Identification of learning disabled students using a severe discrepancy model
by Charles Frederick Hideman

A thesis submitted in partial fullment of the requirements for the degree of Doctor of Education
Montana State University

Abstract:
The area of concern in this study was to determine if the Child Study Team approach for identification of learning disabled students was independent of that identification process which utilized the Ohio Severe Discrepancy Model formula.

In order to look at the concern in greater depth, data were collected and analyzed as part of this study: 1. to determine if the number of students classified as learning disabled or those referred for a perceived learning disability but not so classified using the Ohio Severe Discrepancy Model formula was independent of the number of similar students using the Child Study Team approach alone, 2. to determine if gender or size classification of a school district from which students were classified as learning disabled or referred for a perceived learning disability but not so classified using the Ohio Severe Discrepancy Model formula was independent of the number of similar students using the Child Study Team approach alone, and 3. to determine if the gender of students classified as learning disabled and those referred for a perceived learning disability but not so classified was independent of the size classification of the school district.

The Ohio Severe Discrepancy Model formula was applied to ability and achievement test data collected from student record custodians for Montana public school students, 276 who were identified as learning disabled students and 110 who were referred for a perceived learning disability in Montana but were not classified.

Specifically, the results of this study led the investigator to conclude the following: 1. the deviation of two between achievement and ability appeared to eliminate far too many students from further consideration as learning disabled.

2. Class III School Districts, the smallest of the State districts, seemed more likely to classify referred students as learning disabled, and 3. the gender of the student did not seem to affect the outcome of the consideration for classification as learning disabled.

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by

Charles Frederick Hideman

A thesis submitted in partial fullment
of the requirements for the degree

of

Doctor of Education

MONTANA STATE UNIVERSITY
Bozeman, Montana

June 1985

APPROVAL

of a thesis submitted by

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This thesis has been read by each member of the thesis committee and has been found to be satisfactory regarding content, English usage, format, citation, bibliographic style, and consistency, and is ready for submission to the College of Graduate Studies.

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Date July 18, 1985

ACKNOWLEDGMENTS

I would like to express my gratitude to Dr. Leroy Casagranda who provided me with a meaningful experience and gave so willingly of his time and expertise; to Dr. Donald Robson, Dr. Gerald Sullivan, Dr. Fred Abel and Dr. Henry Worrest for their assistance and encouragement in helping me to develop this thesis; to my friends and colleagues who gave me so much positive support, assistance and the little push just when I needed it; to the personnel in the Office of Public Instruction, Gail Gray, Dr. Kenneth Card, Robert Runkel and their staff for their assistance, support, and advice during this project; to the cooperative and special education directors and their staffs who took the time to provide the data for the study; and finally, to my family for the patience they showed during this past year.

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ABSTRACT

The area of concern in this study was to determine if the Child Study Team approach for identification of learning disabled students was independent of that identification process which utilized the Ohio Severe Discrepancy Model formula.

In order to look at the concern in greater depth, data were collected and analyzed as part of this study:

1. to determine if the number of students classified as learning disabled or those referred for a perceived learning disability but not so classified using the Ohio Severe Discrepancy Model formula was independent of the number of similar students using the Child Study Team approach alone,

2. to determine if gender or size classification of a school district from which students were classified as learning disabled or referred for a perceived learning disability but not so classified using the Ohio Severe Discrepancy Model formula was independent of the number of similar students using the Child Study Team approach alone, and

3. to determine if the gender of students classified as learning disabled and those referred for a perceived learning disability but not so classified was independent of the size classification of the school district.

The Ohio Severe Discrepancy Model formula was applied to ability and achievement test data collected from student record custodians for Montana public school students, 276 who were identified as learning disabled students and 110 who were referred for a perceived learning disability in Montana but were not classified.

Specifically, the results of this study led the investigator to conclude the following:

1. the deviation of two between achievement and ability appeared to eliminate far too many students from further consideration as learning disabled.

2. Class III School Districts, the smallest of the State districts, seemed more likely to classify referred students as learning disabled, and

3. the gender of the student did not seem to affect the outcome of the consideration for classification as learning disabled.

CHAPTER 1

INTRODUCTION

According to Plisko (1983), enrollment has declined significantly in elementary and secondary schools in recent years. In the ten years, 1971 to 1981, public school populations declined from 46.1 million students to 40.2 million, which represented a decrease of 5.9 million or 13 percent. The enrollment decline in Montana during the same period was 14 percent. Tyler (1982) stated that elementary enrollments will continue to decline for the next few years, then increase again as the children of parents who made up the "Baby Boom" of the 1950s reach school age.

Ysseldyke and others (1983) discussed the fact that the number of special education students has grown at an accelerating rate. They reported that in one study figures were calculated for three years with the following results: four to five percent of the total population of students were referred and evaluated for some sort of special assistance. Three percent of those students were placed in special education programs. Wide variations were noted in the data supplied with some districts reporting an incidence as high as 21 percent of their student population being placed. Results such as these pointed out the need for close examination and evaluation of current special education growth rates.

One group of students whose special needs have received attention in recent years is the physically and mentally handicapped. A 1980 United States Office of Civil Rights survey reported in *The Condition of Education: A Statistical Report* that eight percent of the children enrolled in public elementary and secondary schools were classified as handicapped. Variations among states in the proportion of students reported as handicapped range from 14 percent in Delaware to three percent in the District of Columbia. This variation

may have been due in large measure to differences in diagnostic and classification procedures (Plisko, Ed., 1983).

Further evidence presented by Algozzine and others (1983) indicates that some four million handicapped children, ages three through twenty-one, received special education and related services under the combined programs of P.L. 89-313, Federal Assistance to State Operated and Supported Schools for the Handicapped of 1965 and P.L. 94-142, The Education of All Handicapped Children Act of 1975, during the 1979-1980 school year. Based upon this figure, special education and related services were being provided to more than nine and one-half percent of all school children. The number of youngsters under P.L. 94-142 alone was nearly four million. The report also stated that in 1979-1980 the largest percentage of these children between the ages of three and twenty-one were being served in learning disability programs and represented 32 percent of the total special education population in the United States.

Significance of the Problem

Educators have observed that certain students failed to profit from regular instructional practices. This lack of success has been attributed to specific sensory, motor, physical, cognitive, or emotional deficits within the student, and it has been presumed that the students needed a program of special assistance. For decades, educators have attempted to classify students primarily to determine their eligibility for special education assistance. Educators were charged with the task of selecting, from among the large number of students experiencing academic and behavioral difficulties in America's schools, those who should receive this special education. It was decided that the way to determine precisely the kind of special education needed was to sort the students into groups on the basis of common characteristics. Relatively elaborate classification systems were established and

those systems have been modified only slightly over the years (Ysseldyke, Algozzine, and Epps, 1983).

Extended levels of service provided for the handicapped by recent federal and state legislation have been established at great financial cost. Vasa and Wendel (1982) note that according to the National School Boards Association, local school district budgets increased twice as fast for special education as for regular instruction (about 14 percent yearly). Moreover, nationally the ratio of the cost of education for the handicapped to the overall cost of education was around two to one.

According to Algozzine and others (1983), special education is big business. The increase in numbers of students identified have been accompanied by increases in the amount of money spent in educating exceptional children. Public policy with regard to handicapped students has created a growing alternative educational system. Over four million students (nine and one-half percent of the school population) received special education in federally supported programs during the 1979-1980 school year at a cost to the federal government approaching one billion dollars. This cost represented about 12 percent of the average per-pupil expenditure for each handicapped child served.

In Montana, state and federal funds made available to educate handicapped students decreased from $2,732 per pupil in 1978-1979 to $1,898 in 1982-1983. In contrast, the average pupil expenditures for all students during this same time increased from approximately $2,000 to $2,700 per student. Considering inflationary factors, increases in fixed costs, and declining enrollments, most districts were faced with a financial dilemma with regard to funding special education (Hynes and Holmquist, 1984).

Table 1 illustrates the steady increase in the numbers of children identified as learning disabled in the State of Montana.

Lester Mann and others, as reported by Kirk (1983), claimed that practitioners have paid little attention to the numerous definitions of learning disabled. Instead, they have

Table 1. Montana Student Enrollment and Learning Disability Populations.

School Year	Enrollment	Learning Disabled	Percent
1978-1979	164,326	4847	2.95
1979-1980	158,208	5145	3.25
1980-1981	155,073	5900	3.80
1981-1982	153,435	6434	4.19
1982-1983	152,401	7113	4.67
1983-1984	153,646	7335	4.77

(Superintendent of Public Instruction, 1984).

identified many of these children simply because they did not perform at grade level. Many of these youngsters were slow learners, culturally or linguistically disadvantaged, or had inappropriate instruction.

According to Ysseldyke and others (1983), the development of a system for making decisions about the eligibility of children for participation in special education programs is a problem with which our nation must certainly be concerned. In a manner similar to the national experience, Montana has also experienced difficulties with regard to the identification of learning disabled students. According to Beck (1984), one of the major issues confronting both regular and special education is the inconsistency in diagnosing the learning disabled student. Montana's Northwest Council of Administrators of Special Education recently identified this issue as a major concern; they noted the fact that many students may not be truly learning disabled, but are placed in resource rooms because of pressures due to low achievement in regular classrooms (Tintinger, 1984). The Federal Regulations for evaluating specific learning disabilities have not provided a clear definition of the means by which special education students throughout the nation should be identified. Schools have experienced difficulties in developing definitive evaluation criteria (Card, 1984).

Schools in Montana have typically employed the Child Study Team process for identifying learning disabled students. The process involves a group of people, including parents, as well as other professionals they may suggest, special educators, and other professionals

who are charged with the responsibility of gathering all pertinent data regarding the child, who determine if a handicap exists. In addition, it is their purpose to determine the educational needs of the student and the options to best deliver services. The procedure that each team utilizes to gain information relating to a child will vary depending on the needs of that student, the organization of the agency or agencies providing the educational services, and the unique situations related to resource availability to school districts (Superintendent of Public Instruction, 1983).

While a specific procedure for determining the existence of a severe discrepancy between ability and achievement has not been specified at either the federal or state levels, methods for making this determination have varied widely across Montana. The use of a discrepancy formula as a part of the classification process is an attempt to remedy the inconsistencies among school districts in determining learning disability services eligibility by providing a concrete and universal method for deciding if a severe discrepancy between intellectual ability and achievement exists (Superintendent of Public Instruction, 1984).

Statement of the Problem

The problem addressed in this study was to determine if the number of students classified as learning disabled using the traditional methods employed by the Child Stury Team to interpret achievement and ability test data was independent of the number of students classified as learning disabled by applying the Ohio Severe Discrepancy Model formula to the same data with a discrepancy score of two being the determining qualifying factor. Similar information was obtained and presented for students who were referred for learning disability testing, but because of a decision by the Child Study Team were not so classified.

Questions

The following questions were answered in this study:

1. Was the number of classified learning disabled students who had a severe discrepancy, when the Ohio Severe Discrepancy Model formula was applied, independent of the number of students classified as learning disabled using the Child Study Team approach alone?

2. In Class I, Class II, and Class III School Districts was the number of classified learning disabled students who had a severe discrepancy, when the Ohio Severe Discrepancy Model formula was applied, independent of the number of those classified as learning disabled using the Child Study Team approach alone?

3. Was the number of students referred for a perceived learning disability but not classified using the Child Study Team approach alone independent of those with a severe discrepancy when the Ohio Severe Discrepancy Model formula was applied?

4. Based on gender, was the number of students classified as learning disabled with a severe discrepancy, when the Ohio Severe Discrepancy Model formula was applied, indedendent of those classified as learning disabled using the Child Study Team approach alone?

5. In Class I, Class II, and Class III School Districts was the number of students referred for a perceived learning disability who did not have a severe discrepancy, when the Ohio Severe Discrepancy Model formula was applied, independent of those not classified using the Child Study Team approach alone?

6. Based on gender, was the number of students referred for a perceived learning disability who did not have a severe discrepancy, when the Ohio Severe Discrepancy Model formula was applied, independent of those not classified using the Child Study Team approach alone?

7. Was the gender of students classified as learning disabled independent of those not classified as learning disabled based upon the size classification of the school district?

General Procedures

The student sample for this study was drawn from a population which included all public school students categorized as learning disabled during the 1983-1984 school year in the State of Montana and students who were referred and tested during the same year but were not classified. The student samples came from a random sample of school districts within the three Montana school classifications, I, II, and III. Cochran's formula for finite populations, displayed in Figure 1, was used to determine the exact number to be sampled from each group. When appropriate information is calculated with the formula, its solution assured a 95 percent confidence that the sampling error was 5 percent or less. A Table of Random Numbers was used to select the sample.

$$N = \frac{\frac{t^2 PQ}{d^2}}{1 + \frac{1}{Np}\left(\frac{t^2 PQ}{d^2} - 1\right)}$$

Where t = confidence level

PQ = proportion of the population

d = error

Np = population size

N = sample size (Cochran, 1977).

Figure 1. Cochran formula for determining sample size of finite populations.

Ability and achievement test scores were requested for students from sampled school districts and that test data was applied to the Ohio Severe Discrepancy Model formula. A discrepancy of two between the ability and achievement test score deviations was the

determining qualifying factor as to whether or not a student would be classified as learning disabled. Ohio's formula, as described in the *Ohio Rules for the Education of Handicapped Children,* suggested that a discrepancy score of +2.00 between the two z or deviation scores was indicative of a severe discrepancy (Superintendent of Public Instruction, 1984).

In order to determine the independence of the number of students identified as learning disabled from the method of classification, the Chi Square Test of Independence at the .05 level of significance was used.

Limitations

1. Montana allows a variety of procedures to be employed in the identification of learning disabled. Specific tests and methods of determining discrepancies between achievement and ability are not specified by the State. Traditionally, the Child Study Team has made the final classification recommendation based on a variety of considerations.

2. The results of this study pointed out the differences in numbers which might have existed in classifying learning disabled children with and without the Ohio Severe Discrepancy Model formula being applied to their test data.

Delimitations

1. The study was limited to Montana students classified as learning disabled or referred for such testing during 1983-1984 and therefore, inferences can only be made in states with similar geographic and population characteristics.

2. The Ohio Severe Discrepancy Model formula was applied in this investigation.

3. Only students formally referred for learning disability evaluation had their test data applied to the Ohio Severe Discrepancy Model to confirm nonplacement.

4. The population consisted of all Montana Public School students in kindergarten through twelfth grade during the 1983-1984 school year who were classified as learning disabled and those students who were referred for testing because of a perceived learning disability but were not so classified.

5. School districts were randomly selected from within each of the three Montana school district classifications.

Definitions

1. Child Study Team—Child evaluation related to a process which involved a group of persons including the parents, as well as other professionals they may suggest, special educators, and other professionals who were charged with the responsibility of gathering and analyzing all the pertinent data possible regarding an individual child. The objective was to determine if the child was handicapped, what the child's educational needs were, and what options might be best utilized to deliver educational services to the child (Superintendent of Public Instruction, 1983).

2. Ohio Severe Discrepancy Model—The formula for determining a severe discrepancy between student achievement and ability test scores as used in the State of Ohio for purposes of identifying and classifying learning disabled students (Superintendent of Public Instruction, 1984).

The following formula was used when computing the discrepancy score. Figure 2 illustrates the mathematical derivation of the discrepancy score for a specific set of test data.

3. P.L. 89-313—A law enacted to provide funding to school districts through a state agency directly responsible for providing, on a non-school district basis, free public education for handicapped children for programs and projects (including the acquisition of

$$\frac{\text{IQ Score} - \text{Mean of IQ Test}}{\text{Standard Deviation of IQ Test}} = \text{IQ Deviation Score}$$

$$\frac{\text{Achievement Score} - \text{Mean of Achievement Test}}{\text{Standard Deviation of Achievement Test}} = \text{Achievement Deviation Score}$$

$$\text{IQ Deviation Score} - \text{Achievement Deviation Score} = \text{Discrepancy Score}$$

(Telzrow and Williams, 1982)

1. $\frac{98 - 100}{15} = -.13$ (I.Q. Deviation Score)

2. $\frac{36 - 50}{10} = -1.4$ (Achievement Deviation Score)

3. $(-.13) - (-1.4) = +1.27$ (Discrepancy Score)

(Telzrow and Williams, 1982).

Figure 2. Mathematical derivation of a discrepancy score for WISC-R obtained score of 98 and Woodcock Reading Score of 36.

equipment, and where necessary, the construction of facilities) which were designated to meet special education needs of such children (United States Statutes at Large, 1966).

4. P.L. 94-142—The Education for All Handicapped Children Act. Within the law, learning disabled children were defined as:

> those children who have a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which disorder may manifest itself in imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations. Such disorders include perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia (Federal Register, 1976:52404).

5. Resource Room—Special classes for students in which a special education teacher is available to provide direct instruction to handicapped students who may not spend more than one-half time in this type of instruction. These students were concurrently enrolled in the school's regular education program (Superintendent of Public Instruction, 1983).

6. Scatter Analysis—An analysis of the degree of relationship between two variables as shown on a scatter diagram (Ferguson, 1981).

7. School Classification System based on community population:

   a. First class – 6500 or more;

   b. Second class – 1000 to 6499;

   c. Third class – less than 1000.

(Superintendent of Public Instruction, 1983).

8. Severe Discrepancy—A severe discrepancy was indicated when a difference of two or more points between a student's ability level and achievement level as defined by scores on a variety of achievement and ability assessment instruments resulted from the solution of the severe discrepancy formula (Buescher, Ed., 1980).

9. Special Education—Specially designed instruction to meet the unique needs of a handicapped child (Superintendent of Public Instruction, 1983).

10. Specific Learning Disability—As defined in P.L. 94-142

> 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 do mathematical calculations. It includes, but is not limited to 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, mental retardation, or environmental, cultural, or economic disadvantages (Federal Register, 1976:52404).

11. Stratified Random Sample—A sample drawn from a group in which the numbers of members within the various groups were known (Ferguson, 1981).

Summary

Even though the population of schools in the United States has declined during the past few years, the number of special education children increased and continues to do so. One of the reasons for this increase appears to be the inconsistency which exists in the

methods of classifying children with special needs. Montana is no exception to this nationwide trend for it too has experienced an increase in the percentage of special education students from nearly three percent to almost five percent, while the overall student population during a six year period ending in 1984 declined by nearly six percent, or 10,680 students, according to the Montana Office of Public Instruction. The resulting financial burden became excessive.

Attempts were made to bring into line and make more consistent the classification process of learning disabled. One such attempt has been made in the State of Ohio. The use of a severe discrepancy formula for determining the discrepancy between ability and achievement has been applied in an effort to bring consistency to the classification process. It was this formula which this investigator used to determine if the numbers of children in Montana who were classified as learning disabled using the formula as opposed to those so identified using the Child Study Team approach with no discrepancy formula were independent.

The investigator sampled the entire population of learning disabled children from within the three classifications of school districts in the State. In order to determine the difference in the Ohio method of classification as opposed to the Child Study Team approach alone, test data was requested and applied to the formula for those youngsters who were referred because of a perceived learning disability, but for some reason were not classified as learning disabled. The independence between the numbers of students classified and the methods used formed the basis of this investigation. The Chi Square Test of Independence was used to analyze the data in order to determine the independence among the variables studied.

The first procedure in this study was to conduct a thorough review of the literature and research related to the history of learning disabilities, the characteristics that were

apparent in the learning disability population, and the procedures, past and present, used for the identification and assessment of learning disabled. This is found in Chapter 2.

CHAPTER 2

REVIEW OF THE LITERATURE

From the earliest times there have been instances in which individuals had problems writing or reading with the ease with which friends accomplished those same tasks. Numerous attempts were made to classify learning disabled and to identify the causes of these difficulties. Many of these trials have been discarded as unworkable or inaccurate, while others have remained to be used and refined in the task of classification of learning disabled so those identified may be given special programs of assistance in order to help them become functioning members of society (Grossman, 1978).

The presentation of the literature review will cover three general areas relating to the study of learning disabilities: (1) history, (2) characteristics of learning disabled, and (3) procedures used for identification and classification of youngsters who exhibit the characteristics of learning disabled.

History of Learning Disabilities

The term learning disability is relatively new, but the condition in youngsters and adults is not. More than a hundred years ago neurologists were concerned with disorders of language and reading in adults who had lost their ability to read or speak as a result of brain injury acquired during war, accident, or disease. In children, where no known neurological difficulty was present, the terminology, disability in writing, speaking, arithmetic, or oral language had been substituted for the earlier medical terms, although dyslexia was also used especially to describe certain children (Kirk, 1981).

Grossman (1978) indicated that there were three basic periods in the history of defining learning disabilities; medical, academic, and federal involvement. The first of these began in the early 1960s and continued until the middle of that decade. During that time the problem was discussed mostly in medical circles and as a result, definitions were expressed in anatomical language. Before the term learning disabilities became popular, the label of choice was usually "minimal brain dysfunction" or "minimal brain injury." Minimal brain dysfunction was used to describe the child whose functioning was not quite that of his peers, but was still clearly above that of the retarded young person. The implications of brain involvement according to Hallahan and Bryan (1981) were found among several labels used to refer to learning disabled children. A major evolutionary development in the field of learning disabilities was the shift in attitude toward the causal status of neurological factors. This neurological orientation was due largely to the fact that the early theoretical and practical precursors to the field of learning disabilities were contained within the literature on presumably brain injured mentally retarded children. It appears that one of the first definitions of learning disability appeared in a 1962 textbook entitled *Educating Exceptional Children*. Kirk stated:

> A learning disability refers to a retardation disorder, or delayed development in one or more of the processes of speech, language, reading, spelling, writing, or arithmetic resulting from possible cerebral dysfunction and/or emotional or behavioral disturbance and not from mental retardation, sensory deprivation, or cultural or instructional factors (Kirk, 1962:263).

According to Hallahan and Bryan (1981) the first definition from a cosponsored task force was developed by the National Society for Crippled Children and Adults and the National Institute of Neurological Diseases and Stroke of the National Institute of Health in 1966. That organization indicated that the term "minimal brain dysfunction syndrome" referred to children with average or above average general intelligence with certain learning or behavioral disabilities ranging from mild to severe, which were associated with deviations of function of the central nervous system. These deviations manifested themselves

through various combinations of impairment in perceptions, conceptualization, language, memory, and control of attention, impulse, or motor function. The difference between this definition and learning disabled defined in P.L. 94-142 was apparent in one major area. The latter deemphasized the etiological role of neurological factors and emphasized the role of academic behaviors. While the 1966 definition labeled the condition "minimal brain dysfunction", the P.L. 94-142 definition simply included it as one of several labels used to refer to children falling into the category of learning disabled (Hallahan and Bryan, 1981).

During the latter half of the 1960s, a second group looked at these children from the perspective of the classroom. Their descriptions came from the terminology of the educator. They proposed to measure the disability now defined as the difference between a child's potential and actual performance. According to Kirk (1981), learning disabled were not mentioned in federal law. In spite of the omission, grants were made available in 1964 to colleges and universities to further educate teachers of learning disabled children. These grants were authorized under the caption in the federal law, "crippled or other health impaired required special education." Under this category learning disabled was included for both research and training purposes by the federal government. Any impetus for state legislation was due primarily to local parent associations in various states.

Grossman (1978) indicated that the third phase came about toward the end of the 1960s and dated to 1969 when legislation was enacted which placed upon the federal government the responsibility of assuring no child was deprived of an educational opportunity because of a handicap. The speculation as to what percentage of the school-age population might be learning disabled was translated into a budgetary problem for school administrators. It was also about this time that earlier certainties about cause and remediation began to dissipate, because neither remedial nor educational models had been able to demonstrate a clear superiority.

Grossman (1978) discussed the definition problem when he stated that because of the inability to clearly define and remediate the government stepped in to discharge its duty. The definition of learning disability was reworked until, for all practical purposes, it became "that disability which is manifest among some percentage of the population" (Grossman, 1978:122). When defined this way, the only remaining question, where should the line have been drawn to separate normal children from the learning disabled, became the percent for whom the government had to make financial provision, and those from whom it was freed of that responsibility (Grossman, 1978)?

It was in 1963 that Congress passed Public Law 88-164, which established the Division of Handicapped Children in the United States Office of Education. The definition of handicapped in use at that time included "mentally retarded, hard-of-hearing, deaf, speech impaired, visually handicapped, seriously emotionally disturbed, crippled, or other health impaired, who by reasons thereof, require special education" (Kirk, 1981:8). For nearly two decades, educators and committees of professionals had been trying to operationalize the definitions of learning disabilities within the three general classes of definitions which had or would be proposed: (1) ability/achievement discrepancies, (2) academic achievement deficits, and (3) scatter analysis (Ysseldyke, Algozzine, and Epps, 1983). Because of a fear that to include learning disabled in the 1963 law might divert attention from other classifications, Senators Wayne Morse of Oregon and Ralph Yarborough of Texas introduced an independent bill, that was enacted by Congress, titled The Learning Disabilities Act of 1969. That act provided federal funds for research and personnel preparation and created a national awareness of the problem which eventually caused each state to authorize programs for learning disabled children in the schools (Kirk, 1981).

In 1968, The National Committee for Handicapped Children, a citizens' group required by law, surveyed the existing situation and reported that: (1) seven states had enacted special legislation providing programs for learning disabled children; (2) it was

estimated that between one and three percent of school age children had severe problems in this area; and (3) learning disabilities could be defined as follows:

> Children with special learning disabilities exhibit a disorder in one or more of the basic psychological processes involved in understanding or using spoken or written languages. These may be manifested in disorders of listening, thinking, talking, reading, writing, spelling, or arithmetic. They include conditions which have been referred to as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, developmental aphasia, and so forth. They do not include learning problems which are due primarily to visual, hearing or motor handicaps, to mental retardation, emotional disturbance or to environmental disadvantage (Kirk, 1981:9).

It was this definition which served as the basis of the 1969 Learning Disabilities Act and which, with minor revision, became the definition of learning disabled in P.L. 94-142.

Special education educators generally agreed that there was little concensus as to what conditions could or could not be considered a specific learning disability for the following reasons:

1. It was not possible to identify all the components of each specific learning disability. The only accepted manifestation was a discrepancy between expected achievement and ability.

2. There was no hard research data collected on a large enough sample to state with certainty what the common characteristics of learning disabled were.

3. There were several theories about the causes of learning disabilities.

4. There seemed to be no generally accepted diagnostic instruments which could be used alone with all learning disabled children.

5. There were several theories about why or how learning disabled children learned.

None of them were universally accepted. However, as Mykelbust (1983) stated, it was not difficult to distinguish learning disabilities from other handicaps, even though there were many differences of opinion regarding the definition. Few who had studied the extensive data available would deny or question the validity of this condition in children.

The Education for All Handicapped Children Act, Public Law 94-142, was enacted on November 29, 1975. Within the law, learning disabled children were defined as:

> those children who have a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which disorder may manifest itself in imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations. Such term includes such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. Such term does not include children who have learning problems which are primarily the result of visual, hearing, or motor handicaps, of mental retardation, or emotional disturbance, or environmental, cultural, or economic disadvantage (Federal Register, Nov. 29, 1976:52404).

Although the definition excluded several specific handicaps, the global concept of learning disabilities encompassed a number of specific disabilities. It covered a heterogeneous group of developmental learning delays or disabilities in children including language, thinking, attention, memory, discrimination, and spatial orientation, as well as language and academic subjects (Kirk, 1981). This definition deemphasized the etiological role of neurological factors and emphasized the role of academic behaviors (Hallahan and Bryan, 1981).

The original formula for an ability/achievement discrepancy, CA (IQ/300 + 0.17) - 2.5 = Severe Discrepancy Level, first appeared in 1976 in the "Education of Handicapped Children—Assistance to the States" Proposed Rulesmaking. This severe discrepancy was the level at or below which the child must have achieved in one or more of three areas listed in Public Law 94-142. A severe discrepancy between achievement and intellectual ability meant that achievement in one or more of the areas listed fell below 50 percent of the child's expected achievement level, when intellectual ability, age, and previous educational experiences were considered (Federal Register, Nov. 29, 1976). Simply stated, this formula conceptually redefined learning disability to mean "underachievement" (Senf, 1978).

As a result of public hearings, the following changes were made in the proposed regulations published on November 29, 1976: (1) the formula was deleted, and (2) the 50 percent figure for determining "severe discrepancy" was also deleted. These deletions were made based on concerns voiced during the hearings which centered around four general

areas: (1) the inappropriateness of trying to reduce behavior to numbers, (2) the psychometric and statistical inadequacy of the formula, (3) the fear that the use of the formula might lend itself to inappropriate use to the detriment of handicapped children, and (4) the inappropriateness of using a single formula for children of all ages, especially those of preschool age (Federal Register, Dec. 29, 1977).

For the purpose of this study the writer will use the learning disability definition above as contained in the Federal Register on November 29, 1976. This definition formed the basis for learning disability identification in the state of Montana (Superintendent of Public Instruction, December, 1983).

Characteristics of Learning Disabled

Learning disabilities could be classified under two broad categories. There were, according to Kirk (1983), developmentally and academically learning disabled. The developmental category included such characteristics as attention, memory, perception, perceptual-motor deficits, thinking, and language disorders. The academic disability centered around the subject areas of reading, math, spelling, and writing.

The criteria for determining a learning disability as set forth in the Federal Register (1977) stated that a child had a specific learning disability if: (1) he/she did not achieve commensurate with ability levels in one or more of the areas listed in the guidelines, when provided with learning experiences appropriate for the child's age and ability levels; and (2) the placement team found that the child had a severe discrepancy between achievement and intellectual ability in one or more of the areas of oral, listening, or written expression, basic reading skill, reading comprehension, mathematical calculations, or mathematical reasoning.

Kass and others (1982) discussed the fact that learning disabled children had common age-related deficits. For each of five age ranges, a developmental function was defined and

assumed to be the primary learning strategy for that age range. Under each developmental function, certain component deficits had been determined to be common in those with a specific learning disability.

> The five age-related functions were as follows: (1) Sensory Orientation, from birth to 18 months, is the physiological or functional readiness of the human to respond to the environment; (b) Memory, from 18 months to 7 years, is the accurate imitation of stimuli when those are no longer present; (c) Re-cognition, from 7 to 11 years, is the internalization of, and flexibility in, semantic and structural meanings; (d) Synthesis, from 11 to 14 years, is the habituation of previously learned responses; and (e) Communication, 14 years and older, is reception of another's meanings and expression of one's meanings to another (Kass and others, 1982:173).

Within these developmental areas Kass and others (1982) identified the following deficits: Memory Function: (a) deficit in controlling reactions to stimuli, (b) deficit in practicing input for later recall, and (c) deficit in retrieving sensory input immediately; Re-cognition Function: (a) deficit in noting differences within muscle sensations, (b) deficit in noting differences in the sense of touch, (c) deficit in recognizing wholes from sensation of the parts, and (d) deficit in analyzing context into important and unimportant parts; Synthesis Function; (a) deficit in gaining meaning from auditory stimuli, (b) deficit in organizing oneself in time, (c) deficit in noting and correcting errors, and (d) deficit in automatically associating information from more than one sensory system; Communication Function: (a) deficit in gaining meaning from the printed page, (b) deficit in dealing with quantitative concepts, and (c) deficit in communicating meaning through the written word. The sensory orientation function was purposely omitted by the researchers because of difficulties in locating identified youngsters of the age required to participate in the study.

Sabatino (1983) commented on the characteristics of learning disabled children and stated that learning disabilities were indistinguishable from academic underachievement and could be found in children who ranged from mentally retarded to gifted. Disabilities

such as these often existed as a primary condition as long as there were no diagnosable sensory or cultural-linguistic problems or behavioral disorders.

Identification and Assessment

According to Kirk (1981), it has been a difficult task to determine who is and who is not entitled to learning disability services. Some believed that any child who needed extra help was learning disabled. Some said that learning disability classes had become dumping grounds for all problem children. In order to prevent children from being inappropriately classified as learning disabled, Congress decreed in 1976:

> Children with specific learning disabilities may not constitute more than one-sixth of the children eligible to be counted as handicapped. A state may not count more than twelve percent of the number of children aged five through seventeen as handicapped. This means, at most, that only two percent of the children are specific learning disabled for allocation purposes (Federal Register, Nov. 29, 1976:52404).

Following this mandate by Congress, the U.S. Office of Education determined that the 1968 National Advisory Committee definition of learning disability be retained. It was to be left to the judgment of a multidisciplinary team to determine whether a child was eligible for learning disability services (Federal Register, 1979).

Swartz and others (1981) believed that even though a multidisciplinary staff approach employed an attractive group decision making process, it was probably better employed as a vehicle for planning student programs than as a method of identifying learning disabled children.

Placement team meetings were further analyzed by Ysseldyke and others (1982) relative to the kinds of data presented at such gatherings. The relationship between the final decisions and the amount of information presented was positive. There was a greater likelihood of disability identification at meetings in which more information was presented; however, little relationship existed between the type of information presented and the

applicability of a variety of current identification criteria. Eighty-three percent of the statements made were considered irrelevant. The data provided little evidence to suggest that teams used specific formal criteria when making eligibility decisions or that assessment results were used for purposes other than minimal professional credibility.

Kavale and Nye (1981) analyzed 307 research studies in order to determine the characteristics of learning disabled identification criteria. They were able to isolate four: (1) psychometric test data, (2) intact or established criteria—federal and state guidelines, (3) idiosyncratic—variety of identification variables, and (4) previous classifications.

Perlmutter and Parus (1983) reported on a Michigan study which included fourteen school districts. All the districts used standardized achievement tests and teacher referrals and communicated at some point with the child's parents. However, except for certain tests which enjoyed popularity, districts did not agree on how to identify specific learning disabilities. Differences were found in the number of tests given, the use of tests and subtests, the use of intelligence tests, the choice of testing instruments, and cutoff points for determining learning disabilities as well as the point at which the parent was consulted during the diagnostic process. While all refused to diagnose as learning disabled a student with a tested IQ below seventy, some were willing to classify students in the seventy to eighty-five range.

Ames (1977) pointed out five problems within the area of identification:

1. Children who were simply having problems in school were being classified as learning disabled.

2. Many children thought to be learning disabled were actually overplaced. They were struggling in a grade ahead of which their level of maturity suited them.

3. The third area included those children who were in the IQ range from eighty to ninety. They were too intelligent for classes for retarded children, but could not keep up in the classroom. They often ended up in learning disability classes.

4. The fourth group included the children who had modest academic ability, but uneven endowment. They had strong points, but never excelled in the total academic setting.

5. There were also those who had minor physical difficulties such as poor vision, allergies, or inadequate behavior chemistry. They could often be helped in physical ways. There had been attempts to define officially the term learning disability to exclude these causes of learning difficulty. However, it seemed possible that perhaps half of the children classified as learning disabled and taught and treated accordingly, actually suffered from one of these difficulties.

Elliott (1981) reported that there was increasing concern within the federal, state, and local agencies to develop more objective and quantifiable classification systems for learning disabled.

Epps and others (1982) reported on a study designed to assess learning disability classification efforts. In the study, eighteen judges with backgrounds in assessment, decision making, and learning disabilities, were asked to use an array of information to differentiate learning disabled from non learning disabled students. Each was given forms with information on forty-two test or subtest scores of fifty school identified learning disabled students and forty-nine unidentified. The judges were inaccurate in their classifications and in little agreement with each other. It also appeared that different judges emphasized different factors in making their decisions. The results suggested that, given current definitions of the condition called learning disability, there was considerable doubt that school personnel would be able to accurately and reliably identify such statements.

Another study conducted by Oskamp (1965) investigated whether or not psychologists' confidence in their own clinical decisions were justified. Thirty-two judges and eight clinical psychologists individually read background information about a published case, which was divided into four sections. After each section, the judge answered twenty-five

questions involving personality judgments. Accuracy did not increase significantly with increasing amounts of information, but confidence did steadily and significantly increase. However, as Oskamp stated, "increased feelings of confidence were not a sure sign of increasing predictive accuracy about a case" (Oskamp, 1965:263).

Danielson and Bauer (1978) posed several questions in looking at the possibility of using a discrepancy formula for the identification/classification process. The first dealt with effectiveness. Did the procedure identify what might have been taken as appropriate criteria? Did the procedure identify those children who were the most severely handicapped given that criteria? A second area concerned impact, which was defined as a measure of the consequences of the proposed procedure which were not directly related to the explicit goals of the procedure. Implementation was the third area of interest. Could the process be implemented? Was the formula and its interpretation simple?

According to McLarty (1982), conceptually, the identification procedure was clear: (1) measure the students' intellectual ability; (2) measure the students' achievement level; (3) calculate the difference between the students' ability and achievement; and (4) compare the difference to a standard representing "severity." With 1 and 2 it was necessary to consider the reliability and validity of instruments. The instruments most often used were the Weschler Intelligence Scale for Children—Revised (WISC-R) or the Stanford Binet to measure intelligence. The Wide Range Achievement Test (WRAT), or the Peabody Individual Achievement Test (PIAT) were often used to measure student achievement. The Woodcock-Johnson Psycho Educational Battery tended to be the most widely used of all the achievement tests. In step 3, one needed to consider what the effects of differences in tests might be. In the 4th step, the question became whether or not the standard should be norm based or criterion referenced tests. It was also necessary to consider how to minimize Types I and II errors.

McLarty (1982) found that the identification models tended to cluster into three general categories: absolute difference, expected achievement, and proportional difference.

With the absolute difference method, the relationship between ability and achievement measures tended to be ignored. Characteristics of each were considered, but separately. The years below grade level standard where no adjustment was made for ability did not discriminate between slow learners and learning disabled.

McLarty (1982) discussed the more sophisticated absolute difference model. It was the standard score method which used the standard or z score approach. Ability and achievement scores were converted to a standard scale. Adjustments were made for characteristics of each test score, but not for changes in the variation of achievement scores conditional on increased ability, so more high than low ability students could be expected to be identified.

Swartz and others (1981) investigated the Myklebust expectancy formula: (learning quotient) LQ = actual achievement level/expected achievement level, where actual achievement level was the grade level score for any achievement test or subtest and the expected achievement level was the average of chronological age, grade level, actual achievement level and mental age. The derived IQ or learning quotient was used as one basis for classifying learning disabled. Swartz discussed some of the reasons why this formula was inadequate. The LQ differed among grade levels and subject areas. An IQ of ninety was needed to use the formula. The inclusion of grade equivalent scores created a limitation to the validity of the LQ and variable criterion values and cut-off scores should have been used to guarantee fair selection.

McLarty (1982) reviewed and discussed a third identification model. She indicated that the proportional difference method considered the distribution of differences, rather than distribution of test scores. It focused on the variation (standard deviation) of the difference scores or on their error variation (standard error). In either case, the simplest

method compared the actual difference expressed on any convenient scale to a selected proportion of variations. It tended to identify students with unusually large differences between ability and achievement in comparison with the normative group.

Summary

A review of the current literature in the area of learning disabilities revealed the existence of a major problem relative to identification and classification of this population. The difficulty is not new; it has plagued educators since precisely identifying learning disabled became an issue in the schools and for the federal and state governments.

Inherent in this inconsistent and sometimes inaccurate identification process is the problem of overidentification. The expansion of programs to serve this group of handicapped people has caused a multitude of financial problems at the local, state, and national levels, not to mention the possible effect misidentification has on a youngster. No less a problem is the fact that in some cases these students are not being identified at all.

New and unique techniques for classifying learning disabled students are being continually introduced and presently used procedures are being refined. One of the processes which is gaining in popularity is the attempt to mathematically determine the discrepancy between ability and achievement. This mathematical process does respond to the federal guidelines concerning a deviation between ability and achievement and begins to bring needed objectivity to the process. Critics have addressed the issue of numerically categorizing people, but when this method is used on conjunction with other more subjective considerations it seems to have merit.

CHAPTER 3

PROCEDURES

The problem addressed in this study was to determine if the number of students classified as learning disabled using the traditional methods employed by the Child Study Team to interpret achievement and ability test data was independent of the number of students classified as learning disabled by applying the Ohio Severe Discrepancy Model to the same data with a discrepancy of two being the determining qualifying factor. Similar information was obtained and presented for students who were referred for learning disability testing, but because of a decision by the Child Stury Team were not so classified.

The procedures used to conduct the study are outlined under the following categories:

1. Population Description and Sampling Procedures
2. Data Collection Methods
3. Organization of the Data
4. Statistical Hypotheses
5. Analysis of the Data
6. Precautions for Accuracy
7. Summary

Population Description and Sampling Procedures

The student sample for this study was drawn from a population which included all students categorized as learning disabled in the State of Montana and students who were

referred and tested but were not classified during the 1983-1984 school year. These student samples were taken from a random sample of school districts within the three Montana school classifications, I, II, and III. Cochran's formula for finite populations was used to determine the number of students for each group. The application of the formula assures a 95 percent conficence that the sampling error will be 5 percent or less.

Figure 3 displays the solution of the Cochran formula (Cochran, 1977) as used to determine the number of students needed in the sample to assure the necessary confidence level.

$$N = \frac{\frac{t^2 PQ}{d^2}}{1 + \left[\frac{1}{Np}\left(\frac{t^2 PQ}{d^2}\right) - 1\right]}$$

$$N = \frac{\frac{(1.96)^2\ (.5)(.5)}{(.05)^2}}{1 + \left[\frac{1}{7427}\left(\frac{(1.96)^2\ (.5)(.5)}{(.05)^2}\right) - 1\right]}$$

$$N = \frac{384.16}{1 + .0516}$$

$$N = \frac{384.16}{1.05}$$

$$N = 365.86$$

Figure 3. Cochran formula to determine student sample size.

Table 2 displays the number of school districts in the State of Montana by district size classification. It was from these districts that the sample for the study was selected.

Based upon the results of the Cochran formula, districts were randomly selected from each of the three Montana school district classifications using a Table of Random Numbers. The list of districts was obtained from *School Administrators of Montana: 1983-1984*

Table 2. School Districts in Montana by Classification.

Classification	Number
I	18
II	107
III	73

(School Administrators of Montana, 1984).

Salary Survey. Student selection was made from those students who were classified as learning disabled during the 1983-1984 school year. The student sample, N = 365.86 (Figure 2), was obtained using the Cochran formula; however, because 365.86 was not equally divisible by the number of school districts required for this study (162), three students were sampled from each district. Thus, of the total number of 7,427 Montana learning disabled students as identified by the Montana Office of Public Instruction 486 student samples were identified to participate in this study.

Table 3 displays the number of school districts sampled based on computation of the Cochran Formula for Finite Populations. The actual number of student samples requested is also included.

Table 3. Stratified Random Sample Population.

Classification	Districts	Sample
I	16	48
II	86	258
III	69	180
Total	162	486

A second population for which test data were requested was for those students in perceived learning disability but who were not so classified by the Child Study Team. To the number within that population the Cochran formula was again applied and a sample drawn using a Table of Random Numbers. The test data for those students was applied to the Ohio Severe Discrepancy Model formula.

Table 4 displays the investigative categories for the student samples by gender and school district size classification. It includes the numbers of students classified as learning disabled.

Table 4. Investigative Categories for Students Classified as Learning Disabled.

Category	Number
Male	190
Female	86
Class I	25
Class II	144
Class III	107

Table 5 displays the investigative categories for student samples by gender and school district classification. It includes the numbers of students who were referred for a perceived learning disability but not so classified.

Table 5. Investigative Categories for Students Not Classified as Learning Disabled.

Category	Number
Male	82
Female	28
Class I	19
Class II	69
Class III	22

Figure 4 displays the Ohio Severe Discrepancy Model formula (Telzrow and Williams, 1982) which was used by the investigator in order to determine if a discrepancy of two or more exists between student ability and achievement test scores.

$$\frac{\text{IQ Score} - \text{Mean of IQ Test}}{\text{Standard Deviation of IQ Test}} = \text{IQ Deviation Score}$$

$$\frac{\text{Achievement Score} - \text{Mean of Achievement Test}}{\text{Standard Deviation of Achievement Score}} = \text{Achievement Deviation Score}$$

$$\text{IQ Deviation Score} - \text{Achievement Deviation Score} = \text{Discrepancy Score}$$

Figure 4. The Ohio Severe Discrepancy Model formula.

Data Collection Method

All data concerning the numbers of students classified as learning disabled and placed in resource rooms from all school districts were collected from the Montana Office of Public Instruction. In December and June of each school year school districts are required to submit such information to that office. Information concerning specific sample groups, such as the gender of the student, was gathered from the appropriate school district personnel. This information was requested by mail.

The necessary test data for the youngsters who were referred for a perceived learning disability but not classified were collected from the person responsible for maintenance of such records within each district. This information was also requested by mail.

For each student member of the total sample, reported test data were converted, where necessary, to standard scores. That was done using the test manuals and proper conversion tables corresponding to the tests reported. Those converted scores were then inserted into the Ohio Severe Discrepancy Model formula in order to determine if a discrepancy existed between the intellectual and achievement test scores. A two point discrepancy between ability and achievement, as recommended by the State of Ohio, was the criteria used by the investigator to determine a severe discrepancy.

Confidentiality was insured in all cases as the data for the study were reported by school district classification and gender of the student only.

Organization of the Data

The data were collected and displayed in the form of descriptive and contingency tables. Contingency tables may be composed of any number of rows and columns. The data obtained in the study were displayed in this format in order to show the observed frequencies and to determine if there was independence between the compared variables (Ferguson, 1981).

Statistical Hypotheses

The hypotheses which apply to this investigation follow. All null hypotheses were tested at the .05 level of significance.

NULL: 1. The number of students classified as learning disabled or those referred for a perceived learning disability but not so classified using the Ohio Severe Discrepancy Model formula is independent of the number of students classified as learning disabled or referred for a perceived learning disability but not so classified using the Child Study Team approach alone.

ALTERNATIVE: 1. The number of students classified as learning disabled or those referred for a perceived learning disability but not so classified using the Ohio Severe Discrepancy Model formula is dependent on the number of students classified as learning disabled or referred for a perceived learning disability but not so classified using the Child Study Team approach alone.

NULL: 2. The size classification of a school district from which students are classified as learning disabled or referred for a perceived learning disability but not so classified using the Ohio Severe Discrepancy Model formula is independent of the size classification

of a school district from which students are classified as learning disabled or referred for a perceived learning disability but not so classified using the Child Study Team approach aone.

ALTERNATIVE: 2. The size classification of a school district from which students are classified as learning disabled or referred for a perceived learning disability but not so classified using the Ohio Severe Discrepancy Model formula is dependent on the size classification of the school district from which students are classified as learning disabled or referred for a perceived learning disability but not so classified using the Child Study Team approach alone.

NULL: 3. The gender of students classified as learning disabled or those referred for a perceived learning disability but not so classified using the Ohio Severe Discrepancy Model formula is independent of the gender of students classified as learning disabled or those referred for a perceived learning disability but not so classified using the Child Study Team approach alone.

ALTERNATIVE: 3. The gender of students classified as learning disabled or those referred for a perceived learning disability but not so classified using the Ohio Severe Discrepancy Model formula is dependent on the gender of students classified as learning disabled or those referred for a perceived learning disability but not so classified using the Child Study Team approach alone.

NULL: 4. The gender of students classified as learning disabled and those referred for a perceived learning disability but not so classified is independent of the gender of those classified as learning disabled and those referred for a perceived learning disability but not so classified within Class I, II, and III Districts.

ALTERNATIVE: 4. The gender of students classified as learning disabled and those referred for a perceived learning disability but not so classified is dependent on the gender

of those classified as learning disabled and those referred for a perceived learning disability but not so classified within Class I, II, and III Districts.

Analysis of the Data

The hypotheses were tested using the Chi Square Test of Independence. According to Ellis, Chi Square analysis

> furnishes us with a technique for deciding whether the differences between population proportions and the proportion of a sample are significant, whether the difference between the two sample proportions is significant or whether the differences among the proportions in more than two samples are significant (Ellis, 1975:183).

All analyses were tested at the .05 level of significance. According to Kerlinger,

> the .05 level of significance has persisted with researchers—because it is considered a reasonably good gamble. It is neither too high nor too low for most social scientific research (Kerlinger, 1973:170).

Precautions for Accuracy

In order to insure the accuracy of the data presented in this study the investigator calculated all statistical data using the Statistical Package for the Social Sciences computer program at Montana State University.

Summary

The population from which the sample was drawn consisted of all learning disabled students in kindergarten through twelfth grade who were enrolled in Montana Public Schools during the 1983-1984 school year. The sample was selected from the 198 school districts within the three size classifications presently in effect. Three students were selected from each of the 162 participating districts. Achievement and ability test information was requested by mail for each student included in the sample. Seventy-five percent of the original number of 365.86 student samples needed were actually received. That test data

were then applied to the Ohio Severe Discrepancy Model formula in order to determine whether or not each individual had a two point discrepancy. Comparisons were then made between the Ohio Severe Discrepancy Model formula and the traditional Child Study Team approach, in order to determine if gender, and school district size were independent of the learning disability classification system. The Chi Square Test of Independence at the .05 significance level was used to make that determination. The analysis of those data follows in Chapter 4.

CHAPTER 4

DATA ANALYSIS

The problem addressed in this study was to determine if the number of students classified as learning disabled using the traditional methods employed by the Child Study Team to interpret achievement and ability test data was independent of the number of students classified as learning disabled by applying the Ohio Severe Discrepancy Model formula to the same data with a discrepancy of two being the determining qualifying factor. Similar information was obtained and presented for students who were referred for learning disability testing, but because of a decision by the Child Study Team were not so classified.

The data collection instrument, Appendix B, was mailed to all participants with a cover letter, Appendix C, and a stamped, self-addressed envelope on November 29, 1984. On December 13, 1984, a follow-up reminder, Appendix C, was mailed to those participants who had not responded as of that date. A personal telephone call was placed to the final group of nonresponding special education or special education cooperative directors on January 4, 1985 to ask that the data requested be forwarded to the investigator. All forms received by the investigator on or before January 19, 1985 were used in the preparation of the data.

Table 6 displays the number and percentage of school districts which responded to the investigator's request. The percentage was based on the number of districts originally identified in the sample by the investigator.

Table 7 displays the number of usable returns received for students classified as learning disabled and those referred for a perceived disability but not classified.

Table 6. Number and Percentage of District Responses.

District Classification	Number of Districts	Districts Responding	Percentage
I	16	12	75
II	86	60	70
III	60	47	78
Total	162	119	73

Table 7. Number of Usable Returns Received for Classified Learning Disabled Students and for Returns Received for Non Classified Students.

District Classification	Samples Requested	Classified Students	Nonclassified Students
I	48	25	19
II	258	144	69
III	180	107	22
Total	486	276	110

Table 8 displays additional information about the amount of data which were considered to be usable for the study. That table displays the number of returns for students who were classified as learning disabled and the percentage based on the number of samples originally requested by the investigator.

Table 8. Number and Percentage of Usable Returns Received for Students Classified as Learning Disabled.

District Classification	Samples Requested	Samples Returned	Percentage
I	48	25	52
II	258	144	56
III	180	107	59
Total	486	276	57

It should be noted that the percentage of returns for classified learning disabled students was 57 percent as displayed in Table 8. The Cochran Formula for Finite Populations, which was applied to the total population of learning disabled in Montana, indicated that

the investigator needed a sample of 366 students in order to assure 95 percent confidence that the sampling error would be 5 percent or less. The number of usable returns (276) represented 75 percent of the sample.

There were several reasons why information reported was not usable. In some cases the data were incomplete. There were other instances in which either the ability or achievement test information was not reported at all. In other situations the test data reported was not usable because the test company had not established means and standard deviations or the investigator was not able to convert the reported scores to a usable form so that the deviation could be determined.

A second population for which test data were requested was for those students who were referred during the 1983-1984 school year for a perceived learning disability, but who were not so classified by the Child Study Team. The number expected was unknown to the investigator because of the variety of record keeping procedures employed by school districts as well as the investigator's inability to know how many students might have experienced difficulties in classrooms where the difficulty was attributed to a learning disability. The investigator did not apply the Cochran formula to that population as previously suggested because the sample returned was small and there was no way of knowing what the total population of referred students was in 1983-1984.

The method of organization of the remainder of this chapter is as follows:

1. Descriptive Statistics
2. Inferential Statistics

   Chi Square Tests of Independence
3. Hypothesis Decision Summary
4. Summary

Descriptive Statistics

Of the 386 samples received Table 9 displays the number and percentage of those classified as learning disabled.

Table 9. Number and Percentage of Reported Classified Learning Disabled Students in Class I, II, and III Districts.

District Classification	Number	Percentage
I	25	9
II	144	52
III	107	39
Total	276	100

Of the 386 samples received Table 10 displays the number and percent of those in each of the three school district classifications who were referred for a perceived learning disability but were not so classified.

Table 10. Number and Percentage of Reported Non Classified Students in Class I, II, and III Districts.

District Classification	Number	Percentage
I	19	17
II	69	63
III	22	20
Total	110	100

Table 11 displays the number and percentage of classified learning disabled students in each of the three district classifications who had a severe discrepancy of at least two when their test data was applied to the Ohio Severe Discrepancy Model formula.

Table 12 displays the number and percentage of classified learning disabled students by gender with a severe discrepancy of at least two points when their test data was applied to the Ohio Severe Discrepancy Model formula.

Table 11. Number and Percentage of Classified Learning Disabled Students in Class I, II, and III Districts with a Severe Discrepancy Score of Two or More Points.

District Classification	Sample	Number	Percentage
I	44	5	11
II	213	10	5
III	129	14	11
Total	386	29	8

Table 12. Number and Percentage of Classified Learning Disabled Students by Gender with a Severe Discrepancy Score of Two or More Points.

Gender	Sample	Number	Percentage
Male	190	20	11
Female	86	9	10
Total	276	29	11

Table 13 displays the number and percentage of students in each of the three district size classifications who had a severe discrepancy of less than two when their test data was applied to the Ohio Severe Discrepancy Model formula. This sample included both students who were classified as learning disabled and those who were not.

Table 13. Number and Percentage of Students by District Classification with a Severe Discrepancy Score of Less Than Two Points.

District Classification	Number	Percentage
I	39	11
II	203	57
III	115	32
Total	357	100

Table 14 displays the number and percentage of students classified as learning disabled according to gender.

Table 15 displays the number and percentage of students with a perceived learning disability but not so classified according to gender.

Table 14. Number and Percentage of Students Classified Learning Disabled by Gender.

Gender	Number	Percentage
Male	190	69
Female	86	31
Total	276	100

Table 15. Number and Percentage of Non Classified Learning Disabled Students by Gender.

Gender	Number	Percentage
Male	82	75
Female	28	25
Total	110	100

Table 16 displays the number and percentage of students according to gender with a severe discrepancy of less than two when their test data was applied to the Ohio Severe Discrepancy Model formula. It includes both students who were classified as learning disabled and those who were not.

Table 16. Number and Percentage of Students by Gender with a Severe Discrepancy Score of Less Than Two Points.

Gender	Number	Percentage
Male	252	71
Female	105	29
Total	357	100

Inferential Statistics

The following section reports the Chi Square analyses of the test data received as if was applied to the Ohio Severe Discrepancy Model formula. These data answered the following questions:

1. Was the number of classified learning disabled students who also had a severe discrepancy when the Ohio Severe Discrepancy Model formula was applied independent of the number of students classified as learning disabled using the Child Study Team approach alone?

2. Was the number of classified learning disabled students in Class I, Class II, and ClassIII School Districts who had a severe discrepancy when the Ohio Severe Discrepancy Model formula was applied independent of the number of those classified as learning disabled using the Child Study Team approach alone?

3. Was the number of students referred for a perceived learning disability but not classified using the Child Study Team approach alone independent of those who had a severe discrepancy when the Ohio Severe Discrepancy Model formula was applied?

4. Based on gender, was the number of students classified as learning disabled who had a severe discrepancy when the Ohio Severe Discrepancy Model formula was applied independent of those classified as learning disabled using the Child Study Team approach alone?

5. Was the number of students referred for a perceived learning disability in Class I, Class II, and Class III School Districts who did not have a severe discrepancy when the Ohio Severe Discrepancy Model formula was applied independent of those not classified using the Child Study Team approach alone?

6. Based on gender, was the number of students referred for a perceived learning disability who did not have a severe discrepancy when the Ohio Severe Discrepancy Model formula was applied independent of those not classified using the Child Study Team approach alone?

7. Based upon the size classification of the school district was the gender of the students classified as learning disabled independent of those not classified as learning disabled?

Special education and special education cooperative directors were asked to respond with test scores for a preselected sample of classified learning disabled students and also to present test data for students who were referred for learning disability testing, but not so classified. The data were analyzed on the basis of four variables: (1) district classification by size, (2) gender of the student, (3) identified learning disabled or not so classified, and (4) those having a discrepancy score of two or more points when their test data was applied to the Ohio Severe Discrepancy Model formula. Ten tables were used to display this part of the analysis.

Degrees of freedom (df), critical Chi Square values (χ^2), and calculated Chi Square values were reported for each set of data. Those data are presented in the form of frequency count rather than percent of frequency distributions in the Chi Square contingency tables that follow.

Table 17 displays the data of a Chi Square analysis to determine if the learning disabled, non learning disabled classification is independent of the severe discrepancy, non severe discrepancy classification of students, when their test data was applied to the Ohio Severe Discrepancy Model formula in order to show a discrepancy score of two or more points between ability and achievement. This table displays data for all students in the sample.

Table 17. Chi Square Analysis of Learning Disabled, Non Learning Disabled and Severe Discrepancy, Non Severe Discrepancy.

Classification	Severe Discrepancy	No Severe Discrepancy	Row Total
Learning Disabled	24	252	276
Non Learning Disabled	5	105	110
Column Total	29	357	386

df = 1
Critical Chi Square at .05 = 3.84
Calculated Chi Square = 1.40

An analysis of the information displayed in Table 17 showed an independence between the learning disabled, non learning disabled classification and the classification of students when their test data was applied to the Ohio Severe Discrepancy Model formula by discrepancy.

Using Table 17, questions number one and three, which asked if an independence existed in the number of students classified as learning disabled when the Ohio Severe Discrepancy Model formula was employed, as opposed to the Child Study Team approach alone, and were there any students not previously classified as learning disabled who would be so identified using the Ohio Severe Discrepancy Model formulas, can now be answered.

NULL HYPOTHESIS: 1. The number of students classified as learning disabled or those referred for a perceived learning disabilty but not so classified using the Ohio Severe Discrepancy Model formula is independent of the number of students classified as learning disabled or referred for a perceived learning disability but not so classified using the Child Study Team approach alone.

Table 17 indicated no dependence between the variables. Therefore, Null Hypothesis 1 is RETAINED.

Table 18 displays the data of a Chi Square analysis to determine if district classification by size is independent of the learning disabled, non learning disabled classification. This table includes all students in the sample.

An analysis of the information in Table 18 indicated a dependence between school district size and the classification of students as learning or non learning disabled. Of the 129 students in Class III Districts reported, 107 were classified as learning disabled. This figure represented a percentage of 83 as compared to 68 percent in Class II Districts and 57 percent in Class I Districts.

Table 18. Chi Square Analysis of District Classification and Learning Disabled, Non Learning Disabled.

District Classification	Learning Disabled	Non Learning Disabled	Row Total
I	25	19	44
II	144	69	213
III	107	22	129
Column Total	276	110	386

df = 2
Critical Chi Square at .05 = 5.99
Calculated Chi Square = 14.53

Table 19 displays the data of a Chi Square analysis to determine if, when student test data is applied to the Ohio Severe Discrepancy Model formula, school district classification by size is independent of the classification of students. A severe discrepancy score is a difference or discrepancy of two or more points between ability achievement. The table includes all students in the sample.

Table 19. Chi Square Analysis of District Classification and Severe, No Severe Discrepancy.

District Classification	Severe Discrepancy	No Severe Discrepancy	Row Total
I	5	39	44
II	10	203	213
III	14	115	129
Column Total	29	357	386

df = 2
Critical Chi Square at .05 = 5.99
Calculated Chi Square = 5.44

An analysis of the information displayed in Table 19 indicated an independence between district size classification and severe discrepancy when test data was applied to the Ohio Severe Discrepancy Model formula.

Table 20 displays the data of a Chi Square analysis to determine if school district classification by size is independent of the learning disabled, non learning disabled classification. The analysis is controlled by variable four in that it only includes those whose discrepancy score was two or more points between ability and achievement when test data were applied to the Ohio Severe Discrepancy Model formula.

Table 20. Chi Square Analysis of District Classification and Learning Disabled, Non Learning Disabled with a Discrepancy Score of Two or More Points.

District Classification	Learning Disabled	Non Learning Disabled	Row Total
I	3	2	5
II	8	2	10
III	13	1	14
Column Total	24	5	29

df = 2
Critical Chi Square at .05 = 5.99
Calculated Chi Square = 2.87

An analysis of the information displayed in Table 20 showed an independence between district classification by size and the learning disabled, non learning disabled classification when the analysis included only those who had a discrepancy score of two or more points between ability and achievment when test data were applied to the Ohio Severe Discrepancy Model formula.

Table 21 displays the data of a Chi Square analysis to determine if school district classification by size is independent of the learning disabled, non learning disabled classification. The analysis is controlled by variable four in that each member of this population had a discrepancy score of less than two points between ability and achievement when their test data were applied to the Ohio Severe Discrepancy Model formula.

An analysis of the information displayed in Table 21 indicated a dependence between district classification by size and learning disabled, non learning disabled classification

Table 21. Chi Square Analysis of District Classification and Learning Disabled, Non Learning Disabled without a Discrepancy Score of Two or More Points.

District Classification	Learning Disabled	Non Learning Disabled	Row Total
I	22	17	39
II	136	67	203
III	94	21	115
Column Total	252	105	357

df = 2
Critical Chi Square at .05 = 5.99
Calculated Chi Square = 11.93

when the population had a discrepancy score of less than two points between ability and achievement when test data were applied to the Ohio Severe Discrepancy Model formula.

Using Tables 18, 19, 20, and 21 questions number two and five, which asked if an independence existed between the numbers of students classified or those referred for a perceived learning disability but not so classified in Class I, Class II, and Class III School Districts when the Ohio Severe Discrepancy Model formula was employed as opposed to the Child Study Team approach alone, can now be answered.

NULL HYPOTHESIS: 2. The size classification of the school district from which students are classified as learning disabled or referred for a perceived learning disability but not so classified using the Ohio Severe Discrepancy Model formula is independent of the size classification of the school district from which students are classified as learning disabled or referred for a perceived learning disability but not so classified using the Child Study Team approach alone.

Tables 20 and 21 indicate that school district size and classification method were dependent. The calculated Chi Square values of 14.53 and 11.93 for the respective analyses were significant beyond the .05 level. Therefore, Null Hypothesis 2 is REJECTED in favor of the alternative which stated that the size classification of the school district from

which students are classified as learning disabled or referred for a perceived learning disability but not so classified using the Ohio Severe Discrepancy Model formula is dependent on the size classification of the school district from which students are classified as learning disabled or referred for a perceived learning disability but not so classified using the Child Study Team approach alone.

Table 22 displays the data of a Chi Square analysis to determine if the gender of a student is independent of the learning disability, non learning disability classification. The table includes all students in the sample.

Table 22. Chi Square Analysis of Gender and Learning Disabled, Non Learning Disabled.

Gender	Learning Disabled	Non Learning Disabled	Row Total
Male	190	82	272
Female	86	28	114
Column Total	276	110	386

df = 2
Critical Chi Square at .05 = 3.84
Calculated Chi Square = .97

An analysis of the information displayed in Table 22 showed an independence between the gender of a student and the learning disability, non learning disability classification.

Table 23 displays the data of a Chi Square analysis to determine if gender is independent of the classification of the student when the test data was applied to the Ohio Severe Discrepancy Model formula. A severe discrepancy score was a difference of two or more points between ability and achievement data. This table displays data for all students in the sample.

Table 23. Chi Square Analysis of Gender and Severe Discrepancy, Non Severe Discrepancy.

Gender	Severe Discrepancy	Non Severe Discrepancy	Row Total
Male	20	252	272
Female	9	105	114
Column Total	29	357	386

df = 2
Critical Chi Square at .05 = 3.84
Calculated Chi Square = .03

An analysis of the information displayed in Table 23 showed an independence between gender and discrepancy when test data was applied to the Ohio Severe Discrepancy Model formula.

Table 24 displays the data of a Chi Square analysis to determine if gender is independent of the learning disabled, non learning disabled classification. The analysis was controlled by variable four in that it included only those whose discrepancy score between ability and achievement was two or more points when test data was applied to the Ohio Severe Discrepancy Model formula.

Table 24. Chi Square Analysis of Gender and Learning Disabled, Non Learning Disabled with a Discrepancy Score of Two or More Points.

Gender	Learning Disable	Non Learning Disabled	Row Total
Male	16	4	20
Female	8	1	9
Column Total	24	5	29

df = 1
Critical Chi Square at .05 = 3.84
Calculated Chi Square = .003

An analysis of the information displayed in Table 24 indicated an independence between gender and the learning disabled, non learning disabled classification when the analysis included only those who had a discrepancy score of two or more points between

ability and achievement when their test data were applied to the Ohio Severe Discrepancy Model formula.

Table 25 displays the data of a Chi Square analysis to determine if gender is independent of the learning disabled, non learning disabled classification. The analysis was controlled by variable four in that no member of this population had a discrepancy score of two or more points between ability and achievement when test data was applied to the Ohio Severe Discrepancy Model formula.

Table 25. Chi Square Analysis of Gender and Learning Disabled, Non Learning Disabled without a Discrepancy Score of Two or More Points.

Gender	Learning Disabled	Non Learning Disabled	Row Total
Male	174	78	252
Female	78	27	105
Column Total	252	105	357

df = 1
Critical Chi Square at .05 = 3.84
Calculated Chi Square = .74

An analysis of the information displayed in Table 25 showed an independence between the gender of a student and the learning disabled, non learning disabled classification when the analysis included those who did not have a discrepancy of two or more points between ability and achievement when their test data was applied to the Ohio Severe Discrepancy Model formula.

Using Tables 22, 23, 24, and 25 questions numbers four and six, which asked if there was an independence, based on gender, in the numbers of students classified as learning disabled or those referred for a perceived learning disability but not so classified using the Ohio Severe Discrepancy Model formula as opposed to the Child Study Team approach alone, can now be answered.

NULL HYPOTHESIS: 3. The gender of the students classified as learning disabled or those referred for a perceived learning disability but not so classified using the Ohio Severe Discrepancy Model formula is independent of the gender of the students classified as learning disabled or those referred for a perceived learning disability but not so classified using the Child Study Team approach alone.

Tables 22, 23, 24, and 25 indicated that there was no dependence between gender and the learning disability, non learning disability classification. The Chi Square values of .97, .03, .003, and .74 for the respective analyses were not significant beyond the .05 level. Therefore, Null Hypothesis 3 was RETAINED.

Table 26 displays the data of a Chi Square analysis to determine if the gender of the classified learning disabled student is independent of the size classification of the school district. This table includes all students in the sample.

Table 26. Chi Square Analysis of District Classification and Gender.

District Classification	Male	Female	Row Total
I	28	16	44
II	155	58	213
III	89	40	129
Column Total	272	114	386

df = 2
Critical Chi Square at .05 = 5.99
Calculated Chi Square = 1.66

An analysis of the information displayed in Table 26 indicated an independence between district classification by size and gender of students. Using Table 26, question number seven which asked if there was an independence between the gender of students classified as learning disabled and those referred for a perceived learning disability but not so classified based upon the size classification of the school district can now be answered.

NULL HYPOTHESIS: 4. The gender of student classified as learning disabled and those referred for a perceived learning disability but not so classified is independent of

those classified as learning disabled and those referred for a perceived learning disability but not so classified in Class I, II, and III Districts.

Table 26 indicates an independence between these two variables. Therefore, Null Hypothesis 4 is RETAINED.

Hypothesis Decision Summary

The general research questions, the related statistical hypotheses and the decisions made relative to retention or rejection of each null hypothesis follow:

QUESTION 1. Was the number of classified learning disabled students who also had a severe discrepancy when the Ohio Severe Discrepancy Model formula was applied independent of the number of students classified as learning disabled using the Child Study Team approach alone?

QUESTION 3. Was the number of students referred for a perceived learning disability but not classified using the Child Study Team approach alone independent of those who had a severe discrepancy when the Ohio Severe Discrepancy Model formula was applied?

NULL HYPOTHESIS: 1. The number of students classified as learning disabled or those referred for a perceived learning disability but not so classified using the Ohio Severe Discrepancy Model formula is independent of the number of students classified as learning disabled or referred for a perceived learning disability but not so classified using the Child Study Team approach alone.

DECISION: RETAINED

QUESTION 2. Was the number of classified learning disabled students in Class I, Class II, and Class III School Districts who had a severe discrepancy when the Ohio Severe Discrepancy Model formula was applied independent of the number of those classified as learning disabled using the Child Study Team approach alone?

QUESTION 5. Was the number of students referred for a perceived learning disability in Class I, Class II, and Class III School Districts, who did not have a severe discrepancy when the Ohio Severe Discrepancy Model formula was applied independent of those not classified using the Child Study Team approach alone?

NULL HYPOTHESIS: 2. The size classification of a school district from which students are classified as learning disabled or referred for a perceived learning disability but not so classified using the Ohio Severe Discrepancy Model formula is independent of the size classification of a school district from which students are classified as learning disabled or referred for a perceived learning disability but not so classified using the Child Study Team approach alone.

DECISION: REJECTED

QUESTION 4. Based on gender, was the number of students classified as learning disabled who had a severe discrepancy when the Ohio Severe Discrepancy Model formula was applied independent of those classified as learning disabled using the Child Study Team approach alone?

QUESTION 6. Based on gender, was the number of students referred for a perceived learning disability who did not have a severe discrepancy when the Ohio Severe Discrepancy Model formula was applied independent of those not classified using the Child Study Team approach alone?

NULL HYPOTHESIS: 3. The gender of students classified as learning disabled or those referred for a perceived learning disability but not so classified using the Ohio Severe Discrepancy Model formula is independent of the gener of students classified as learning disabled or those referred for a perceived learning disability but not so classified using the Child Study Team approach alone.

DECISION: RETAINED