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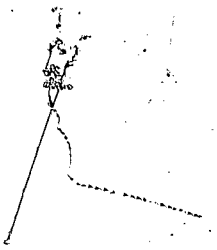
ABSTRACT

Two studies were conducted to examine the extent to which the category "learning disabilities" (LD) meets the major criterion for classification systems, specifically that the category demonstrates at least one universal and one specific characteristic. Analyses were conducted on psychometric data for 248 students in regular 3rd, 5th, and 12th grade classes, and for 99 4th grade students (some of whom were low achievers and others classified as LD). Findings revealed that 85 percent of the regular class students (grades 3, 5, 12) and 88 percent of the low achievers (grade 4) could be classifed as LD. Further, 4 percent of the LD Ss did not meet any of the criteria for classification of LD. (AUthor/CL)



University of Minnesota

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IRLD

Institute for Research on Learning Disabilities

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During 1980-1983, Institute research focuses on four major areas:

- Referral
- Identification/Classification
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Abstract

Two studies were conducted to examine the extent to which the category "learning disabilities" meets the major criterion for classification systems, specifically that the category demonstrates at least one universal and one specific characteristic. Analyses were conducted on psychometric data for 248 students in regular third, fifth, and twelfth grade classes, and for 99 fourth grade students (some of whom were low achievers and others who were classified as LD). Findings revealed that 85% of the regular class students (grades 3, 5, 12) and 88% of the low achievers (grade 4) could be classified as LD. Further, 4% of the LD students did not meet any of the criteria for classification as LD. Implications for classification practices and for serving students failing in school are discussed.

A Logical and Empirical Analysis of Current Practices in Classifying Students as Handicapped

> Classification systems should have "clear definitions and a coherent logical structure." (Cromwell, Blashfield, & Strauss, 1975, p. 14)

Our nation is faced with a complex problem: the development of a defensible system for making decisions about the eligibility of students for participation in special education services. Educators are charged with the task of choosing, from among the large number of students experiencing academic and behavioral difficulties in America's schools, those who should receive a "special education." For many years, educators have observed that certain students fail to profit from the experiences offered in regular education. The failure was attributed to specific sensory, motor, physical, cognitive, or emotional deficits within the student, and educators presumed that "special education" was needed. It was decided that the way to determine precisely the kind of special education needed was to sort the students into groups (i.e., categorize them) on the basis of common characteristics. Relatively elaborate classification systems were established; the systems have been modified only slightly over the years. For decades, we have been trying to classify students primarily to determine their eligibility for the services that have become special education.

For the most part, the system for classifying students that exists in American education is based on inclusionary/exclusionary

principles. Definitions for categories are written; they directly state or imply the characteristics that professionals have agreed to include as defining characteristics (e.g., mental retardation is... , a specific learning disability is... , blindness is...). Individuals are classified based on the extent to which they exhibit the specific features of one condition (inclusionary principle) and do not exhibit the characteristics of another (exclusionary principle).

Much has been written on the potential deleterious effects of classification and labeling (Algozzine & Mercer, 1980; Gallagher, 1976; Gorham, Des Jardins, Page, Pettis, & Scherber, 1976; Hallahan & Kauffman, 1977). Gallagher (1976) cited three supposed advantages: (a) classification should lead to a sequence of treatments that is peculiarly designed to counteract certain negative conditions; (b) classification should aid researchers in studying both etiology and intervention; and (c) classification should call public attention to specific problems and aid in securing resources or funding to combat these problems. Others (e.g., Algozzine & Mercer, 1980) have noted similar purposes.

A significant amount of money is spent in the education of handicapped children; approximately $564 million (about 12% of the average per pupil expenditure) was spent in the 1979-1980 school year (U.S. Department of Education, 1980). Because of the important political, social, and economic implications of identification as exceptional, classification systems should have "clear definitions and a coherent, logical structure" (Cromwell et al., 1975, p. 14). Any

definition or any classification system that results in a considerable number of nonhandicapped individuals being identified as handicapped and receiving services designated for handicapped individuals, will not, and should not, be acceptable to professionals or to the general public. Similarly, a system that results in a significant number of handicapped students not being identified, and thus not receiving special services, is unacceptable. The efficiency and effectiveness of a classification are important; they depend on the extent to which classified and non-classified individuals demonstrate a set of universal and specific characteristics. In any classification system, all members classified in a group must have at least one characteristic in common (a universal), and at the same time, there must be at least one characteristic (a specific characteristic) that only the members of the group have. The members of a group must be alike in at least one way, and they must somehow differ from individuals who are not members of the group.

Two studies were conducted to investigate the universal and specific nature of the category learning disability. First, we looked at the extent to which 248 normal students enrolled in regular third, fifth, and twelfth grades met the criteria proposed in the professional literature for identification as learning disabled. In the second study, we examined the extent to which there were specific differences between low achieving students enrolled in regular classes and students labeled learning disabled.

Historical Efforts to Operationalize Learning Disabilities

It is specified in the current federal definition that the term specific learning disability "means a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or to do mathematical calculations" (U.S. Office of Education, 1977, p. 65083). The complete definition is similar to definitions that have driven the LD field from its inception (cf. Lerner, 1981; Mercer, 1979). For nearly two decades, educators and committees of professionals have been trying to operationalize definitions of learning disabilities. At least three general classes of definitions have been proposed: (a) ability-achievement discrepancies, (b) academic-achievement deficits, and (c) scatter analyses.

Ability-achievement discrepancy. Several attempts have been made to operationalize the ability-achievement discrepancy so basic to LD conceptualizations. Definitions based on specific formulas evolved from the original 1968 definition developed by the National Advisory Committee on Handicapped Children (NACHC), in which LD was a "disorder in one or more of the basic psychological processes involved in understanding or in using spoken or written languages" (U.S. Office of Education, 1968, p. 34). In a survey of 42 state departments of education conducted from 1974 to 1975, moderate influence of the NACHC definition was apparent (Mercer, Forgnone, & Wolking, 1976). It is almost identical to the current federal definition. Federal

legislation (P.L. 94-142) enacted in 1975 resulted in the need for a more precise definition of LD and led to the development of the 1976 federal formula that quantified ability-achievement discrepancy (U.S. Office of Education, 1976). The proposed formula for determining the presence of a severe discrepancy was as follows:

$$[CA \times (IQ/300 + 0.17)] - 2.5 = \text{severe discrepancy level (SDL)}$$

The resultant SDL represented the level at or below which the student must achieve in one or more of eight specific academic areas in order for a severe discrepancy to exist. This formula met with significant criticism (cf. Danielson & Bauer, 1978) and was deleted in the 1977 federal regulations (U.S. Office of Education, 1977).

Algozzine, Forgnone, Mercer, and Trifiletti (1979) investigated the effect of various IQ and CA levels on the calculations of the severe discrepancy level. Their results indicated that SDL was differentially influenced by IQ. As an alternative to the 1976 federal formula, they developed a modified formula so that SDL would represent a 50% discrepancy at all IQ levels. Their formula for determining SDL was as follows:

$$SDL = .5[(IQ/100) \times (CA - 5.5)]$$

Johnson and Myklebust (1967) advocated calculating a learning quotient (LQ), a ratio of achievement to expectancy age, as an index of discrepancy. Myklebust (1968) elaborated on the LQ from a psychoneurological perspective and maintained that both verbal and nonverbal facets of learning (involvement of both left and/or right hemispheres) must be considered. He concluded that the higher score from verbal

and nonverbal tests, plus measures of physiological maturity and experience (i.e., opportunity for learning) were required for a measure of expectancy. Hence, Myklebust reported the following formula for determining expectancy age:

$$\text{Expectancy Age} = \frac{\text{Mental Age} + \text{Life Age} + \text{Grade Age}}{3}$$

Once expectancy age had been determined, the learning quotient was obtained by using the following formula:

$$\text{LQ} = \frac{\text{Achievement Age}}{\text{Expectancy Age}} \times 100$$

According to Myklebust, a LQ of 89 or below constituted the basis for classification as learning disabled.

Because the 1977 federal definition does not specify the amount of discrepancy between ability and achievement that is required, a variety of attempts have been made to operationalize ability-achievement discrepancy. Samples of such definitions include quantitative differences between WISC-R Full-Scale scores and standard scores from a battery of academic achievement tests. In practice, variation in the point-difference cutoff (e.g., 15 points difference between ability and achievement scores vs. 30 points difference) will produce variation in the population that fits (i.e., is classified by) such a cutoff.

Academic achievement deficit. A variety of operational definitions of low achievement, i.e., grade placement-achievement discrepancy, have been developed. These definitions represent efforts to conceptualize LD solely on the basis of academic factors,

disregarding notions of ability. Formulas have been developed for operationalizing academic-achievement deficit. Schere, Richardson, and Bialer (1980) proposed a formula that averages scores from two group-administered tests and three individually administered tests.

Another way of using academic-achievement measures to determine grade placement-achievement discrepancies consists simply of using scores earned on a battery of achievement tests in a variety of academic areas (e.g., reading, math, language, and spelling). Students are said to be LD if the standard scores earned on achievement tests are below a specified cutoff (e.g., one standard deviation below the mean).

Scatter analysis. One of the more widely used techniques to relate psychological processes to an operational definition of LD is the use of scatter analysis (also referred to as profile analysis and pattern analysis). As noted by Sattler (1974), scatter refers to the pattern or configuration formed by subtest scaled scores. In general, the intent of scatter analysis is to identify diagnostically different groups, and eventually the individuals composing them, on the basis of their differential performance on a number of subtests (Rapaport, Gill, & Schafer, 1968; Wechsler, 1958). Thus, for example, the Wechsler Intelligence Scale for Children (WISC) and the Wechsler Intelligence Scale for Children-Revised (WISC-R) have been frequently used in psychological assessment in attempts at differential diagnosis and identification of areas of specific strengths and weaknesses.

There are several approaches to scatter analysis. One approach

involves comparing verbal-performance discrepancies with a certain quantitative difference said to indicate LD. A second method entails the comparison of subtest scaled scores by examining scaled-score differences. A third approach is one in which sets or categories of individual subtest scores are compared. Bannatyne (1968, 1971, 1974, 1979) and Witkin, Dyk, Faterson, Goodenough, and Karp (1962) proposed that WISC (WISC-R) subtests could be grouped into major categories and factors for diagnostic purposes.

The first type of scatter (difference between Verbal-Scale and Performance-Scale IQs) has been widely used. In the WISC-R Manual, Wechsler (1974) reported that on the average for the 11 age groups, a "difference of 9 points is required for significance at the 15 percent level, and a difference of 12 points is needed at the 5 percent level" (p. 34). However, despite these reported differences at the .15 and .05 levels of confidence, Wechsler stated that a difference of 15 points ($p < .01$) is really what is clinically important. Similarly, Foster and Sabatino (1976) viewed a difference of 16 or more IQ points as significant. Clearly, there is little agreement in the literature on the magnitude of Verbal-Performance discrepancy necessary for clinical significance. Although 12-point or 15-point Verbal-Performance discrepancies are statistically meaningful, knowledge of the amount of discrepancy in the profiles of normal children, as provided by Kaufman (1976c), is essential for what constitutes "unusual" Verbal-Performance discrepancy.

Another type of scatter is the range between the highest and

lowest subtest scores. A large number of investigators have used this method (Anderson, Kaufman, & Kaufman, 1976; Gutkin, 1979; Kaufman, 1976a, 1976b; Marston, 1980; Ribner & Kahn, 1981; Ysseldyke, Shinn, McGue, & Epps, 1981). A third type of scatter is the number of subtests deviating significantly from the mean of the remaining subtest scores. Several researchers have used this scatter index (Kaufman, 1975, 1976a, 1976b; Ribner & Kahn, 1981; Swerdlik & Wilson, 1979).

Additional indices of subtest scatter are based on a recategorization of the WISC subtest scaled scores. Bannatyne's (1968, 1971, 1974) recategorization divided the WISC subtest scaled scores into Spatial, Conceptualizing, and Sequencing categories. Bannatyne (1971) reported that "genetic dyslexics" demonstrated a certain pattern of abilities, with their highest scores in the Spatial category, intermediate scores in the Conceptualizing category, and the lowest scores in the Sequencing category.

Clearly, there are a large number of ways to operationalize definitions used to categorize students with problems achieving in school. There is very little agreement as to how to measure such concepts as discrepancy, achievement deficit, scatter, or process deficit. If such lack of consensus exists at the heuristic level, what kind of agreement exists among decisions at the applied level? In this research, we compared the numbers of students identified by different operational criteria of the definition of learning disabilities.

Method

Study 1

Psychometric data (cognitive ability and scholastic achievement test scores) were available for 248 students enrolled in regular third (n=83), fifth (n=81), and twelfth (n=84) grade classrooms in a large suburban school district. Individual ability measures included the Woodcock-Johnson Psycho-Educational Battery (WJ) Tests of Cognitive Ability, the Wechsler Intelligence Scale for Children-Revised (WISC-R) or the Wechsler Adult Intelligence Scale (WAIS), and the Peabody Picture Vocabulary Test (PPVT). Individual achievement measures included the Peabody Individual Achievement Test (PIAT), the Wide Range Achievement Test (WRAT), and the Woodcock-Johnson Psycho-Educational Battery (WJ) Tests of Achievement. Means and standard deviations of the three groups of subjects are presented in Table 1; all standard scores except one were within the normal range (i.e., 90-110).

Insert Table 1 about here

Study 2

Data for 99 fourth-grade children in nine metropolitan school districts were available for analysis from a previous descriptive study (Ysseldyke, Algozzine, Shinn, & McGue, 1982). Fifty of the children were identified by their school districts as being learning disabled. The criteria used by the districts were not available;

however, it was assumed that some operationalization of the current federal definition was used in making the eligibility decision.

Forty-nine of the children were low achievers in school. The criterion for selection was school achievement at or below the 25th percentile on the Iowa Tests of Basic Skills. Demographic characteristics (i.e., sex, age, socioeconomic status, and parental marital status) of the two groups were not statistically different. Test scores included indices of cognitive ability (W-J Tests of Cognitive Ability and WISC-R) and scholastic achievement (PIAT and W-J Tests of Achievement). These data are presented in Table 2.

Insert Table 2 about here

Procedure

Scores from selected tests were used to make classification decisions for each student. The diagnostic classification of LD was assigned to a student who qualified under operationalization of any of the 17 definitions listed in Table 3.

Insert Table 3 about here

Results

Study 1 (Normal Students)

When the 248 regular class students were classified according to the 17 operationalizations of the definition of learning disabilities,

from 2% to 65% of the total group of students met criteria for classification as LD. Raw data, listing numbers and percentages of students classified LD at each grade and according to each definition appear in Table 4; the average percentage of normal students identified as LD was 21%. Differences in numbers of students classified at each grade level were indicated. At the third grade level, from 1% to 51% of the regular class students could be classified using the 17 operationalizations; the average number of students meeting these LD criteria was 16%. Of the 81 fifth grade students, from 0% to 63% were identified, with an average of 18% of the students meeting the LD criteria. From 4% to 84% of twelfth graders met the criteria, with an average of 28% of normal twelfth graders identified as LD.

Insert Table 4 about here

The highest percentages of normal students were identified as LD by those operationalizations with relatively modest difference criteria: (a) ability-achievement discrepancy of 10 points, and (b) WISC-R scatter (verbal-performance discrepancies) of 9 points. The smallest percentages of normal students were identified LD by those using relatively stringent criteria: (a) an ability-achievement discrepancy greater than 30 points, (b) an academic achievement deficit cutoff below 70, and (c) Bannatyne WISC-R category differences in excess of 7 points.

Some general trends are evident in the data. First, operational definitions based in any way on achievement test standard scores (formulas, statistical discrepancies, and standard score cutoffs) resulted in identification of many more students at upper than lower grades. For definitions 1-11 (see Tables 3 and 4) there is an increase in the number of normal students classified as LD from fifth to twelfth grade. Second, for both statistical discrepancy definitions (2, 3, 4) and standard score cutoffs (8, 9, 10), whenever the discrepancy criteria were increased or cutoff levels lowered, percentages of normal students classified as LD decreased. Third, operational definitions that do not use achievement test data as contributing factors (12-17), but are based on intellectual data alone (WISC-R Verbal-Performance scatter, subtest scatter, Woodcock-Johnson cluster scatter), identified relatively consistent percentages of students across the three grades represented.

One additional analysis was completed to ascertain the total number of operational definitions under which each student qualified; data are summarized in Table 5. A total of 211 of the 248 normal students (85.1%) met at least one operationalization. Additionally, 68.1% met two or more definitions; nine normal students (3.6%) met 10 or more operational definitions for classification as LD.

Insert Table 5 about here

Differences between students who met at least one of the criteria

and those who did not meet any were analyzed. Although not statistically different, ability scores of the students not classified by any of the 17 criteria were lower and less variable than those of the "classified" students. Most of the achievement scores of the students who were not classified under any definition were significantly higher than those of the classified students (see Table 6).

Insert Table 6 about here

In summary, substantial numbers of regular-classroom students were identified as learning disabled by the various operational definitions despite the facts that, as a group, their achievement-test scores were within the normal range (i.e., 90-110) and they had not been identified as LD by the schools. Definitions with relatively modest criteria (e.g., mild ability-achievement discrepancy and mild Verbal-Performance discrepancy) identified many of the students while more stringent definitions (e.g., severe ability-achievement discrepancy, very low achievement, and large Verbal-Performance discrepancy) identified few students. Normal students classified under one or more definitions had lower achievement scores than students not classified by any.

Study 2 (School-Identified LD and Low-Achieving Students)

The number of school identified LD and low achieving students meeting each operationalization of the LD definition is presented in

Table 7. When 50 LD students were classified by each of the 17 definitions, from 1% to 78% were classified. When 49 low-achieving students were classified using the 17 definitions, from 0% to 71% were classified. For both the LD and low-achieving students, relatively lenient operational definitions (e.g. mild ability-achievement discrepancy and mild Verbal-Performance discrepancy) identified a large portion of the students while stricter definitions (e.g., severe ability-achievement discrepancy, very low achievement, and substantial scatter in categories of subtests) identified a small portion.

Insert Table 7 about here

The number of definitions under which each child was classified as LD also was calculated; the range was from 0-15 definitions for both LD and low-achieving students (see Table 8). Only eight of the 99 children (8%) were not classified as LD by any definition; 2 of these 8, however, were classified as LD by the schools. Thus, 4% of the LD sample did not qualify under any of the 17 definitions. On the other hand, 87.8% of the low-achieving students were identified by at least one operational definition.

Insert Table 8 about here

Discussion

In 1968, McCarthy placed the field of learning disabilities in

perspective when he said, "Tell me how many children you want and I will write a definition to get that many" (p. 2). From its inception, the LD classification has been an ill-defined, poorly conceptualized, incredibly popular idea. There are millions of children who perform poorly in reading, writing, mathematics, listening, speaking, and/or other academic areas; significant numbers of students are failing to profit from their educational experiences (Ysseldyke & Algozzine, 1982). There is no defensible system for classifying or categorizing these students; there are no defensible inclusionary/exclusionary principles to guide our efforts to classify them.

In a recent General Accounting Office (1981) report to the Chairman of the U.S. House of Representatives Subcommittee on Select Education, major questions were raised about the rapid increase in the number of students labeled learning disabled, and attention was drawn to the considerable variance across states in the numbers of students served in this category. Special educators face much embarrassment in attempts to defend current classification practices. The embarrassing state of affairs is enhanced by data from a variety of sources. For example, Shepard and Smith (1981), in a recent report to the Colorado Legislature, stated that their research showed that more than 45% of the students currently enrolled in Colorado's classes for children with perceptual-communicative disorders (PCD) did not meet state criteria for placement in those classes. Ysseldyke et al. (1982) found no meaningful psychometric differences (on 49 measures) between low achievers and students labeled LD. The data presented here

indicated that 85% of a group of regular-classroom students were classified as LD, that 92% of a group of 99 low-achieving students were classified as LD, and that as many as 4% of a group of school-identified LD students did not meet any of the 17 operational definitions.

Professionals from related areas of education also have demonstrated an interest in the state-of-the-art in diagnostic decision making in special education. Glass (1981) raised serious questions about a "condition" that could be said to be evidenced by 47 times as many students in one school district as in a neighboring school district. Scriven (1981) referred to a current "diagnostic scandal" in which students are labeled handicapped simply to increase the flow of state and federal monies to LEAs, and to relieve regular classroom teachers of having to instruct hard-to-teach students.

We believe it is time to quit side-stepping the problem of developing ways to educate students who currently are failing in school. Reynolds and Wang (1981) offer some promising alternatives. A direction, though obviously not the only direction, would be to remove from the federal government the task of providing regulations for delivery of services to handicapped students. We need an open period of experimentation in which federal funding is used to encourage innovative development rather than categorical "bounty hunting." States should receive federal assistance for planning and implementing new alternatives (not old choices with new names) for providing services to students. If federal agencies were to support

innovation, rather than simple-minded compliance, leadership personnel at the local and state levels would be encouraged to move quickly to address this major national problem. Removal of federal regulations would permit local flexibility, and at the same time move us from the "casualty" approach we now have (you have to be sufficiently discrepant to qualify for services) to experimentation with preventive approaches.

At this point in time, our knowledge about how to classify students and about how to educate these classified students is extremely limited. It is premature to impose a rigid definitional, categorical system on what we do. Rather, we need to support innovative local approaches and to <u>evaluate</u> their effectiveness against a goal of more productive learning for all students. The challenge of this new question should be obvious; the extent to which it will be addressed remains a provocative enticement of the future.

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Footnotes

Bob Algozzine is also a Professor at the University of Florida, Gainesville. Susan Epps currently is an Associate Professor at Iowa State University, Ames. The authors acknowledge the efforts of Audrey Thurlow, Marilyn Hyatt, Jing-Jen Wang, Yetta Levine, and Leila Cantara in the preparation of this work.

Table 1

Means and Standard Deviations of Ability and Achievement Scores of Students in Study 1[a]

	School Grade		
	Three	Five	Twelve
Ability Measures			
WISC-R/WAIS			
Verbal	106.2 (14.8)	105.8 (11.5)	105.3 (11.4)
Performance	104.9 (12.4)	105.7 (12.1)	108.2 (11.9)
Full Scale	106.1 (13.5)	106.2 (11.0)	107.0 (11.3)
W-J Broad Cognitive	105.9 (15.1)	106.5 (11.7)	103.4 (14.0)
PPVT	106.3 (13.7)	105.0 (11.5)	104.3 (13.8)
Achievement Measures			
PIAT			
Mathematics	106.7 (9.5)	106.8 (10.1)	103.4 (11.9)
Reading Recognition	107.8 (11.2)	103.3 (9.6)	96.0 (10.1)
Reading Comprehension	106.6 (11.3)	104.2 (11.2)	101.9 (12.0)
Spelling	103.6 (10.3)	99.6 (13.1)	94.1 (13.4)
WRAT			
Spelling	103.9 (16.0)	98.2 (11.8)	95.7 (11.6)
Reading	111.8 (18.3)	105.6 (13.3)	104.4 (14.3)
Arithmetic	98.0 (10.0)	93.2 (8.6)	
Woodcock-Johnson			
Reading	104.2 (14.4)	101.8 (12.5)	99.1 (15.8)
Mathematics	108.2 (16.5)	105.3 (14.9)	99.4 (14.9)
Written Language	105.6 (13.8)	98.4 (12.7)	100.4 (17.7)
Knowledge	103.2 (13.8)	101.3 (11.6)	100.7 (13.8)

[a]Test scores are standard scores with means of 100 and standard deviations of 15. Numbers in parentheses are standard deviations.

Table 2

Means and Standard Deviations of Ability and Achievement Scores of Learning Disabled and Low-Achieving Students[a]

	LD Sample	Low-Achieving Sample
Ability Measures		
WISC-R		
Verbal	96.8 (12.7)	101.3 (9.3)
Performance	104.1 (13.7)	103.9 (11.3)
Full Scale	100.0 (12.4)	102.6 (9.5)
W-J Broad Cognitive	92.4 (11.4)	98.3 (8.8)
Achievement Measures		
PIAT		
Mathematics	96.1 (10.5)	101.0 (11.1)
Reading Comprehension	93.0 (11.0)	100.5 (7.3)
Reading Recognition	91.8 (9.0)	100.7 (8.4)
Spelling	88.5 (10.3)	95.8 (8.2)

[a]Test scores are standard scores with means of 100 and standard deviations of 15. Numbers in parentheses are standard deviations.

Table 3

Criteria Used to Determine Eligibility for

Learning Disabilities Classification

Definition	Criteria
Ability-Achievement Discrepancy	
1. 1976 Federal Formula	Achievement in one or more areas below "severe discrepancy level" defined by 1976 federal formula: SDL = [CA x (IQ/300 + 0.17)] - 2.5. WISC-R Full-Scale IQ was used as a measure of IQ. Grade equivalent scores for W-J Written Language, W-J Mathematics, PIAT Mathematics, PIAT Reading, and PIAT Spelling were used as indices of achievement..
2. Statistical Discrepancy	Difference of 10 or more points between WISC-R Full-Scale IQ and standard scores for W-J Written Language AChievement, W-J Mathematics Achievement, PIAT Mathematics, and PIAT Reading.
3. Statistical Discrepancy	Difference of 20 or more points between WISC-R Full-Scale IQ and standard scores for W-J Written Language Achievement, W-J Mathematics Achievement, PIAT Mathematics, and PIAT Reading.
4. Statistical Discrepancy	Difference of 30 or more points between WISC-R Full-Scale IQ and standard scores for W-J Written Language Achievement, W-J Mathematics Achievement, PIAT Mathematics, and PIAT Reading.
5. Alternative Federal Formula	Achievement in one or more areas below "severe discrepancy level" defined by alternative to 1976 Federal Formula: SDL=.5[IQ/100 x (CA - 5.2)]. Grade-equivalent achievement scores for W-J Written Language, W-J Mathematics, PIAT Mathematics, and PIAT Reading were evaluated.
6. Myklebust Learning Quotient	Learning Quotient in one or more areas at or below 89: LQ = actual achievement/expected achievement. Actual achievement, as measured by W-J Written Language, W-J Mathematics, PIAT Mathematics, and PIAT Reading was compared to expected achievement based on the average of the student's chronological age, mental age, and grade-placement age.

Table 3 (continued)

Definition		Criteria
7.	Woodcock-Johnson Severe Deficit	Scholastic aptitude and achievement scores from the Woodcock-Johnson Psycho-Educational Battery were used to determine the student's functioning level (i.e., degree of discrepancy)
Low Achievement		
8.	Standard Score Cut-off	Achievement in one or more areas at or below cut-off criterion of 85. Standard scores for W-J Reading, W-J Mathematics, and W-J Written Language Achievement as well as PIAT Mathematics and PIAT Reading were evaluated.
9.	Standard Score Cut-Off	Achievement in one or more areas at or below cut-off criterion of 77. Standard scores for W-J Reading, W-J Mathematics, and W-J Written Language Achievement as well as PIAT Mathematics and PIAT Reading were evaluated.
10.	Standard Score Cut-Off	Achievement in one or more areas at or below cut-off criterion of 70. Standard scores for W-J Reading, W-J Mathematics, and W-J Written Language Achievement as well as PIAT Mathematics and PIAT Reading were evaluated.
11.	Standard Score Cut-Off	Achievement in one or more areas at or below cut-off criterion of 85. Standard scores for W-J Written Language and W-J Mathematics as well as PIAT Mathematics and PIAT Reading were compared. The definition is identical to #8, except that W-J Reading was not included in this definition.
Scatter		
12.	Verbal-Performance Discrepancy	Difference of 9 or more points between WISC-R Verbal and Performance standard scores.
13.	Verbal-Performance Discrepancy	Difference of 12 or more points between WISC-R Verbal and Performance standard scores.
14.	Verbal-Performance Discrepancy	Difference of 15 or more points between WISC-R Verbal and Performance standard scores.
15.	Subtest Scatter	Difference of 10 or more points between scaled scores on highest and lowest WISC-R subtests.

Table 3 (continued)

Definition	Criteria
16. Subtest Scatter	Bannatyne's (1979) recategorization of the WISC-R was used in which the Spatial category (Picture Completion, Block Design, and Object Assembly) was greater than the Conceptualizing category (Similarities, Vocabulary, and Comprehension) which in turn was greater than the Sequencing category (Arithmetic, Coding and Digit Span).
17. Subtest Scatter	Significant differences between Bannatyne's (1979 categories in which the Spatial category score was at least 7 points greater than the Conceptualizing category score which in turn was at least 7 points greater than the Sequencing category score.

Table 4

Frequencies and Percentages of Regular Classroom Students (Study 1) Classified by Each of 17 Operational Definitions[a]

Definition	Third Grade		Fifth Grade		Twelfth Grade		Total	
	N	%	N	%	N	%		
1	3	4	1	1	17	25	21	10
2	30	46	43	63	54	84	127	65
3	9	14	14	21	27	42	50	25
4	2	3	0	0	6	9	8	4
5	2	3	0	0	13	19	15	7
6	18	23	28	39	52	75	98	45
7	4	5	2	3	8	11	14	6
8	14	17	15	19	27	37	56	25
9	3	4	5	6	9	12	17	7
10	1	1	1	1	7	10	9	4
11	13	16	11	14	23	31	47	20
12	42	51	42	52	34	41	118	48
13	33	40	32	40	27	32	92	37
14	19	23	20	25	15	18	54	22
15	9	11	12	15	7	9	28	12
16	14	17	12	15	16	20	42	17
17	1	1	1	1	3	4	5	2

[a]Percentages were adjusted for missing cases.

Table 5

Numbers and Percentages of Normal Students (Study 1) Classified as LD by Various Numbers of Operational Definitions of LD

Number of Definitions	Number of Students Classified as LD	Cumulative N	Cumulative %
1	42	211	85.1
2	33	169	68.1
3	35	136	54.8
4	30	101	40.1
5	27	71	28.6
6	21	44	17.7
7	8	23	9.3
8	5	15	6.0
9	1	10	4.0
10	3	9	3.6
11	3	6	2.4
12	1	3	1.2
13	1	2	0.8
14	1	1	0.4
15	0	0	0.0
16	0	0	0.0
17	0	0	0.0

Table 6

Comparison of Ability and Achievement Scores of Normal Students Classified and Not Classified as LD[a]

	Student Group			
	Classified		Not Classified	
Ability Scores				
Verbal-Scale IQ	106.1	(13.2)	103.6	(8.8)
Performance-Scale IQ	106.8	(12.5)	102.9	(9.8)
Full-Scale IQ	106.9	(12.2)	103.5	(9.8)
Achievement Scores				
Woodcock-Johnson				
Mathematics	103.9	(16.2)	108.2	(12.3)
*Written Language	100.4	(15.5)	108.4	(9.1)
PIAT				
Mathematics	105.5	(11.0)	106.9	(7.5)
*Reading Recognition	101.4	(11.5)	104.5	(7.8)
*Reading Comprehension	103.2	(11.9)	110.7	(6.9)
*Spelling	97.9	(13.0)	107.3	(8.0)

[a]Test scores are standard scores with means of 100 and standard deviations of 15. Numbers in parentheses are standard deviations.
*Difference significant at 0.01 level.

Table 7

Frequencies and Percentages of School-Identified LD Students and Low-Achieving Students (Study 2) Classified as LD by 17 Operational Definitions[a]

Definition	Labeled LD Sample N	%	Low-Achieving Sample N	%	Total N	%
1	2	4	9	18	11	11
2	30	70	32	76	62	73
3	17	40	19	45	36	42
4	2	5	5	12	7	8
5	1	2	3	6	4	4
6	25	51	43	86	68	69
7	5	10	7	14	12	12
8	21	43	36	74	57	58
9	3	6	13	27	16	16
10	0	0	2	4	2	2
11	19	39	33	67	52	53
12	19	39	25	50	44	55
13	13	27	16	32	29	29
14	6	12	15	30	21	21
15	14	29	7	14	21	21
16	8	16	12	25	20	20
17	2	4	1	2	3	3

[a]Percentages were adjusted for missing cases.

Table 8

Numbers and Percentages of School-Identified LD Students and Low-Achieving Students (Study 2) Classified as LD by Various Numbers of Operational Definitions of LD

Number of Definitions	School-Identified LD Students			Low-Achieving Students		
	Number Classified as LD	Cumulative N	Cumulative %	Number Classified as LD	Cumulative N	Cumulative %
1	4	48	96.0	3	43	87.8
2	1	44	88.0	9	40	81.6
3	4	43	86.0	11	31	63.3
4	6	39	78.0	5	20	40.8
5	8	33	66.0	3	15	30.6
6	6	25	50.0	4	12	24.5
7	8	19	38.0	2	8	16.3
8	4	11	22.0	2	6	12.2
9	3	7	14.0	2	4	8.2
10	1	4	8.0	0	4	8.2
11	1	3	6.0	1	2	4.1
12-15	2	2	4.0	1	1	2.0

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