurred after the variation explained by the three processing abilities had been partialed out from the regression equation. While the reliance on ability-achievement discrepancy formulas for LD identification has been a topic of much professional debate, these findings suggest that Reading Discrepancy scores have utility in the prediction of reading outcomes for LD students. They might also have value in predicting reading outcomes for other "at risk" groups such as those students served in federal Chapter I programs for the disadvantaged.

In the class of family influences SES is a weak predictor ($p=.181$) of reading comprehension scores even when it is the seventh element of the equation. SES, which designates two low status groupings from the rest of the population, continues to contribute to the equation after the more direct measures of family influences, Parent Involvement and School Attendance, have been partialled out. As Garber (1988) suggests, family processes should be more closely scrutinized to determine specific processes within the family that are being
represented by the summary variable of SES. What other processes are taking place in addition to the parent's willingness to participate in school conferences and their support in seeing that the their child attends school regularly that are contributing to the student's school outcomes?

Regression Model Predicting Work Habit Ratings

Comments by Horn et al. (1983) and Bickel and Bickel (1986) suggest that personnel looking at student outcomes need to consider measures in addition to standardized achievement test scores. This study attempted to do so by applying the model to a student work habits rating completed by the LD teacher. Student attributes were considered first in the model. As a class of variables they only accounted for 4.5% of the variance in work habits ratings, a non-significant amount. Interestingly, the model had two individual variables that approached significance. They were VC ($p=.104$) and RD ($p=.191$). These are the same two variables that significantly contributed to the model when predicting reading comprehension scores. When the class of family influence variables was added to the model, the model's accounting of variance only increased by 1%. Again, the model was a non-significant predictor of work habits. By adding school programming features to the model that included
student attributes and family influences, the model then accounted for 19.1% of the variance in work habits ratings and became a significant predictor (p=.005). Within this model the variable that best predicted work habits ratings was the IEP Focus on Work Habits, a not too surprising result. Verbal Comprehension and Reading Discrepancy continued to be weak predictors of work habits rating. Within the context of the model, the LD student's verbal abilities and discrepancy between ability and achievement might be related in some way to how a student is perceived to demonstrate work habits during the course of a school year. Possibly, the student is perceived to have poor work habits when in fact marginal verbal abilities and significant discrepancies between ability and achievement might be a contributor to that rating. Unexpectedly, Abbreviated Freedom from Distractibility contributed minimally to the model. It was anticipated that a distractibility index would make a unique contribution in explaining the variation in work habits ratings. Gage (1969) and Newborg (1971) found distractible behavior to be associated with neurologically handicapped students who earned poor grades in school. Successful daily performance in class would seem to require both the academic skills needed to do the work and the work habits necessary to perform that work on a regular basis.
Discriminant Function Analysis for Reading Groups

Discriminant function analysis was used for two purposes. It gave an indication of the model's ability to discriminate between groups of students based upon reading scores. It also identified those variables within the model that best separated various reading groups from each other. As a model, using the entire sample, the three classes of variables correctly assigned 51.6% of the students to the appropriate group. Results indicated that one discriminant function separated the extreme groups from each other and the extreme groups from the moderately achieving groups. These predictors were Verbal Comprehension (VC), Perceptual Organization (PO), Socio-Economic Status (SES) and Parent Involvement (PI). The two processing scores, VC and PO, contributed to the classification. Carroll’s model (1963) stating that both specific verbal abilities and general aptitudes are necessary for school learning are supported by this function. The highest achieving LD students also had the highest PO scores. It also generally supported the conclusion of Clark and Frisbee (1980) that for successful reading comprehension performance an interplay of processes was necessary as opposed to a reliance on one particular process.
Another interesting finding is that Parent Involvement (PI) and Socio-Economic Status were part of the function discriminating high achieving from low achieving LD groups. The highest achieving groups had the highest level of PI. While PI did not appear as a significant predictor in accounting for the variation in reading scores it was part of the function that best separated these LD students into groups based on their reading performance. This suggests some implications for LD program personnel in terms of looking at ways of promoting greater parent involvement as a possible means to raise the reading comprehension levels of their low achieving students. Additionally, the highest rated reading group had an SES index score that indicated the lowest level of participation in the federal free and reduced lunch programs. The two low reading groups had the highest level of subsidized lunch program participation. Having a learning disability and being economically disadvantaged appears to be a significant deterrent to academic success. The contributions of the family influence variables of PI and SES in reading group assignment is supportive of the findings of Bodner-Johnson (1986), Gage (1969), and Newborg (1971) that factors associated with the family are related to the level of academic success experienced by handicapped students.
Discriminant Function Analysis for Work Habits

Using discriminant function analysis to predict group assignment based upon work habits ratings, the model correctly assigned 56.1% of the students to the correct group. Two discriminant functions were significant. The first discriminant function separated the lowest rated group from the others. This function consisted of Parent Involvement, Duration of Services, and School Attendance. The second discriminant function separated the highest rated work habits group from the others. It consisted of IEP Focus on Work Habits (IEPWH), Abbreviated Freedom from Distractibility and Perceptual Organization. The highest rated students had the least number of objectives specifying work habits on their IEP. These results have some potential implications for program operation. As with predicting reading group assignment, limited parent involvement is associated with the lowest reading achieving group and the lowest rated LD student in work habits. Facilitating greater parent involvement with the lowest achieving and the lowest rated students might be a way to improve student outcomes for these groups. A second issue has to do with the IEP Focus on Work Habits. The low work habits ratings are consistent with a deficit approach in writing IEPs. When a student is viewed as having poor work habits more objectives are written on the IEP reflecting that deficit. Even though the objectives
are drawn from the two most recent IEPs, the group of students are not reflecting high work habits ratings. In other words, the IEP work habit objectives may not be met. Either poor work habits are an enduring student characteristic not amenable to intervention, IEP objectives only list the problems but do not indicate a program focus, or a more concerted effort needs to be made to improve work habits.

**Further Research**

Additional applications of this model need to be tried. As Cohen and Cohen (1975) and Norusis (1985) indicate a model using multiple regression analysis tends to maximize the $R^2$ value when it is used on the sample for which it was developed. The same model needs to be utilized on a different sample to determine if the predictive or discriminating value of the model remains significant for the LD population. Additionally, the study only identified variables that are potential predictors of selected LD student outcomes. They do not reflect cause and effect. Therefore additional analysis needs to be done before program changes are made based on the results of this study.

In terms of model refinement other indices of student attributes should be considered. Ability components as indicated by measures of intelligence, assume a narrow
focus. Student attributes differing from intelligence might substantially enhance prediction. This is also true with the other classes of variables. Indices were developed on the basis of available information since most program administrators are not afforded the luxury of additional data collection beyond current practices within their respective school systems. However, other ways of viewing the instructional process might be more helpful in predicting achievement outcomes than the general indices used in this study. Specifically, teacher observations can be conducted and lesson plans reviewed to identify actual instructional features occurring within that classroom environment which impact on student learning.

Taking a developmental perspective, the model should be applied to various age groups to determine if selected variables are of greater influence on student outcomes at certain ages than at others. Family influences such as parent involvement might well have a significant impact on student outcomes at the younger ages, but a more subtle influence as the student matures. School work habits might also show a developmental trend which impacts upon LD student classroom performance. Disorganization and attention deficits might be tolerated to a greater degree by primary grade teachers, but become a major inhibitor of learning in the upper grades when the older student is expected to assume more responsibility for learning.
Finally, additional indices of student outcomes should be considered for future research purposes. A great diversity exists in student outcomes. While academic performance and school work habits are important, such factors as self-concept, daily classroom performance, and levels of participation in school activities also contribute to the student's and the school's perception of success. These outcomes for the LD student should be explored.

Conclusions

The findings of this research support the conclusion that a model consisting of variables from the classes of student attributes, family influences, and school programming features can discriminate between groups of successful and non-successful LD students. Success was viewed in terms of both reading comprehension achievement outcomes and school work habits ratings. The model was less adequate in accounting for the variation in reading achievement and school work habits ratings for the entire LD sample. It is anticipated that further refinement of the measures used to represent the three classifications can enhance the model's ability to account for the variation in LD student school outcomes measures.
Appendix A

School Work Habits Rating Sheet

Directions for the Teacher
Check the appropriate box under each heading to rate the student's school work habits during the 1987-1988 school year.

Student: _________________________________________________

School Building: _________________________________ Grade: ____

<table>
<thead>
<tr>
<th></th>
<th>Very</th>
<th>Good</th>
<th>Ave.</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Listens and follows directions.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Completes assignments on time.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Uses materials carefully.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Works carefully and neatly.</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Parent Involvement

1. Parent(s) assisted the student with his/her school work.
   ___ a great deal   ___ some
   ___ little        ___ none

2. Parent(s) came in for 1 or more parent/teacher conferences during the school year (Not counting the annual IEP conference).
   ___ yes           ___ no
## Annual Income Eligibility Scale for Free/Reduced-Price Meals

Effective for the 1987-1988 School Year

<table>
<thead>
<tr>
<th>Household Size</th>
<th>Income Eligibility Scale, Free Meals</th>
<th>Income Eligibility Scale, Reduced Meals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$7,150.00</td>
<td>$10,175.00</td>
</tr>
<tr>
<td>2</td>
<td>$9,620.00</td>
<td>$13,690.00</td>
</tr>
<tr>
<td>3</td>
<td>$12,090.00</td>
<td>$17,205.00</td>
</tr>
<tr>
<td>4</td>
<td>$14,560.00</td>
<td>$20,720.00</td>
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<tr>
<td>5</td>
<td>$17,030.00</td>
<td>$24,235.00</td>
</tr>
<tr>
<td>6</td>
<td>$19,500.00</td>
<td>$27,750.00</td>
</tr>
<tr>
<td>7</td>
<td>$21,970.00</td>
<td>$31,265.00</td>
</tr>
<tr>
<td>8</td>
<td>$24,440.00</td>
<td>$34,780.00</td>
</tr>
</tbody>
</table>

Each Additional Household Member +$2,470.00 +$3,515.00
Bibliography


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