DIAGNOSTIC AND CLASSIFICATION ACCURACY
FOR MILDLY MENTALLY HANDICAPPED CHILDREN

by

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Date February 8, 1990
The purpose of this study was to examine the diagnostic and classification accuracy of placement decisions for Mildly/Educably Mentally Handicapped (M/EMH) children in British Columbia. Evidence from the United States suggests that classification decisions are often made on the basis of idiosyncratic student behaviours and the subjective opinions of educators, not on the basis of empirical evidence. Although Canadian special education practice is often based on that of the U.S., no major study of the accuracy of diagnosis and classification has been undertaken in this country.

Based on a review of the literature, internationally accepted criteria for the diagnosis and classification of M/EMH students were formulated. In addition, variables that might influence the use of these criteria were identified.

Elementary age students from two metropolitan Vancouver school districts who had been suspected of being M/EMH during a two-year period served as subjects (n=106). Of these 57 were classified as M/EMH and 49 were classified as regular education. An evaluation of IQ, adaptive behaviour, reading and arithmetic achievement, maladaptation, and visual and hearing acuity was performed for each subject.
Preliminary data analyses permitted the formation of an achievement composite score and the pooling of subjects from the two districts. Using an internationally accepted two-factor diagnostic model, analyses were performed to investigate the classification accuracy for the sample. Cut-off criteria used with the two-factor model were adjusted to those of both the American Association for Mental Deficiency and the draft B.C. Special Education Guidelines. Where subjects could not be confirmed by the application of these models, sources of classification error were identified.

Next, a series of discriminant function analyses, each representing a historical step in the development of diagnostic and classification models, were performed and the classification accuracy of each examined. Finally, a full model of all measured variables was examined using both a forced discriminant function procedure and a step-wise technique.

The findings suggested that a combination of the adaptive behaviour, IQ, and achievement variables provided the highest classification accuracy. This result is consistent with much of the research from the U.S. IQ scores were found to consistently dominate classification decisions. In addition, academic achievement proved to be a
valid predictor, either in combination with social adaptation or maladaptation. However, maladaptive behaviour, whenever entered with social adaptation, overwhelmed the latter as a discriminator of group membership. The highest classification rate for the total sample was 92.0% for the combination of adaptive behaviour, IQ, and academic achievement.

Although visual and hearing acuity were not found to be related to group membership, it was discovered that testing for these variables was not occurring in the districts studied in accordance with accepted best practice. A disproportionate number of M/EMH students proved to be untestable using school-based audiological and visual sweep testing techniques. In cases of untestability, the assumption that the child can see and hear within normal tolerances appears to be made, and efforts to use alternative testing procedures are not pursued. In addition, visual and hearing testing appears to occur after the administration of standardized cognitive tests, and not before, as best practices would dictate.

The principal contributions of this research are (1) that it is the first major study of diagnostic and classification accuracy with a Canadian M/EMH population, (2) that it advises the inclusion of academic achievement as
a domain of adaptive behaviour based on empirical evidence of the importance of that variable in diagnosing M/EMH, and
(3) it examines the role of auditory and visual acuity testing in M/EMH diagnosis and classification.
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Chapter 1
Introduction and Delineation of the Problem

Introduction to the Problem

The placement of a child into a special education program, a process expedited by testing and labelling, has been described as "perhaps the most serious decision that educators can make." (Tymitz, 1984, p. 12)

Diagnosis and Placement Issues

Special education programmes for the Mildly/Educably Mentally Handicapped (M/EMH) showed rapid growth during the 1960’s and 1970’s. In British Columbia, special education programmes grew at a rate six times that of regular school programmes during the 1960s. A significant portion of that growth was accounted for by students labelled as M/EMH (Ballance, Kendall, & Saywell, 1972; Kendall, 1980). This rapid expansion of special education programmes required that students who had previously not been receiving special education services be located and declared eligible.

Throughout the 1970’s, especially in the United States, questions about the correct definition and procedures for assessment of M/EMH received increasing attention. Both state and federal education authorities allocated large amounts of research funding for investigations of diagnostic
and placement procedures. At the same time that professional researchers were exploring these questions and positing procedures for ensuring fair and accurate diagnostic and placement practices, court actions were being fought over these same issues. In both Diana (1972) and Larry P. (1972) versus the State of California, minority group youngsters who had been placed into special education classes for M/EMH successfully sued school authorities. In their decisions, the courts noted the seriousness of inappropriate placements into special education programmes, stating that such placements could result in consonant loss of educational opportunity and unwarranted social stigmatization. The courts upheld the allegation that existing placement and assessment practices were inappropriate, especially for minority group children. Judicial decisions often excoriated special education services for inappropriate testing procedures, the use of biased assessment instruments, lack of programme monitoring, and excessive zeal in labelling children (MacMillan, 1982; Polloway & Smith, 1983; Reschly, 1988; Reschly, Kicklighter & McKee, 1988).

At the heart of these actions, as well as much of the professional debate, was the definition of mental retardation itself. At that time, the primary tool in the
diagnosis of M/EMH was the intelligence (IQ) test. It was the use of IQ tests more than any factor that led to challenges to diagnostic and placement practice (Goodman, 1977; Hartshorne & Hoyt, 1986; Hobbs, 1975; Mercer, 1972, 1973; Reschly, Kicklighter, & McKee, 1988; Reschly, 1988).

**Two-Factor Diagnostic Model for M/EMH**

The culmination both of court actions and professional research and debate came in the passage of Public Law 94-142 (PL 94-142), the Education of All Handicapped Children Act (1975). Embodied in this act was the notion that a multi-factor, multi-disciplinary model for the diagnosis and placement of special needs students should be followed. In this model, a variety of factors were identified as being of unique importance in diagnosing and placing students within categorical labels of handicap. These factors were then assessed by the members of a multi-disciplinary team. The team was comprised of members from appropriate fields of professional expertise who actively collaborated in decision making. For M/EMH children specifically, a two-factor diagnostic model based on the equal co-factors of general cognitive ability and adaptive behaviour was considered best practice (MacMillan, 1982; Polloway & Smith, 1983; Reschly, 1982, 1986). In the two-factor model students tested must score below a set standard on both an individually
administered intelligence test and a test of adaptive behaviour in order to be classified as mentally handicapped. This two-factor model, which had been initially posited by the American Association on Mental Retardation (AAMR) in 1959 (Grossman, 1983), was rapidly accepted both within the United States and internationally as the most appropriate diagnostic model. Referring to this model, the National Association of School Psychologists (NASP) described its use as "both mandatory and indispensable" (Reschly, 1985, p. 353). Similar views were put forward by both the American Psychiatric Association and the World Health Organization (Grossman, 1983).

Reductions in M/EMH Placements

Although the tenets of best practice and federal law in the United States continue to demand the application of the two-factor model within a multi-disciplinary framework, there is evidence to suggest that these procedures have not effectively stopped or even significantly reduced inappropriate labelling and placement (Grade, Casey, & Christianson, 1985; Knoff, 1983, 1984;). Although it has been noted that within the classification M/EMH there has been a reduction of as much as 17% in the total number of children labelled and placed (Forness, 1985; Lambert, 1981; Polloway, Epstein & Cullinan, 1985), recent authors argue
that this reduction is simply the result of a more stringent application of the IQ requirement of the two-factor model. By lowering the upper accepted range of IQ scores for M/EMH classification, significant numbers of students are no longer labelled as M/EMH. McMillan and Borthwick (1980) have noted that the lowering of the upper IQ score for the M/EMH classification from 85 to 75 does not necessarily reflect a fairer or more sophisticated diagnostic and placement procedure. These authors suggest that the exclusion of students whose IQ scores fall between 75 and 85 simply generates a more select and "patently disabled group" (p. 155). Indeed, Gottlieb (1981) has noted that the upper end of the IQ range has, in practice, moved well below an IQ cut-off of 75, with the label of mild mental handicap appearing "to be reserved for the lower end of the IQ range, usually for children having an IQ of about 65 or lower" (p.124). Consequently, authors concerned with diagnosis, placement, and programming for M/EMH students have more recently called attention to those students who were once, but perhaps no longer are served by the special education system. This large group of students constitutes what McMillan (1988) described as "an unserved segment which is 'socially promoted' from grade to grade with their academic deficiencies being undetected or ignored" (p. 280).
McMillan further suggests that this apparent oversight of an unserved group (high end M/EMH) is further compounded by the attitude of professional organizations "such as CEC (Council for Exceptional Children), (and) AAMD (American Association on Mental Deficiency) ...(which are) less concerned with mild mental retardation than with severely handicapped or LD (learning disabled)" (p. 275).

Changes in the Severity of Deficits in M/EMH Populations

Within the M/EMH classification, problems common throughout the field of special education have been seen. Grade et al. (1985), for example, have noted that "current practices in special education can be characterized as inconsistent and problematic at each phase of the assessment and decision-making process - for [sic] referral, to testing, for [sic] identification/classification, to decision making, for [sic] eligibility determination and program planning" (p. 378). These general problems may be compounded for M/EMH students because of the alterations that have taken place in basic definitions of M/EMH, especially those alterations which have resulted in M/EMH classes containing fewer children in the upper range of the M/EMH and borderline classifications. McMillan and Meyers (1984), for example, argue that the kinds of students presently enrolled in M/EMH classes are so unlike those
enrolled prior to 1973 that research performed before PL94-142, and on which much intervention research was based, may be invalid for today’s M/EMH students (p. 478). 

IQ Scores and Overrepresentation

Childs (1982) found that even under legal and professional constraints, up to 88% of minority group children and 80% of all other children placed into U.S. public school classes for M/EMH could not be confirmed in their placements through the use of the two-factor model, even though that was the model which was required for use in making the original placement decisions. These findings are consistent with observations made by other researchers that it is the IQ test score that appears to be the primary determinant in M/EMH placement. Turnbull and Turnbull (1986) have termed this reliance on general intelligence test scores the "hypnotic effect (of) a student’s IQ" (p. 179). Although, in deference to PL94-142, compliance in administering the second component of the two-factor model (adaptive behaviour) seems almost universal in the United States, it is often simply overwhelmed by the attraction that the IQ score appears to hold over those responsible for making diagnostic and placement decisions (Childs, 1982;

**Visual and Hearing Acuity**

The factors of visual and hearing acuity that should be considered in making a valid multi-disciplinary diagnosis and placement of M/EMH also appear to have been overlooked. It has been repeatedly demonstrated that vision and hearing difficulties appear within the mentally handicapped population with greater-than-average frequency (Fulton & Lloyd, 1969; Nolan & Tucker, 1984; Rogow, 1988). Because of this demonstrated relationship between visual and auditory acuity and mental handicap, and also because undetected hearing and visual acuity problems can generate spurious test scores, repeated calls for the careful examination of vision and hearing as part of the multi-disciplinary evaluation have been made (Fulton & Lloyd, 1969; Gearhardt & Litton, 1979; Gerken, 1986; Hartshorne & Hoyt, 1977; President’s Committee on Mental Retardation, 1970). Such evaluations have not, however, been emphasized either within the accepted two-factor diagnostic model or in practice despite the fact that they are required by PL94-142 (Grossman, 1983). The United States literature on diagnosis and placement of M/EMH students is surprisingly void of
attempts to investigate the function of visual and hearing acuity in diagnosis and placement.

Academic Achievement

In addition to the lack of consideration of the roles of visual and hearing acuity in M/EMH diagnosis, academic achievement also appears to have been, until recently, overlooked. Although academic achievement can easily be argued as a critical component of adaptation to a school environment (Reschly, 1982, 1988; Reschly & Gresham, 1988), it is not implicitly a part of the two-factor diagnostic model.

Many of the major tests of adaptive behaviour such as the Vineland - R (Sparrow, Balla, & Cicchetti, 1984) and the Adaptive Behavior Inventory for Children (Mercer & Lewis, 1977), do not include achievement as a sub-domain of school adaptation. Yet the findings of Ysseldyke et al (1983) suggest that lack of academic achievement may contribute heavily to teacher belief that a child may be mentally handicapped. The degree to which lack of academic achievement contributes to M/EMH referrals as well as the legitimacy of including academic performance as a domain of school adaptation is in need of study.

Reduction of Professional Interest in the M/EMH

An examination of the special education literature
shows that during the 1960s and 1970s issues related to the valid and reliable diagnosis and placement of M/EMH children were central concerns in the fields of special education and educational psychology (Bersoff, 1982; Cruickshank, 1983; Csapo, 1980, 1981; McMillan, 1988; Mercer, 1965, 1973; Reschly, 1983, 1985). During the early 1980s, however, interest in M/EMH children, especially those at the upper end of that classification, began to wane. Several authors have examined this lack of interest (Forness, 1985; McMillan, 1988; Polloway & Smith, 1983), and possible reasons for it have been put forth. These have included a shift of professional attention to learning disabilities and more severe mental handicaps, and a pervasive belief among special educators that problems associated with the M/EMH population were resolved in the 1970s.

Development of Special Education in Canada

If, as described by McMillan (1988), M/EMH children in the United States have become the "stepchildren" (p. 273) of special education, what of M/EMH children in Canada?

Under the Constitution Act of 1867 (the British North America Act), and later re-affirmed in the Constitution Act of 1982, the education of school-aged children in Canada is the sole and legal responsibility of the provinces. As with all educational legislation, special education law has
evolved separately in each provincial jurisdiction (Cruickshank, 1983; Csapo, 1980, 1981; Poirier, Goguen, & Leslie, 1988). Consequently there are differences among provinces on such fundamental issues as the definition of handicapping conditions, placement practices, and programming.

Although some provinces and many local school districts have emulated the models developed in the United States under the provisions of PL94-142, Poirier et al (1988) have noted that "...no Canadian province has gone so far as the U.S. Act" (p. 73). In addition, recent studies have shown that Canadian student performance on both intelligence and achievement tests is significantly higher and with less dispersion than that of U.S. students (Holmes, 1981; Peters, 1976; Wormeli, 1984).

Since the beginning of the period of rapid special education growth in the 1960's, Canadian special education researchers have drawn attention to the shortcomings of Canadian legislation. In addition, they have pointed out the lack of empirical studies on the efficacy of Canadian diagnostic and placement practices and procedures (Csapo, 1980, 1981; Hall & Dennis, 1968; Lazure & Roberts, 1970; Goguen, 1980; Poirier & Goguen, 1986; Poirier et al., 1988). Csapo (1981) commented, "...the education of handicapped
children (in Canada) is grievously neglected and suffering" (p. 197), while Cruickshank (1983) noted "there is an increasing clamor in the special education field for changes to be brought about" (p. 218).

Such calls for action have gone largely unanswered. Unlike the United States, in Canada there has been neither the compunction of federal education law nor the danger of costly litigation to stimulate more immediate action. However, the adoption of the Canadian Charter of Rights and Freedoms of the Canada Constitution Act (1982) now makes it possible for handicapped individuals or groups representing them to challenge provincial special education diagnostic and placement practices in the Supreme Court of Canada which "...is the supreme law of Canada and applies to provincial education legislation and to school boards" (Poirier et al., 1988, p. 25). Canadian diagnostic and placement practices for M/EMH children will likely fall under the same kind of scrutiny as did those in the United States during the early 1970's. Predictably, the results obtained will be "similar to those attained in the United States" (Poirier et al., 1988, p. 77).

Carter and Rogers (1988) recently surveyed both provincial and territorial laws and guidelines, as well as local school district practices, with respect to the
definition, assessment, labelling, and re-evaluation of M/EMH students. An important finding of their research is that there are important and even alarming differences both between and within provinces in terms of practices.

Although our perusal of individual provincial procedures clearly shows much that is encouraging, it is the analysis of the Canadian picture in its entirety that is of concern. Depending upon which jurisdiction a student resides in, the potential for that student being diagnosed as M/EMH using arbitrary procedures, of being labelled without reference to potentially invaluable data, and of being left in a special education programme without re-evaluation is high, indeed too high. (p. 21)

Among the recommendations made by Carter and Rogers (1988) is one which is critical to this study: "local school district authorities [should] examine their practices using these same frames of reference [even] where their ministries of education are reluctant to do so" (p. 22). The frames of reference referred to are the standards implicit in U.S. PL94-142 which demand a two-factor diagnostic model performed after taking into consideration possible visual or hearing anomalies.
Repeatedly, Canadian authors (Csapo, 1980, 1981; Goguen, 1980; Hall & Dennis, 1968; Lazure & Roberts, 1970; Poirier & Goguen, 1986; Poirier et al., 1988) have called for the adoption of practices like those embodied within PL94-142 in the United States. As has been pointed out, Canadian practice shows wide variation both between provinces based on their unique legislation, and within provinces, as local school boards have sought to implement appropriate diagnostic and placement procedures. The evidence is that, even though PL94-142 has shaped much of Canadian practice in diagnosing and placing students into special class programmes for M/EMH, Canadian diagnostic and placement practices with respect to this large grouping of special education students have not been studied sufficiently.

If, as McMillan (1988) points out, in the United States there has been "an extremely limited amount of work published on this (M/EMH) ...group of children" (p. 273), this same group of children in Canada is at least in need of immediate study.

Purpose of the Study

The purpose of this study was to examine the validity of diagnostic and assessment practices with respect to
Mildly/Educably Mentally Handicapped children. Using the accepted international standards of the two-factor diagnostic model, and recognizing the vital, if often overlooked importance of determining visual and hearing acuity as a part of that diagnostic process, a study of students referred for consideration as M/EMH was conducted. As will be shown in Chapter 2, research into diagnosis and placement of M/EMH children demonstrates four major weaknesses, with the first being specific to the Canadian education milieu:

1. studies have been done on the United States population, a population demonstrated to be different from the Canadian school population (Holmes, 1981; Peters, 1976; Wormeli, 1984);

2. although many studies have employed the two-factor model (IQ and adaptive behavior), few have included the critical components of visual and hearing acuity;

3. studies that have included measures of adaptive behaviour generally have not included academic achievement as an adaptive domain;

4. the emphasis of research has been on children inappropriately placed into M/EMH programmes (false positives) but not on children possibly inappropriately
rejected for M/EMH programmes (false negatives).

Research Questions

This study addresses these weaknesses by answering the following general research questions based on a sample drawn from two large school districts in the Province of B.C.:

1. Are there differences between students referred for placement and placed in programmes for the M/EMH and those referred and not placed? (Figure 1 represents a typical placement decision grid for deciding those placed versus not placed). More specifically:

   a. are students who have been assessed and placed as M/EMH confirmable in that placement, based on the standards of the two-factor diagnostic model; and,

   b. can students who have been assessed and not placed be confirmed as inappropriate for placement as M/EMH, based on the standards of the two-factor diagnostic model; and,

2. What factors provide the best explanation of current placement decisions? Specifically, what is the contribution of the variables IQ, adaptive behaviour, academic achievement, maladaptation, and visual and hearing acuity to the placement of these students?
Figure 1

Typical Referral and Diagnostic procedures in Seeking Placement into an M/EMH Class

Referral of suspected M/EMH by classroom teacher

principal and parental consent obtained

psycho-educational assessment performed by district psychologist

label as M/EMH do not label as M/EMH

refer to district special class screening committee do not refer to district special class screening committee

place into M/EMH programme do not place into M/EMH

on-going evaluation consider another category

place in another category apply to another category do not apply

return to regular class

END

END

END

END

a. Based on a metro Vancouver school district.
b. Screening committees have the authority to place a child in an alternative programme, psychologists can only request such action of a screening committee.
These questions were investigated by comparing placement decisions against the standards of the AAMD two-factor diagnostic model, with the IQ and adaptive behaviour components adjusted to two possible cut-off criteria; standard score (s.s.) 75, representing the upper limit of the AAMD criteria (Grossman, 1983), and s.s. 69, representing the current B.C. Ministry of Education draft Special Education Guidelines (see Appendix A). It should be recognized that in the literature there is considerable variation in the standard score cut-off criteria used. The two criteria selected for this study (that of the A.A.M.D. and Proposed B.C. Draft Guidelines) were selected since the former is the most clearly established international criterion, and the latter is of local importance. In addition, data with respect to each student’s IQ, adaptive behaviour, maladaptive behaviour, academic achievement, and visual and hearing acuity were collected and analyzed using a variety of discriminant function procedures. This analysis was used to determine which of the measured variables were contributing to actual placement decisions.

Delimitations of the Study

The study was conducted with students who had been referred for consideration as Mildly/Educably Mentally
Handicapped in two Metropolitan Vancouver school districts since May 1, 1987. All of these students were still in the elementary school system at the time of data collection (April 17 - May 26, 1989).

The restriction of current school placement was included to ensure that the BC Quick Individual Educational Test (BC QUIET), which is an individualized achievement test designed for use with elementary school students, could be used with all subjects. The rationale for the selection of the BC QUIET and other assessment instruments is provided in Chapter 3.

Justification for the Study

As will be demonstrated in Chapter 2, there is abundant evidence to support the notion that large numbers of students are inappropriately labelled and placed into M/EMH programmes in the United States. This occurs even in the presence of strong federal law, "best practices," and the threat of litigation. Although tests of adequate technical qualities for appropriate decision-making are available, their application often appears confounded by placement teams relying too heavily on IQ scores and allowing "clinical judgement" to sway decisions.

In Canada, in the absence of federal law and a history of aggressive litigation, educators have made calls to
emulate the procedures mandated in the United States with respect to the diagnosis and placement of M/EMH students. This has been done in the absence of substantive evidence that current Canadian practices are either appropriate or inappropriate. Using accepted international diagnostic criteria, and including measures of visual and auditory acuity which have not typically been included in studies of this population, this research comes at a time of great potential change in Canadian special education. The motivation for designing this study is the author's original bias, based on field experience, that students are often labelled and placed as M/EMH not because they meet the standards of the two factor diagnostic model, but for other reasons.

**Definition of Terms**

The following definitions will be used throughout this research:

**Mental Retardation** (Mental Handicap): significantly subaverage general intellectual functioning existing concurrently with deficits in adaptive behaviour and manifested during the developmental period (Grossman, 1983, p. 11).

**General Intellectual Functioning**: is operationally defined as the results obtained by assessment with one or
more of the individually administered standardized general intelligence tests developed for the purpose (Grossman, 1983, p. 11).

**Significantly Subaverage General Intellectual Functioning:** an IQ score below 70 on standardized measures of intelligence; however, it is often extended upward through IQ 75 to allow for error of measurement (Grossman, 1983, p. 11).

**Deficits in Adaptive Behaviour:** limitations in an individual's effectiveness in meeting standards of maturation, learning, personal independence, and/or social responsibility that are expected for his or her age level and cultural group, as determined by clinical assessment and, usually, standardized tests of social adaptation (Grossman, 1983, p. 11).

**Mild (Educable) Mental Handicap (Retardation):** an IQ score on tests of general intellectual functioning of between 50 and 75 existing concurrently with adaptive behaviour test scores below approximately the third percentile (Grossman, 1983, p. 11; Reschly, 1982, p. 234).

**Developmental Period:** the period of time between conception and the 18th birthday (Grossman, 1983, p. 11).

**Hearing Loss:** a "significant hearing loss" is defined as a loss in either ear of 30 dB, at any of 1,000, 2,000, or
4,000 Hz, on a sweep test of hearing acuity using a pure tone audiometer (Newby & Popelka, 1985, p. 286).

**Visual Loss:** two factors must be taken into consideration in screening subjects:

A. visual acuity: the ability of the child to accurately see and interpret visual stimuli as measured by a standardized test. A score of 20/40 (corrected) for children aged four to grade three and a score of 20/30 or less (corrected) for children at or above the fourth grade in both or the worst eye using accepted practice with the Snellen visual acuity chart (Randall & Lawrence, 1977, p. 56; Winzer, Rogow & David, 1987, p. 346).

B. visual anomalies: while administering the Snellen visual acuity test, or during other opportune times, the examiner should note any of the following: (Harley & Randall, 1977, p. 58)

- crusts on the eyelids
- crusts among the eyelashes
- red or swollen eyelids
- watery or discharging eyes
- sensitivity to light
- reddened conjunctiva
- lack of coordination in focussing the eyes
- excessive eye rubbing or brushing
squinting
standing excessively far from or close to visual stimuli.

Two-factor Diagnostic Model: a determination of mental handicap based on the simultaneous finding of significantly low general intellectual functioning and adaptive behaviour on appropriately selected and administered standardized tests. This model is represented in figure 2 (Grossman, 1983, p. 12).
Figure 2

Two-factor Diagnostic Model
for Mental Handicap

<table>
<thead>
<tr>
<th>General Intellectual Ability (IQ)</th>
<th>Retarded</th>
<th>Not Retarded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adaptive Behaviour</td>
<td>Retarded</td>
<td>Diagnosis: &quot;retarded&quot;</td>
</tr>
<tr>
<td>Not Retarded</td>
<td>Diagnosis: &quot;not retarded&quot;</td>
<td>Diagnosis: &quot;not retarded&quot;</td>
</tr>
</tbody>
</table>

Chapter 2

Review of the Literature

It is ironic that during the 1960s and 1970s the major issues that confronted special education and mental retardation concerned mildly mentally retarded (MMR) children, while today that same group of children are the stepchildren of special education. (McMillan, 1988, p. 273)

The literature review is divided into four sections:

(1) an historical review of early concepts and definitions of mental handicap from the nineteenth century;

(2) an examination of the relative roles of IQ and adaptive behaviour from the introduction of the first IQ test in 1905 up until the passage of U.S. Public Law 94-142 in 1973;

(3) a review of the development of Canadian special education; and,

(4) a review of three major studies conducted since the passage of PL94-142 which are central to this research.

The Nineteenth Century

Although the historical study of mental handicap is a fascinating one, and one which has been dealt with ably by many authors (Gearheart & Litton, 1979; Grossman, 1983;
Sloan, 1963), it is the history of one aspect of the education of mentally handicapped children subsequent to the beginning of the nineteenth century that is salient to this study. That aspect is the definition of what constituted a mental handicap in general, and a Mild or Educable Mental Handicap in particular, and the way in which assessment practices intended to reflect the latter were formulated and applied. Although serious efforts have been made by a variety of cultures to understand and address the needs of mentally handicapped individuals, it is the development of the two-factor model, one which includes both low general cognitive ability along with significant deficits in adaptive behaviour, that is of concern to this study.

In 1799, the French physician Jean Itard had his first contact with Victor, the so called "Wild Boy of Aveyron." This twelve year old feral child had previously been diagnosed as having "incurable and irreversible" mental retardation (Gearheart & Litton, 1979, p. 3). Itard believed that "sensation training" could bring about improvement in Victor. Although after almost five years of intensive intervention Itard concluded that he had failed to bring about significant improvement, the French Academy of Sciences highly commended his efforts in this area of "educational science" (Gearheart & Litton, 1979, p.4).
In addition to compassionately addressing the circumstances of this unfortunate boy, Itard's work is important for two reasons: firstly, that he scientifically and methodically sought to bring about improvement in a seriously disabled child, and secondly that his "sensation training," which was broken down into five "aims" clearly addressed social adaptation as the fundamental need in Victor's life. Indeed, in his hierarchical list of aims for Victor's education, Itard placed "to interest him in social life" as the first aim, and "to extend his range of thought" as the third aim (Cleland, 1978, pp. 6-7). Itard's five aims clearly foreshadowed the roles of adaptive behaviour and general intelligence that form the basis for the most universally accepted definition of mental handicap today. The importance of Itard's work in anticipating current thinking in the area of mental handicap cannot be underestimated. In addition to his emphasis on adaptive behaviour, and his use of what we might now term general intelligence as a co-factor, the methods of education that he employed, particularly his emphasis on the modification of and adaptation to the environment, are contemporary. As Cleland (1978) points out in discussing Itard's foreword to his book The Wild Boy of Aveyron, "Itard's Wild Boy was the first text to focus on teaching methods for the retarded; it
is still, in many respects, one of the best 'methods' texts" (p. 272).

In addition to Itard, other strong advocates of the role of social adaptation and the ameliorability of mental handicap were prominent in the nineteenth century. Among these were Sequin, a pupil of Itard's, Voisin, and Montessori, who, although her work is most commonly associated with the education of non-disabled children, began her work with the mentally handicapped.

From IQ tests to PL94-142 (1905 - 1973)

By the turn of the 19th century, governments were becoming increasingly interested in the parameters of mental retardation. This interest was sparked by the provision of universal public school education and the desire to identify, for the purposes of assisting or excluding, mentally handicapped children (Rush, Rose, & Greenwood, 1988).

Development and Impact of IQ Testing

In 1904, the French government contracted Alfred Binet to devise a means whereby, through some form of testing, mentally handicapped students could be differentiated from those who were capable of academic success within the regular education programme. The results of his research came in 1905 with the production of the Binet-Simon Scale of
Intelligence, the first IQ test.

The development and overwhelming acceptance of the IQ test, it has been argued, was responsible for the development of the contemporary construct of Mild/Educable Mental Handicap (Reschly, 1988). It has subsequently been held responsible for the emphasis placed on IQ scores to the detriment of other valuable educational information (Reschly, 1988; Turnbull & Turnbull, 1986; Knoff, 1984).

Recently, however, MacMillan (1982) has pointed out that special class programmes for M/EMH children were established in the United States as early as 1890, approximately 15 years before the publication of the Binet-Simon Scale. MacMillan suggests that the development of this particular classification of mental handicap was not triggered by Binet's work. It appears patent that educators, prior to the availability of the IQ test, diagnosed and placed children into programmes designed to serve mildly mentally handicapped children. Nonetheless, it can still be convincingly argued that the availability of an instrument such as the Binet and later the American Stanford-Binet, profoundly accelerated the diagnosis and placement of large numbers of M/EMH children. Sapon-Shevin (1989), in summarizing contemporary views of the role of the IQ test in labelling mildly handicapped students, has
suggested that although the IQ test itself is not a "mischievous" (p. 87) instrument, when combined with Differential funding for special education and the need for a scientific basis to support segregation (it may) have provided an incentive for classifying as many students as possible as mentally retarded. (p. 87)

According to Cronbach (1970), the introduction of the Stanford-Binet Scales of Intelligence into the United States was welcomed "enthusiastically" (p. 201) with the instrument quickly becoming "...central to research and practice ...indeed from 1920 to 1940 the main function of the clinical psychologist was to 'give Binets' in schools and other institutions" (p. 201).

Cronbach goes on to link certain specific concepts about the nature of mental retardation directly to this practice of 'giving Binets'. In spite of the earlier work of Itard, Voisin, and Sequin in which the role of adaptive behaviour was given prominence over the role of general intelligence, and in spite of the clear belief by these earlier researchers and educators that mental retardation was amenable to intervention, the majority of psychologists using the Binet Scales disagreed. These practitioners relied on IQ scores virtually alone for the purposes of diagnosis and placement and "usually held the view that a
person's rate of mental development, and the level he will ultimately reach, are essentially fixed" (Cronbach, 1970, p. 202) as a result of their IQ. This argument was an important component of a debate which would continue throughout this century, that of the so called "nature-nurture controversy" (Lefrancois, 1988, pp. 142-143).

Renewal of Interest in Adaptive Behaviour

It has been suggested that the concept of social adaptation reflected in the work of Itard, Voisin, and Sequin was quite effectively replaced by the IQ test. Although the IQ test had become an overwhelming force in diagnosing and placing children as M/EMH, it cannot be concluded that Binet himself was insensitive to the idea of social adaptation as an important component in the definition of mental retardation. This was clearly reflected in the intervention methodology which Binet helped develop for use with mentally handicapped children. "Mental Orthopedics," a philosophy set out in Binet's Modern Ideas About Children (c. 1910, in Cleland, 1978, p. 9), clearly demonstrated that Binet recognized that mental retardation was not necessarily a fixed attribute, but one which could be socially determined and which was amenable to corrective action.

An individual is normal when he is able to conduct
himself in life without heed of the guardianship of another, and is able to perform work sufficiently remunerative to supply his personal needs, and finally when his intelligence does not exclude him from the social rank of his parents. As a result of this, an attorney's son who is reduced by his intelligence to the condition of a menial employee is a moron; likewise the son of a master mason, who remains a servant of 30 years, is a moron; likewise a peasant, normal in ordinary surroundings of the fields, may be considered a moron in the city. (Binet, 1909, p.266)

In spite of such clear statements by the "father of intelligence tests," it is apparent that in the arena of diagnosis and placement decision making - the domain of the psychologist - a uni-factor model was being used in determining mental handicap, with that one factor being general intelligence as measured by an IQ test. By the late 1930s and early 1940s two authors raised serious challenges to the state that diagnostic and placement practices had reached by re-emphasizing the importance of adaptive behaviour in the definition of a mental handicap. Tredgold (1937), whose views on the euthanasia of severely handicapped children later tarnished his reputation, provided what has come to be called a "biological"
definition, but one which nonetheless emphasized the role of social adaptation.

(Mental retardation is) ...a state of incomplete mental development of such a kind and degree that the individual is incapable of adapting himself to the normal environment of his fellows in such a way as to maintain existence independently of supervision, control, or external support. (p. 4)

Doll (1941), the author of the Vineland Social Maturity Scale, the first device for the quantification of deficits in adaptive behaviour, proposed a more complete definition of mental handicap, suggesting that the following six criteria must be met in order that a mental handicap is said to exist. These are that the individual:

1. is socially incompetent,
2. is mentally subnormal,
3. is developmentally arrested, and that these deficiencies:
4. obtain at maturity,
5. are of constitutional origin,
6. are essentially incurable (p. 215).

Both Tredgold and Doll clearly called for a return to a definition of mental handicap that included social adaptation as an important if not critical component.
Binet, as previously discussed, recognized the importance of social adaptation as a co-factor with general intellectual ability. The calls of these people for the inclusion of social adaptation, and the abandonment of a significantly low IQ score alone as indicative of mental handicap, were met with a hostile reaction from much of the educational and psychological community. Those who advocated the use of the IQ score alone argued that the inclusion of social adaptation in the diagnosis of mental handicap was non-empirical, unmeasurable, and unscientific, while the IQ test, they argued, contained all of these characteristics (Goodman, 1977).

**Calls For a Two-Factor Model**

By the late 1960s and early 1970s, the deficiencies of this uni-dimensional model were becoming increasingly apparent. Mercer (1965) argued that the social environment in which a person lives is the most important factor in the determination of a mental handicap. Stressing that it is the ability of the individual to adapt to a particular environment that is the critical variable in whether a person is mentally handicapped, she stated "a person may be mentally retarded in one system and not mentally retarded in another. He may change his label by changing his group" (p. 21).
Mercer (1965) studied two institutionalized groups of persons labelled as mentally retarded. These two groups were matched for intelligence, age, sex, ethnicity, and number of years spent in the institution. She found that mentally handicapped individuals who were released to their families came from markedly lower socio-economic group families, while those from higher socio-economic families tended to be retained within the institution in disproportionately large numbers. Mercer also confirmed earlier studies that noted that the children of lower socio-economic families who were labelled as mentally handicapped were so labelled at a later age than the children of higher socio-economic status families. She reported that nearly 80% of the high status children had been labelled as retarded by age six, while only 36% of the low status children had been labelled. Here, it was argued, was clear evidence to support the belief that mental handicap was, at least in large degree, socially determined since low socio-economic status children were slower to be recognized within their poorer environments, and were deemed suitable for return to that environment more quickly than were the high status children. Based on this relationship between socio-economic status and mental retardation, Mercer argued that the use of IQ tests alone is inappropriate, since the IQ
tests would not be able to capture the degree to which a person is able to adapt to their social environment.

Mercer went on (1973) to argue strenuously for the inclusion of measures of social adaptation, as well as to make allowances for the cultural and social bias that were inherent in both intelligence tests and tests of social adaptation. She noted that, statistically, using a generally accepted cut-off criterion on standardized intelligence tests, 2.5% of all school age children would be labelled as mentally handicapped. However, when using both measures of IQ and social adaptation, this figure could be reduced by as much as 10 to 20 percent overall, with the population of students making up the difference being commonly referred to as the "six hour retarded" (President's Committee on Mental Retardation, 1970), namely those who are considered as retarded only for the hours when they are inside a school building.

Mercer criticized the diagnostic and placement practices of the early 1970s on two primary grounds. Firstly, that the IQ test score was often the sole criterion used, with adaptive behaviour being largely ignored, and secondly, that the IQ tests themselves were severely flawed. Mercer, more than any other author, addressed the issue of the psychometric criterion as a determinant of mental
retardation, particularly in reference to minority groups. Her position was that there were biases in "...measures of intelligence that favor the Anglo, middle class child" (Huberty, Koller, & Ten Brink, 1980, p. 256). In her own words:

...The primary criterion for mental retardation - the IQ test - is inaccurate and, when it is used on minority groups, unfair. However retardation is measured, minority groups suffer as a result of the Anglo, middle-class content of the tests ...While the schools do most of the labelling, they do not agree with other agencies on the proper criteria for mental retardation. (Mercer, 1972, p.44)

Since the introduction of the Binet and Stanford-Binet intelligence tests, the IQ score has been the primary, and in many, if not most cases, the only tool used in declaring children mentally handicapped. Beginning with Binet, consistent and persuasive calls were made for the additional consideration of adaptive behaviour. Despite these calls, the IQ test has been the instrument of choice for school and clinical psychologists in making diagnostic decisions. The reasons for this choice are perhaps best summed up in the criticisms that proponents of the IQ test alone directed at tests of adaptive behaviour: that they were unscientific and
reflected a construct that was unmeasurable. By extension, the proponents of IQ tests would argue that these were characteristics inherent also in IQ tests. As Langone (1986) has noted:

On the one hand professionals believe that a person's ability to function in society is a better measure of competence than an isolated score on a standardized intelligence scale. Conversely, the lack of objectivity currently inherent in the measurement of adaptive behavior may weaken the argument for its use. (p. 6)

Litigation and Legislation in the U.S.

The 1970s, was a decade of rapid change in special education. This change, although foreshadowed by much of the work of Tredgold, Doll, and Mercer, was brought about primarily through court action, especially Larry P. versus Riles (1972) and Diana versus the State of California (1972). In both of these actions, minority group youngsters who had been placed in programmes for the mentally handicapped on the basis of low intelligence test scores sued school authorities. In both actions it was successfully argued that culturally and racially biased assessment procedures led to the inappropriate placement of these children into special education programmes with a
consequent loss of educational opportunity and social stigmatization. The courts in both cases heard large volumes of professional evidence. In the Larry P. case, for example, the court transcript was 10,000 pages long, much of that being the evidence of expert witnesses (Reschly, 1982).

Court rulings were consistently in favour of the plaintiffs. Although much of the focus of these famous cases was on specific minority groups (especially Black), the detailed analysis given in the courts to major issues related to special education practices, both placement and instructional, should not be underestimated. Reschly (1982) noted that included within these cases were such implicit issues as the nature-nurture debate, whether mental retardation was a fixed or dynamic condition, and the efficacy of special class programmes.

The federal government, in response to these court actions and to mounting pressure from special needs advocacy groups and special education professionals, enacted in 1973 The Education of All Handicapped Children Act, PL94-142. This act called for increased access to a free and appropriate education for disabled students, mandated that parental/guardian involvement be stressed, and called for major changes in diagnostic and labelling practices. It also prohibited the use of any single test instrument in
making labelling and placement decisions, and clearly indicated that multi-factor, multi-dimensional assessments were to be used (Knoff, 1984).

Although under no legal compunction to do so, the American Association on Mental Deficiency (AAMD) proposed the following definition of mental retardation, one which had been promoted by that organization since the 1950s.

(Mental Retardation is) significantly subaverage intellectual functioning existing concurrently with deficits in adaptive behaviour and manifested during the developmental years. (Grossman, 1983, p.11)

Generally regarded today as the most acceptable standard for the identification of a mental handicap, this two-factor definition has been adopted by the World Health Organization, the American Psychiatric Association, and by most state departments of education (Grossman, 1983). The National Association of School Psychologists (NASP) unofficially underscored the importance of this model in its Best Practices Manual (Thomas & Grimes, 1985) by including an article which states that the use of the two-factor model in the diagnosis of a mental handicap is "...both a mandatory and indispensable component of mental retardation classification and programming. There is little argument on that point" (Reschly, 1985, p. 353).
Implicit in the two-factor model as described by Grossman (1983) is the equal inclusion of adaptive behaviour and IQ. It is required by the model that significant deficits in adaptive behaviour must exist concurrently with significant deficits in IQ. For a child to be labelled as mentally handicapped both criteria must be met, making each factor both necessary and equal. It is notable, however, that although in the research literature cut-off scores for low IQ are generally those suggested by the AAMD (IQ 70 - 75), the AAMD does not provide direct guidance in determining cut scores for adaptive behaviour tests. Although researchers typically adopt an adaptive behaviour cut-off score of percentile rank 2.5 - 3.0, matching the IQ cut-off score provided by the AAMD, clear direction to do so has not been provided.

Although the two-factor model clearly is the most accepted diagnostic criterion, (with some debate beginning about the inclusion of achievement data) several authors have recently challenged the entire two-factor construct. Shinn (1988) and Tucker (1985), in calling for the abandonment of the two-factor model, refer to it as a "psychometrically based identification procedure" (Shinn, 1988, p. 61). Their argument is that psychometric information has the propensity for excessive bias, as was
demonstrated in the litigation of the 1970s. and that it does not accurately predict the performance of children after they are placed in special education programmes. These authors argue for the general abandonment of such psychometric procedures and their replacement by "curriculum-based models" (Shinn, 1988, p. 61). Although it has been demonstrated in the literature that such models can successfully diagnose student needs (Tucker, 1985), the use of the model alone for differentiation of special needs versus non special needs students has not been well supported. Curriculum-based measures have important uses in making curricular decisions, in monitoring student progress and, indeed, are useful as an academic component of a multi-factor diagnostic procedure. At present, however, there is no compelling evidence in the literature to support the replacement of the accepted AAMD two-factor diagnostic model with curriculum-based assessment procedures alone.

Achievement as a Domain of Adaptive Behaviour

In discussions of the definition of adaptive behaviour, Tredgold (1937) emphasized that appropriate social adaptation involves "(the student) adapting himself to the normal environment of his fellows" (p. 4). Since that time, and with the development of a number of popularly used standardized measures of social adaptation, discussion with
respect to the inclusion of academic achievement as a legitimate sub-domain of social adaptation has occurred. Many of the most popular measures of social adaptation such as the Vineland Adaptive Behavior Scales, simply do not formally test for academic achievement. Although some individual items on adaptive tests do query achievement tasks (ie: the student can print their first and last name), these tests do not provide the examiner with a more sophisticated achievement measuring device.

It could be argued that the producers of adaptive behaviour scales assume that those assessing students will test academic proficiency through other means. If this is the case, it results in such measures of academic achievement not forming part of the total adaptive test score. In consequence, academic achievement does not enter into the formal two-factor diagnostic model for making placement decisions.

Both Grossman (1983) and Reschly (1982) have suggested that reference to the "standards of learning" (Grossman, 1983, p. 11) of a student’s peer group are appropriately a part of adaptive behavior. This suggestion complemented the observations made in the Ysseldyke et al. studies, where low achievement and idiosyncratic classroom behaviour were found to be primary determinants of a teacher's decision to refer
students for psychometric testing. This case for the inclusion of measures of academic achievement has been made by Reschly (1988, 1986) who argued strenuously for the inclusion of basic academic achievement as a valid sub-domain of overall adaptive behaviour. Reschly pointed out that severely deficient reading and arithmetic skills are maladaptive within the regular classroom environment. Achievement test results, he argued, reflect the "standards of learning" component of the AAMD definition of adaptive behaviour and should therefore be included in a valid measure of social adaptation.

If basic cognitive operations and literacy skills are emphasized by all sociocultural groups, if these skills are taught to a large degree in school settings, and if these skills are very important to adequate adaptive behavior ...then the school setting and academic achievement must be viewed as integral, essential components of adaptive behavior. (p. 354)

Consideration of Hearing and Vision

It has long been recognized that students with lower IQ scores suffer from a disproportionately high incidence of hearing and visual impairments (Brooks, 1978; Cunningham & McArthur, 1982; Mykelbust, 1954; Nolan and Tucker, 1984, 1981). Mykelbust (1954) reported that nine per cent of
students referred to a hearing clinic had IQ scores below 70, while such students only represented approximately two per cent of the population in schools.

Not only is the recognition that visual and hearing disorders occur more frequently in the mentally handicapped population important. The potential effects that such organic dysfunctions, when unknown, can have on placement decisions is critical. Brooks (1978) has pointed out with reference to hearing acuity, that in the case of mentally handicapped and other "hard-to-test" subjects, "psychologic assessment and audiologic assessment must go hand-in-hand. Without a knowledge of the capabilities and limitations of the child (any) evaluation may be meaningless or even misleading" (p. 130). Although psychologists administering standardized psycho-educational tests are usually careful in test selection when dealing with a youngster who has obvious organic pathology such as blindness, deafness, or cerebral palsy (Tucker & Nolan, 1984, p. 374), it is not patent from the literature that such is the case with the M/EMH population. This, in spite of the demonstrated fact that hearing and visual acuity deficits are experienced by this population at a significantly higher rate than the typical population. As Nolan & Tucker (1984) point out with respect to auditory impairment:
All too often the lack of response to sound, speech in particular, is put down to the child's mental capacity rather than hearing integrity, this despite the fact that numerous studies have highlighted that the incidence of hearing loss in such groups is significantly higher than in the normal population.

...The comment that there is little point in assessing hearing in the mentally handicapped because they are usually untestable and have no problem with hearing anyway, is simply untrue and totally unacceptable. (p. 92)

The comments made with respect to auditory impairment can be reasonably made for visual impairment, especially in the way that loss of sensory input can easily confound the results of standardized tests. Hartshorne & Hoyte (1986) point out that it is essential to either confirm visual and hearing acuity within normal limits or to quantify sensory loss before embarking on a programme of psychological testing. To assess a student who has an unknown but significant visual and/or hearing loss may result in the selection of inappropriate tests, and the false interpretation of low test scores as indicative of mental as opposed to sensory disability. The same observation has
been made with respect to academic assessment (Gerken, 1986).

Canadian Special Education Development

Lack of Federal Education Authority

Under the provisions of the Constitution Act of 1867 (formerly the British North America Act), and later as reaffirmed in section 93 of the Constitution Act of 1982, education of all school age children in Canada is the sole and legal responsibility of the provinces. As with all educational legislation, special education legislation has necessarily evolved separately in each of these jurisdictions (Csapo, 1980, 1981; Cruickshank, 1983; Poirier et al., 1988). Consequently, there are differences among the provinces on such fundamental issues as the definition and programming for special needs children, and the rights of these children and their parents. Unlike the United States, there is no law like PL94-142 at the federal level.

PL94-142 as a model

In an examination of the Canadian literature in special education since the 1960s, constant references to the shortcomings of Canadian special education are encountered, with such comments often being framed as comparisons with the U.S. situation (Csapo, 1980, 1981; Goguen, 1980; Hall & Dennis, 1968; Lazure & Roberts, 1970; Poirier & Goguen,
1986; Poirier et al., 1988). Repeatedly authors contrast the progress made in American special education with the lack of progress in Canada. Csapo (1980) noted "...the education of handicapped children (in Canada is) grievously neglected and suffering from a lack of clear national policy" (p.197). Later, in a report commissioned by the Canadian Teacher's Federation, Csapo (1981) went on to state,

Most of all, teacher's federations are asking ministries to assume leadership and clarify it's [sic] thinking on matters relating to integration, to provide organizational models, definitions of handicaps and procedures for identification, implementation and evaluation. (p.215)

Potential effects of the Canadian Charter of Rights and Freedoms

The progress in special education made in the United States was propelled by two forces; litigation and federal educational law. Neither of these forces has been influential in Canada. Not only is there no federal education law in Canada constitutionally, there is also a tradition of jurisprudence that seldom sees actions taken against educational authorities. Even when such actions do occur, there is a history of the courts upholding the
educational authorities (Bales, 1985; Cruickshank, 1983; MacKay, 1985).

There is, though, a potential for influences such as those found in the United States to be felt in Canada. Although the Constitution Acts of 1867 and 1982 vested authority over education to the provinces, the Charter of Rights and Freedoms will likely override that authority. Furthermore, since it is apparent that "...the new Charter is the supreme law of Canada and applies to provincial education legislation and to school boards" (Poirier et al., 1988, p.25), it may be increasingly utilized to challenge the disparate laws and regulations governing special education across Canada.

Evidence of such use of the Charter of Rights and Freedoms is beginning to be seen. In the case of Elwood versus Halifax County-Bedford (1987), an initial court order was awarded to the family of a mentally and physically handicapped student, stating that the child be integrated into a regular classroom in his neighbourhood school pending further court proceedings. Although the case was ultimately settled in favour of the Elwood family in an out of court settlement, it is believed that the threat of a Charter of Rights based court action led to that settlement (MacKay,
1987; Fraser, 1987). As MacKay (1987), one of the Elwood's lawyers has stated:

The Elwood case will be a landmark case in the educational rights of disabled children in Canada. ...it is a classic illustration of the out of court uses of the Charter of Rights as an important negotiating tool for students and parents. There is no doubt in my mind that there would have been no agreement in the Elwood case had we not been prepared to go to court under the Charter of Rights. (p. 110)

Very recently, in a case involving a family who felt that the Vancouver School Board was not providing sufficiently for their learning disabled child, suit was launched in B. C. Supreme Court against the Board to recover the costs of sending their child to a private school for dyslexic children. In this case Justice Trainor stated, "although school boards are under a duty to provide sufficient accommodation and tuition, this does not mean there is a duty to provide the best education" (Odam & Bula, 1989, p. Al). Justice Trainor found that the Board had made reasonable efforts to assist the child, and that the educational rights of the child had not been violated by the Board refusing to pay for his private education. Although
the Charter of Rights and Freedoms is not explicitly referred to in reports of this case, it is apparent that the rights of both the child and the Board were being considered. In a commentary on whether the board had violated the rights of the child in this case, Bula (1989) stated "(based on this decision) ...boards can't be liable for everything" (p. A12). It is reasonable to suggest that precedents like the Elwood case may have had a bearing on the Vancouver decision as courts attempt to delineate what does and does not constitute the reasonable educational rights of special needs students as guaranteed by the Charter.

Clearly, a pattern of resolving the educational rights of both students and school boards through redress to the courts can be observed. That the Elwood and Vancouver cases were each settled differently only indicates that the courts, based on the Charter of Right and Freedoms, are seeking to determine the parameters of the educational rights of special needs children. The Charter of Rights and Freedoms has been, and should continue to be, central to the resolution of the relative rights of both special needs students and the school systems that serve them.
Recent Studies on Diagnosis and Placement

The Minnesota Institute Studies. In the late 1970s, the United States Department of Education called for research proposals into the efficacy of special education interventions. Ysseldyke et al. (1983), presented a research plan in which they criticized the focus of the government's call for research. Addressing learning disabled (LD) students, the authors suggested that research into programme efficacy was "at best premature" (p. 75), since the procedures being used in diagnosis and placement of LD students showed "tremendous variability in criteria" (p. 76). Because of this variability in diagnostic practice, the authors argued that research done on the efficacy of specific programme interventions "were incapable of generalization" (p. 76). Based on this argument, the authors proposed a comprehensive set of research studies into the decision-making process. After several initial studies, the authors specified five levels of decision-making related to the provision of special education services. These were deciding:

(1) who to refer for evaluation,

(2) who to declare eligible for service,

(3) how to plan specific interventions,
(4) how much students were benefitting from interventions, and
(5) how effective specific programmes of instruction were.

Of these, the first two are important for the present research. Over the space of five years, and after more than 100 individual studies, the authors found that two specific points in the diagnostic process were critical in determining whether a child would be labelled and placed regardless of suspected disability. These were (1) at the point of classroom teacher referral (p. 80), and (2) at the point where psycho-educational test results were interpreted (p. 77).

Teacher referrals. Ysseldyke et al. (1983) conducted a national survey of directors of special education, requesting referral and placement data for special class programmes in general. They found that on an annual basis, from two to six percent of the total school population would be referred for a psycho-educational evaluation. Of that number, 92% would actually be tested, with 73% of these being declared eligible for special education placement.

After noting the very high probability of referred students being both tested and placed, the authors posited two possible reasons for their observations: (1) that there
was a combination of extreme "accuracy in both referring and testing" (p. 80); and (2) the figures reflected the efficiency of the placement apparatus of school systems in acting on the requests of classroom teachers, irrespective of the actual needs of the students.

To investigate these possibilities, the authors conducted several detailed studies in which referring teachers were interviewed to determine their reasons for making the original referral. Upon examination of the teacher's responses, they were found to state their reasons for such referrals in "vague and nebulous terminology" (p.80), often citing social concerns about the child's home and family.

When asked what they expected from their original referrals, the teachers were clearer, typically stating that they "wanted testing and placement" (Ysseldyke et al., p. 80). The authors found that the classroom teachers had "made no systematic effort to alter instructional plans for the students" (pp. 80-81), but that the most fundamental reasons for referrals were found to be idiosyncratic, based on behaviour produced by the referred student that tended to irritate the referring teacher. "When we investigated the specific determinants of referral, we found that teachers tend to refer students who bother them" (p. 81).
The most significant finding of this portion of the Minnesota studies, then, has to do with the power of the classroom teacher in determining who will be placed into special education programmes. Nationally, given that 92% of all students referred for psycho-educational assessment are in fact tested, and that of these, 73% are labelled and placed, it is patent that the original decision to make a referral, a step found to be in the control of the classroom teacher and often made for capricious reasons, is the greatest determinant in a child entering a special education programme.

It is clear that the most important decision made in the entire assessment process is the decision by a regular classroom teacher to refer a student for assessment. Once a student is referred, there is a high probability that the student will be assessed and placed in special education. (Ysseldyke et al., 1983, p. 80)

Psycho-educational evaluation and interpretation. Ysseldyke et al. (1983) found that although "considerable time, effort and money go into the administration of large numbers of tests" (p. 82), such expenditures do not guarantee appropriate diagnosis. Although "there are technically adequate norm-referenced tests that can be used to make
decisions about students ...for the most part, these are now restricted to the domains of intelligence and academic achievement" (p. 81). They found that many tests of personality and learning styles typically used by psychologists were technically inadequate. It was noted that the personnel most likely to administer and interpret psycho-educational tests, school psychologists and special education teachers, although usually technically qualified to do so, may have an inflated view of their ability to interpret test results. This was particularly true for psychologists and special education teachers who were often found to revert to what they termed "clinical judgement" in interpreting test results, especially sub-test profiles of IQ tests. The authors state,

Placement decisions made by teams of individuals have little to do with the data collected on students. We were able to demonstrate that the decisions that are made are more a function of naturally occurring pupil characteristics than they are data based. (p. 78)

To investigate the accuracy of clinical judgement, the authors performed an interesting experiment in which student test information was presented to two groups of people, labelled experts and non-experts. The expert group was comprised of psychologists, psychometrists, and teachers of
learning disabled students. The non-expert group was made up of undergraduate students with no experience or course work in education or psychology. Each group of 18 persons was asked to read test information, and to decide whether or not the children represented by the test material were learning disabled (LD) or non-LD. Using existing federal criteria for LD classification, it was found that the expert group was only 50% accurate in correctly labelling LD students, while the non-expert group was 75% accurate (p. 82).

Each participant was also asked to rate the confidence that they had in their ability to discern a learning disability from the information presented. Although the psychologists were no more accurate than their other professional colleagues, and certainly less accurate than the non-expert group, they reported a very high level of confidence in their "clinical judgement" accuracy (p. 82).

The authors noted that while many test instruments utilized in the diagnostic process have individual technical accuracy, especially IQ and achievement tests, many do not. Of those that do possess these qualities, that accuracy is disrupted by the way in which test results are interpreted, and by the inordinate confidence that professionals place in their ability to use "clinical judgement."
Ysseldyke et al. concluded, on the basis of their five-year study that, "there are significant problems in current assessment and decision-making practices" (p. 87). The authors first argued that the special education referral and placement system was designed primarily to remove children from regular class programmes because of their inability to fit into those programmes behaviourally. If the reasons for this lack of programme fit were such that special class placement could address and correct them, and then promptly return the student to the regular education environment, the referral and placement process might be useful. The authors suggested that in most instances that was not the case.

Beginning with classroom teacher referrals, children were selected for psycho-educational assessment for what were often arbitrary reasons, most often for behaviours that the teacher found irritating. Referrals were made without reference to specific regular classroom learning problems, and there was little evidence of specific pre-referral intervention strategies being tried. The only consistently articulated reasons for referral appeared to be to have the child placed into special education, which might also be worded, 'to get the child out of the regular class.' The authors challenged the assumption that students and teachers are best served by this process.
Even as the reasons for referring a student for assessment appeared to be arbitrary, so too did the process of testing and labelling. Although the authors noted that standardized tests of satisfactory reliability and validity were available, and even though most testing personnel had the training to competently administer and interpret them, the impact of what they termed "clinical judgement" tended to interfere. Based in a confidence that clinical judgement is an appropriate diagnostic tool, it was apparent that the accuracy of diagnostic and placement practices as exercised by school psychologists and other educational professionals was lacking.

The Minnesota studies served to highlight three important points with reference to this study:

1. studies of special education programme efficacy without reference to a solid understanding of the diagnostic and placement practices that put children into special education programmes are premature and seriously undermine the generalizability of any such studies;

2. criteria for referral, assessment, and placement decision making appear to be arbitrary, with the
critical factor in seeing a child labelled and placed lying with the original teacher decision to refer. Upon completion of that step, placement into special education programmes is most often forthcoming; and

3. although technically adequate tests are available, it is apparent that the way tests are interpreted by diagnostic professionals is as important, if not more important, than the test results themselves. A study of diagnostic and placement practices must focus not just on the instruments used, but on the way that such instruments are used.

The use of standardized tests in making educational placement decisions is a procedure which is intended to ensure fairness of selection and appropriateness of placement. The studies of the Minnesota Institute point out that the diagnostic and placement process appears to be contaminated by biases of both teachers and placement teams. Capricious reasons often appear to be the motive for teacher referrals, while placement teams which are designed to counteract such caprice appear to be as arbitrary as the teachers by relying on "clinical judgement." The suggestion clearly is that placement teams are strongly influenced by psychologists and psychologists are strongly influenced by
reliance on an intangible and demonstrably unreliable clinical sense.

Order of Presentation and Test Influence

Knoff (1984), using a simulation study, investigated the role that both the types of assessment data and the order of their presentation had in influencing committee placement decisions for M/EMH students. Knoff noted that both PL94-142 as well as the tenets of best practice as outlined by the AAMD "insist on IQ and adaptive behavior assessments for cases of suspected mental retardation" (p. 123). Following the accepted two-factor diagnostic model, the author assembled four case studies on potential M/EMH candidates. Each case study included results from the following: (1) WISC-R IQ; (2) AAMD-SE Adaptive Behavior Scale; (3) Daberon screening reading tests; (4) Bender-Gestalt test of visual-motor integration; and, (5) Goodenough-Harris Drawing Test.

The author assembled four groups of 20 persons each as follows: group 1: psychologist trainees; group 2: psychologist practitioners; group 3: special educator trainness; and, group 4: special educator practitioners. Each member of the groups was given a booklet containing the case studies. The case studies were arranged within the booklets in random order, and each individual was asked to
independently review the case studies and to make placement decisions for each by assigning the case to one of 10 described placement options. These ranged from "full time regular class with no basic change in teaching procedures or support services" through to "full time special class for trainable mentally retarded students" (p. 124). Employing a $2 \times 2 \times 2 \times 4 \times 2$ Analysis of Variance balanced for repeated measures (profession x status x order x case x decision), the author found that there were no significant differences between any of the four groups in placement decision making, with each group tending to favour least restrictive placement options from the list.

However, in analyzing the relative effects of presented psycho-educational information, it was noted that IQ test results, regardless of the order in which such results were presented, often acted as "a free variable" (p. 127), always having the most significant effect on placement selection. Furthermore, adaptive behavior information, although not influencing placement decisions as strongly as did the IQ scores did act as a co-factor with IQ. IQ scores were demonstrated to be interacting with other variables regardless of the order of test score presentation, while adaptive behaviour scores, although not having as strong an
effect as IQ were demonstrated to be consistently in interaction with IQ regardless of placement.

The effect of adaptive behaviour scores, unlike that of IQ score was found to be more significant when presented first. The authors also found that additional information presented, other than that of IQ and adaptive behavior, did not appear to influence placement decisions. In examining the interaction between IQ and adaptive behavior scores, Knoff states:

The complexity of the relative influences of IQ and Adaptive Behavior Scale data on educational placement decisions is evident over the four case studies. ...Four separate patterns of IQ/Adaptive Behavior influence were noted on the four case studies. School psychologists, special educators, and child study teams, therefore, should recognize that educational placement decisions potentially can be affected disproportionately by diagnostic data and by the presentation order of this data and should consider their effects on the team process and on sound educational programming. (p. 127)

Knoff's study, while limited both in its size as well as in the fact that it was a simulation and therefore not
fully generalizable to real placement team decision making, nonetheless reinforces two important concepts: firstly, it supported the notion that the use of the co-factors IQ and adaptive behavior as demanded by best practices, can effectively make educational placements for M/EMH students; and second, it demonstrated that, while appropriate programme selections took place, IQ scores operate as a more-than-equal co-factor, which, while not overwhelming adaptive behavior information, certainly appeared to dominate it.

These results support the concerns of Ysseldyke et al. (1983) who note that IQ scores, especially when used as a basis for "clinical judgement" may lead to inaccurate diagnoses rendered with inordinate confidence by school psychologists and special educators. Concerns similar to those discussed have recently been addressed by Reynolds et al. (1987) who, in referring to the identification and placement of children into special education classes, suggested that three fourths of such placements were inappropriate, having been based on faulty test interpretation and/or clinical judgement, with their only true handicapping condition being that of a "judgmental handicap."
It must be recognized that the efficacy of educational placements made is not the concern in these studies. That was the point made by Ysseldyke et al. (1983) in their counter-proposal to the U.S. federal initiative calling for programme efficacy studies. Rather, these studies were examining the first critical step in programme efficacy - the selection of individuals to be placed. In each case, what was being considered was the accuracy of placement decisions based on an established selection criteria. In the case of M/EMH students that was the two-factor diagnostic model as specified in law and in best practices.

**Confirmation of Placements Using the Two-Factor Model**

Childs (1982) studied a random sample of 50 students between the ages of five and eight who were enrolled in programmes for M/EMH students in the Rocky Mountain Region of the United States. Childs noted that, although PL94-142, best practices, and professional organizations all clearly called for the use of the two-factor diagnostic model for mental handicap, careful analysis of the adaptive behavior of children enrolled in special class programmes for M/EMH students had not taken place. The author demonstrated that between 1974 and 1978 only 5.3% of research studies included both adaptive behavior and intelligence for determining mental handicap. Furthermore, he noted that of 41 states
reporting in 1980, only 15 included adaptive behavior in their state definition of mental handicap.

Childs notes, "since the inclusion of adaptive behavior in the determination of mental retardation has been established as a necessary consideration ...(it is necessary) ...to examine the adaptive behavior of educable mentally retarded children and its relationship to the diagnosis of mental retardation as a two-dimensional concept" (p.109).

Childs interviewed the parents of all fifty subjects, and administered to them the Adaptive Behavior Inventory for Children (ABIC). A 2 x 3 x 3 x 2 factorial ANOVA design incorporating the independent variables of sex, race, IQ, and placement was performed. The criterion for a student having significantly impaired adaptive behavior was set in accordance with generally accepted practice at the third percentile.

Childs found that there was a relationship between IQ scores and ABIC scores, with decreases in one being associated with decreases in the other. However, of the 50 children, all of whom had been officially diagnosed and placed as M/EMH, only ten could be confirmed in that placement when adaptive behavior was used as a necessary and equal co-factor with IQ, as implicit in the two-factor
diagnostic model. Thus, overall, on the application of the two-factor model, 80% of the students studied could be said to have been incorrectly placed. Furthermore, when students from minority group backgrounds were examined separately, the misplacement rate was found to be even higher, with 88% not being confirmable as M/EMH using the two-factor diagnostic model.

In his discussion of these results, Childs raised two questions: first, was the use of a cut-off score of the third percentile for adaptive behavior too high, and thus responsible for the high misplacement rates found; and, secondly, what would be the effects of declassifying up to 80% of the total M/EMH population if these results accurately reflect conditions within M/EMH classes in general?

Other questions not addressed by Childs, emerge from his study. Given the ages of the children studied, and the date of the research (data collection occurred in 1980), each of these children should have been placed using a two-factor diagnostic model as mandated by PL94-142 and irrespective of state definitions of M/EMH. If that were the case, did their adaptive behaviour scores improved markedly since their enrollment, or, were such tests not given in originally placing the children? If they were
given, were they were ignored or not weighted equally with IQ?

**Summary of Three Studies**

Given the comments by Ysseldyke et al. (1983) that "placement decisions made by teams of individuals have very little to do with the data collected on students" (p. 78), and that of Knoff (1984) that the interaction between available psychometric information, particularly IQ and adaptive behavior information, is complex and can have a marked effect on sound educational planning (p. 127), it is surprising that Childs did not draw greater attention to the role adaptive behavior data played in inappropriately labelling and placing the children in his sample. Knoff clearly recognizes the potential for the IQ - adaptive behavior interaction being responsible for inappropriate placements into special classes.

Future research should continue to document the interaction between assessment data and special education placement decisions ...the interaction between the influence of IQ and adaptive behavior data and the significant determinants and definitions of mental retardation. (Knoff, 1984; p. 127)

Although Knoff's 1984 study clearly calls for further study of the interaction between IQ and adaptive behavior,
it is only in the last few years that such a call has been responded to. This response comes not in the form of new studies in this area, but in a vigorous call for new studies. MacMillan (1988), for example, notes that the concerns about M/EMH students that were raised at the time of the Diana and Larry P. cases have not been resolved, "the concerns over ...their education raised in the 1960s and 1970s are every bit as valid today" (p. 282). Similarly, Reschly (1988) in referring to the last 20 years of assessment and placement issues surrounding M/EMH students notes that these issues are still "unresolved" (p. 285).

Recent concerns about the role of academic achievement in the measurement of adaptive behaviour is another issue that should be addressed. Although a generally accepted definition of adaptive behaviour has been given (Grossman, 1983, p.11), there is still considerable debate in the literature with respect to academic achievement as a component of adaptive behaviour (Reschly, 1988; Reschly & Gresham, 1987; Reschly, 1982). Reschly (1988) has argued convincingly that since academic performance is an integral part of the social domain of schools, and since weaknesses in academic performance are often the trigger for a school referring a child for placement consideration, it is appropriate to include measures of academic performance
within the evaluation of adaptive behaviour. Reschly states,

Perhaps the most important issue here (in deciding what to include within a measure of social adaptation) is whether or not the domain functional academic skills is included, and it is in this area that the most disagreement appears to occur. I have argued that functional academic skills should be included as a part of the conception of adaptive behavior. It is a critical domain for school age children and youth. Inclusion of this domain is consistent with AAMR classification. (1988, p. 291)

An examination of the literature on the development of measures of adaptive behavior does not reveal a defense for the exclusion of achievement as an adaptive domain. Rather it would appear that since many well standardized individualized achievement tests are available, the producers of adaptive measures have left that domain alone, or if they have included it, it has been dealt with in a very abbreviated manner. This may be a well intentioned effort not to compete with existing achievement tests, but has the effect of eliminating achievement information as a part of adaptation to the school environment as far as the two-factor model is concerned.
In an examination of the most commonly used measures of adaptive behavior, it is noted that the majority do not include a basic reading and arithmetic component, while those few that do (ie. the Comprehensive Tests of Adaptive Behavior (CTAB) include only brief tests.

Reschly's argument that since a primary business of schooling is the teaching of academics, and that weaknesses in academics often serve as triggers for referrals to special class placement, is compelling. This author is choosing to follow these arguments and to include testing of academic skills in the research design.

Chapter Summary

This chapter traced the development of the definition of mental handicap from the beginning of the 19th century up to the present with special reference to the relative roles that IQ and adaptive behavior have played in that development.

In the 19th century Itard, Sequin, and Voisin all gave primacy of place to deficits in social adaptation, with lack of general cognitive ability being an important but secondary consideration. It was demonstrated that although Alfred Binet (1910), the "father of IQ tests" was a strong proponent of the role of social adaptation in a definition of mental handicap, the widespread use of intelligence tests
by psychologists resulted in a diminution of the role of adaptive behavior as an important factor in diagnosing a mental handicap.

Beginning with Tredgold (1937) and Doll (1941), authors began to call for a return to establishing deficits in measured adaptive behavior as a co-factor with general intelligence in defining a mental handicap. The efforts of these authors, and later of Mercer (1972) to clearly re-establish inclusion of adaptive behavior was met with some scepticism and even ridicule, with opponents viewing consideration of social adaptation as being unscientific.

By the early 1970s court actions in the United States resulted in renewed interest in social adaptation. In 1975, the United States federal government passed PL94-142, an educational law which restricted the role of IQ tests in labelling exceptional children and which clearly demanded a two-factor diagnostic model for M/EMH. This two-factor model is now the widely accepted international standard for the identification of mental handicap.

In Canada, a different constitutional structure and legal tradition has inhibited more rapid development of special education practice. The recent adoption of section 15 of the Canadian Charter of Rights and Freedoms makes challenges to diagnostic and placement practices at the
national level a possibility, with comparisons to the standards of U.S. PL94-142 being a likely basis for such challenges.

Three research studies conducted in the last eight years were examined. The results of a five year study by Ysseldkye et al. (1983) led to the conclusion that children are referred for consideration as special education candidates for reasons that often have nothing to do with the programmes in which they are ultimately placed. Behaviours irritating to classroom teachers appear to be the most common reasons for referring children for psycho-educational evaluation. The authors report that once a referral is made, diagnostic teams will tend to confirm placements based on questionable clinical judgements.

Knoff (1984) investigated the way in which psychoeducational information affects placement decisions. He found that, although both IQ and adaptive behavior data were of importance in determining classification as M/EMH, IQ scores had significantly more power in swaying decision making than did adaptive behavior, and that the order in which test information was presented was of importance in determining placement outcomes.

Childs, (1982) in examining the adaptive behavior profiles of elementary aged students enrolled in M/EMH
programmes found evidence that although a two-factor model of diagnosis should have been used in placing children, the application of that same two factor model after placement resulted in very high (80% - 88%) declassification rates.

The literature reviewed demonstrated that the use of a two-factor diagnostic model has been called for for almost 200 years. In this century, IQ test scores have tended to overshadow concerns for measured adaptive behavior, and even though legislation and best practices now clearly demand the use of IQ and measured social adaptation as equal co-factors, IQ scores still tend to dominate placement decision making.

Although there is much evidence to suggest that the diagnostic and placement process, from classroom teacher referral to the psychologist’s clinical judgement, is seriously flawed, that is not grounds for abandoning study of that process. Great effort has been expended to develop diagnostic models to make the placement process fair and effective. The problem appears to be a tendency within the system that administers that model to subvert its intent.
Chapter 3
Methodology

This chapter describes specific procedures for collecting and analyzing the data. This description is divided into five major sections: (1) Design, (2) Testing Procedures, (3) Data Collection, (4) Data Preparation, and (5) data analysis procedures.

Design

Subjects

Students who had been referred for consideration as Mildly/Educably Mentally Handicapped (M/EMH) in two Metro Vancouver school districts since May 15, 1987 and who were still enrolled at the elementary school level at the time of data collection (April 15 - May 26, 1989) served as subjects. The restriction to current elementary school enrollment ensured that the BC Quick Individual Educational Test (BC QUIET), which is designed for use with elementary school students only, could be used with all subjects.

Selection of Subjects

After obtaining appropriate permission from the University of British Columbia and the superintendents of the two school districts, subject selection procedures were undertaken. Because of differences in record-keeping
practices in the two school districts, somewhat different selection procedures were required in each district.

**District 1.** In District 1, each school psychologist (n = 7) is required to keep a case log (see Appendix A). As new referral forms are received by the psychologist (see Appendix B), referral information is perused and an initial suspicion of possible presenting problem (M/EMH, Behaviour Disordered, etc.) is made. Where more than one problem is suspected, they are listed in descending order based on the suspicion of their contribution to the student’s difficulties. For example, in reviewing the referral of a subject, the psychologist may note factors leading to the suspicion that the primary presenting problem is a Mild Mental Handicap, while a Behaviour Problem is a secondary factor.

In District 1, the case logs are sent to the central office approximately every three months where they are entered into a computer file. In this district, a printout of all referrals logged since May 15, 1987 was obtained. The names of subjects for whom the primary suspicion was that of a mental handicap (there were none for whom suspicion of a mental handicap was a secondary suspicion) were then taken from this list. Using the central office computer, the names of subjects selected were tracked, and
lists of those currently placed in M/EMH classes \((n = 28)\) and not placed in M/EMH classes \((n = 22)\) were compiled. It was found that of students originally suspected as being M/EMH, 12 were not available for inclusion either because they had moved into district secondary schools \((n = 4)\) or because they had moved out of the district \((n = 8)\) (see Table 1).

**District 2.** In District 2, case logs like those found in District 1 are not used. In this district, each psychologist \((n = 9)\) receives referral forms (see Appendix C) through the central special education office, and proceeds with the referral without a formal registration of suspicion. Although the list of subjects actually placed into M/EMH classes since May 15, 1987 was available, there was no record of initial suspicions. However, in discussions with the District Principal in charge of Special Education and a former district psychologist now working in the District Research Department, it was determined that it would be possible to establish initial suspicions.

All referrals to the school psychologists over the target time period \((n = 1412)\) were filed in the district special education office. Using information contained on the referrals, the following criteria for establishing suspicion of M/EMH were agreed upon: (1) Peabody Picture
Vocabulary Test scores below the tenth percentile; (2) anecdotal comments written by the principal, classroom teacher and/or learning assistance teacher indicating concerns about mental handicap, low ability, or need for special class placement because of lack of academic progress; and (3) where referral forms contained Wechsler Intelligence Test scores (n = 205, 14.5%), a Full Scale IQ of less than 80. All of the above criteria had to be met for a student to be suspected as M/EMH. Where only partial information was available (n = 1207, 85.5%), any two of the three criteria had to be met. In no cases was information from less than two of the criteria available. In discussions with the Director of Special Education Programmes and a psychologist in District 1, this procedure was found to parallel that used by District 1 psychologists when filling in their case logs.

Of the 1412 referrals made in District 2, 155 (10.9%) were classified as suspected M/EMH using the above criteria. To confirm the selection of these subjects as legitimately suspected M/EMH, an inter-rater reliability study was conducted. A random sample of 40 referral forms, which had been initially classified as suspected M/EMH, were mixed with a random sample of 40 referral forms which had not been initially classified as suspected M/EMH. A school
psychologist with three years experience in District 2 volunteered to sort the forms into two groups: suspected M/EMH and not suspected M/EMH.

After the sort was completed, the inter-rater agreement was calculated. The results were as follows: agreement between rater 1 (researcher) and rater 2 (psychologist) was 95.0\% (n = 76). Of the cases where disagreement occurred (n = 4), two occurred when rater 1 listed a child as suspected M/EMH and rater 2 disagreed, and two occurred where rater 1 listed a child as not suspected M/EMH and rater 2 disagreed. This level of agreement was considered high enough that all of the subjects initially identified as suspected M/EMH were retained.

Following identification of suspected M/EMH students, a search was made of all current special education lists in District 2 to determine which of the suspected M/EMH subjects were still enrolled in elementary level M/EMH classes in the district. For those subjects not enrolled, the following procedure was used: the principal or secretary of the school from which the referral to a psychologist form was originally received was contacted. If the student was still enrolled in that school that information was recorded. If the subject was no longer enrolled, the school was asked to check their records to determine where the child had
transferred to. If the child had transferred out of the district \((n = 19)\), or if they had moved to a district secondary school \((n = 3)\), their name was deleted from the list of possible subjects. If they had transferred within District 2, the school to which they had transferred was contacted. In 12 instances, multiple moves within the district were checked to locate the subject.

For the purposes of this study, final identification of M/EMH students was made by checking district records to verify that students were receiving M/EMH funding from the Ministry of Education. This clarified situations where students were heavily integrated into regular class programmes, and where students were housed in classes that did not carry the M/EMH designation, but where the students were so funded. This situation occurred primarily in District 1 where several students were listed as being funded as M/EMH and who indeed met provincial criteria for M/EMH, but who were housed in "non-categorical" classes.

For a subject to be considered non M/EMH, they were not listed under any special education funding category, (e.g. learning disabled, moderately/trainably mentally handicapped), and were enrolled in a regular education classroom.
Recruitment of Schools and Students

After the identification of subjects for inclusion in the study, lists of involved schools were drawn up, and a letter was sent to the principal of each school (see Appendix D). All principals agreed to participate in the study.

Upon receipt of principal approval, letters to be forwarded by the school principals to the parents/guardians of each subject were sent to the schools. Letters contained a description of the study and sought permission from the parents for inclusion of their child in the study (see Appendix E).

Table 1 indicates the number of students identified in each of the districts, available for testing, receiving parental consent, and excluded through illness or unwillingness to participate both by group (M/EMH and regular education) and for the total sample.

Testing Procedures

Test Selection Criteria

Tests were selected on the basis of two criteria: (1) that they possess adequate reliability and validity, and (2) that they be commonly administered in the diagnosis of M/EMH. The following tests were selected:
Table 1

Recruitment of Subjects

<table>
<thead>
<tr>
<th></th>
<th>District 1</th>
<th>District 2</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M/EMH(^a)</td>
<td>REGED(^b)</td>
<td>M/EMH</td>
</tr>
<tr>
<td>Number of students identified</td>
<td>28</td>
<td>27</td>
<td>55</td>
</tr>
<tr>
<td>Number of students moved out of dist. or to secondary</td>
<td>7</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>No parental consent</td>
<td>1</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Number of available students</td>
<td>20</td>
<td>18</td>
<td>38</td>
</tr>
<tr>
<td>Number of students absent or refused to participate</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Subjects tested</td>
<td>19</td>
<td>18</td>
<td>38</td>
</tr>
<tr>
<td>% of available</td>
<td>95.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

\(^a\) Mildly/Educably Mentally Handicapped
\(^b\) Regular Education
Vineland Adaptive Behavior Scales (VABS);
BC Quick Individual Educational Test (BC QUIET);
Wechsler Intelligence Scale for Children - Revised (WISC-R);
Pure Tone Audiometric Test (PTAT); and the
Snellen Visual Acuity Test (Schnellen) plus observations of visual anomalies.

Vineland Adaptive Behavior Scales

The Vineland Adaptive Behavior Scales (VABS) (Sparrow, Balla, & Cicchetti, 1984) is reported as being a useful instrument for screening and classification decisions, and is described by Campbell (1985) as "one of the best overall measures of adaptive behavior" (p. 1214). Split-half reliabilities for the Adaptive Behavior Composite are reported as ranging from .89 to .98, with a median value of .86, while test-retest and interrater reliability coefficients are reported as .99 and .98, respectively. In their recent Canada-wide study, Carter and Rogers (1988) found that the VABS is the most commonly used test of adaptive behaviour in Canada (p. 17).

The VABS is a recent revision of the Vineland Social Maturity Scale, first developed by Doll (1935). It is organized around four behavioural domains: Communication, Daily Living Skills, Socialization, and Motor Skills.
Within each behavioural domain the test utilizes a developmental schedule to provide an outline of detailed performances with respect to the ability of an individual to assume responsibility and look after their practical needs within that domain. Items within each domain are arranged in order of ascending difficulty, and as such provide a basis for some task analysis and programme planning. The instrument is administered through an interview with a person familiar with the subject (often the classroom teacher) following procedures laid out in the administration and scoring manual. Total test scores are reported as an overall composite Social Age (SA) and Social Quotient (SQ). Depending upon the subject, from 20 to 60 minutes are required for administration.

In addition to the overall test composite score and domain scores, an additional subtest of maladaptive behavior is included in the VABS. The Maladaptive Domain is described by the authors as "descriptive categories that indicate the frequency of maladaptive behaviors" (p. 23). The respondent is asked to indicate whether a series of described maladaptive behaviours are usually, occasionally, or never observed in the child. This subtest does not form part of any of the previously discussed four domain scores or the overall test composite score. The Maladaptive domain
is broken into two parts. Part one contains 27 items addressing less severe maladaptation such as thumb sucking, over activity, temper tantrums (Sparrow et al., p. 24) while part two contains nine items measuring more severe maladaptation "seldom exhibited by non-handicapped individuals" (Sparrow, et al., p. 24). These include public masturbation, self injury, rocking, and other ritualized behaviours (Sparrow, et al., 1984, p. 296). These behaviours are more usually associated with severely and profoundly mentally handicapped, autistic, and severely behaviour disordered students (Cleland, 1978; Gearheart & Litton, 1979; Hallahan & Kauffmann, 1988). Only the scores obtained from part one of the Maladaption subtest are compared to the national standardization sample used for the development of the VABS. Separate norms based on more severely disabled subjects are provided for part two.

The total score for part one of the maladaptive domain is compared against the norms for ten age groups (from chronological age 5 - 0 to 18 - 11) and the degree of maladaptation is categorized as either nonsignificant (percentile rank < 50), intermediately significant (percentile rank 51 - 84), or significant (percentile rank 85 and above). The reliabilities of the Maladaptive Domain, part one, using both split-half and test-retest reliability
estimates are similar to those for the other Domain scores, with the Maladaptive Domain coefficients ranging from .77 to .88 and a median value of .86. That the maladaptive domain is not included in the calculation of the Vineland Adaptive Behavior Composite score is indicative of the overall construct of social adaptation utilized both in this instrument and as described in the literature (Grossman, 1983; Mercer, 1973; Langone, 1986). However, despite its limitations the decision was taken to include the administration of part one of the Maladaptive scale in this research, particularly as it might reflect on the concerns raised in the literature with respect to the role that idiosyncratic student behaviour plays in initiating teacher referrals.

British Columbia Quick Individualized Educational Test

After comparison with several other commonly used individualized achievement tests (the Woodcock-Johnson Psychoeducational Battery - Part II, Peabody Individual Achievement Test, Woodcock Reading Mastery Tests, KeyMath Diagnostic Arithmetic Test), the British Columbia Quick Individual Educational Test (BC QUIET) (Wormeli, 1984) was found to satisfy most closely the test selection criteria. The BC QUIET was developed as an individually administered, standardized screening instrument for use with children in
grades one to seven. It includes measures of achievement in reading (with separate sub-tests for word identification and passage comprehension), arithmetic, and spelling, but does not report a test composite score. The passage comprehension sub-test is not administered to grade one students. The BC QUIET is based on curriculum and materials in general use in the province of B.C. (Wormeli, 1984, p. 9). Administration time for this test ranges from 20 to 45 minutes. Internal consistency reliability for the various sub-tests using a split-half technique is reported as ranging from .68 to .97, with a median value of .86, comparing favourably with other achievement test instruments considered. Empirical validation of the BC QUIET using discriminant function analysis demonstrated that "the BC QUIET effectively discriminates pupils who require remedial services from those who do not" (Wormeli, 1984, p. 133).

Finally, the BC QUIET is the only available standardized achievement test based on British Columbia curricula.

Wechsler Intelligence Scale for Children - Revised

The WISC-R (Wechsler, 1974) was found to possess excellent reliability and validity (Bortner, 1985; Detterman, 1985; Witt, 1985), and is clearly the most commonly used instrument for the purpose of M/EMH placement in Canada (Carter & Rogers, 1988, p. 17).
The WISC-R is a standardized, individually administered test of global intelligence based on a conceptualization of intelligence as a "multidimensional and multifaceted entity rather than an independent, uniquely defined trait" (Weschler, 1975, p.5). The WISC-R enjoys prominent status among individual intelligence tests (Bortner, 1985; Dettermann, 1985; Witt, 1985; ), being described by Bortner (1985) as "...the best standardized, most objectively administered and scored test of its kind" (p. 1713), and by Witt (1985) as occupying "a position of preeminence in the testing community ...(it is) recognized as the quintessential testing instrument ...the subject of literally thousands of research studies" (p. 1716). It is intended for children between the ages of six and seventeen, and produces 12 sub-test scores, six of which are classified as Verbal and six as Performance. One each of the Verbal and Performance sub-tests (Digit Span and Mazes, respectively) are optional in test administration.

Reliability coefficients for Full Scale, Verbal and Performance scores are reported as "high ...across the entire age range, the average coefficients being .94, .90, and .96 respectively" (Wechsler, 1974, p. 27). Reliabilities for each of the sub-tests are high, ranging
from .77 to .86 for the Verbal sub-tests and from .70 to .85 for the Performance sub-tests (Wechsler, 1974, pp. 27-29).

Although other tests can and are used with suspected M/EMH students, it is clear that the WISC-R is the test of choice (Detterman, 1985, p. 1715). In Canada, for example, Carter and Rogers (1988) found that it was the most chosen test instrument for the diagnosis of M/EMH in 92.2% of reporting school districts (p. 17).

**Pure Tone Audiometric Screening**

The use of pure tone audiometry as an efficient and effective means of screening youngsters for hearing problems is well established (American Academy of Ophthalmology and Otolaryngology, 1972; American Speech & Hearing Association, 1985; Fulton & Lloyd, 1969; Jerger, 1984; Newby & Popelka, 1985). Considerable information can be derived from the skillful use of a properly calibrated pure tone audiometer:

- Pure-tone audiometry provides an index to the basic functional relationship between a person and his environment in terms of auditory input and stimulation...
- Considerable information for the diagnosis of hearing impairments can be obtained from pure-tone data. (Fulton & Lloyd, 1969, p. 1)

Although many guidelines for sweep screening criteria exist (American Academy of Ophthalmology and Otolaryngology,
1969, p. 30; American Speech and Hearing Association, 1975, 1985; Fulton & Lloyd, 1969, p. 2), recent evidence supports the deletion of such testing at 500 Hz because of background noise typically encountered in school situations, and at 4,000 Hz because of a high incidence of false identification (Newby & Popelka, 1985, p. 284). The pass/fail criteria selected for this study reflect most closely those recommended by Downs (1969) but with the fail dB level raised from 20 to 30 to allow for high levels of ambient noise experienced while testing in school buildings.

In this study auditory sweep screening was performed with a properly calibrated pure tone audiometer using accepted procedures both for machine operation and control of ambient noise (Bess & McConnell, 1981, pp. 51-52; Newby & Popelka, 1985, pp. 116-127). Complete parameters for the pass/fail criteria of the pure tone audiometric testing are given in Chapter 1. Where a subject failed the first sweep test, a second test was conducted approximately three weeks later to allow possible interference from colds and middle ear infections to subside. Where such individuals failed on the second test administration, the school principal was contacted and advised to inform both the parents and the public health nurse so that appropriate further action could be taken.
Snellen Visual Acuity Test

The majority of school screening programmes for visual acuity problems are based on the Snellen test (Rogow, 1988, p. 35) along with observations for other overt visual anomalies (Harley & Lawrence, 1977, p. 58). Although the Snellen test was developed in 1862, it has proved to be as reliable as seemingly more sophisticated instruments for the purposes of screening school aged children for visual defects. Harley and Lawrence (1977) report that in a test of 1,215 students, each of whom was assessed with the Snellen, Massachusetts Vision Test, Telebinocular test, Ortho-Rater, Sight-Screener, and near vision test, the correlations for distance visual acuity when compared to ophthalmic findings were highest for the Snellen and the Massachusetts Vision Test. Although a valid criticism of the Snellen is that it does not address near vision and other potential visual problems, it remains the most widely used school screening device. It was therefore considered appropriate to utilize the Snellen as the standardized screening instrument of visual acuity in this study.

Along with the Snellen Test, measures of overt visual anomalies were also used. Although the Snellen results formed the measure for the visual acuity variable, review of the literature revealed that best practices demand the
reporting of certain visual anomalies even where the Snellen test is passed. The observations of visual anomalies suggested by Harley and Randal (1977, p. 58) were made for each subject, and cases of overt visual anomalies (n = 2) were drawn to the attention of the school principal with the recommendation that a referral for an ophthalmological evaluation be made.

Data Collection

Examiner Training

The author conducted all administrations of the WISC-R. The WISC-R requires level "C" training (Cronbach, 1970, p. 18) and, in the case of M/EMH students, experience in administration with low functioning children. This investigator has both level "C" training and six years experience as a psychologist assessing low functioning children with the WISC-R.

Administration of all other test instruments was shared between the author and a level "B" examiner (Cronbach, 1970, p. 18) trained in the administration and scoring of these instruments. The level "B" examiner is a licensed B.C. school teacher with experience as a research assistant. Training in the administration of the VABS, BC QUIET and Snellen was provided by the researcher. Training in the use of the pure tone audiometer was provided by a professor in
the Department of Educational Psychology and Special Education of the University of British Columbia.

**Test Administration**

Before testing, each subject's (n = 106) school and district office records were checked to see whether a WISC-R had been administered since May 15, 1987 and whether a BC QUIET had been performed within the previous six months. The results of 101 WISC-R (95.3%) and 16 (15.1%) BC QUIET administrations were found, usually summarized in a psychological report. In all cases, efforts to locate the original test protocols were made. A total of 37 WISC-R and ten BC QUIET protocols were found; these protocols were examined for errors in calculation of chronological age, basal and ceiling cut-off points, addition, and calculation of derived scores. Of the three WISC-R protocols found to contain errors, two contained errors sufficient to alter the Full Scale standard scores (s.s.) by more than 3 (errors of s.s. 4 and 5 respectively). As these scores were those used in making placement decisions, it was decided to retain them, and not to re-administer the WISC-R to these subjects. In the case of the BC QUIET, no errors were found among the test protocols reviewed. Each subject was administered the WISC-R (where needed, n = 5), BC QUIET (where needed, n = 90), the Pure Tone Audiometric Sweep Test, and the Snellen
Visual Acuity Test plus eye function observations (both n = 106).

Except for one subject, each subject's teacher was interviewed for the purpose of completing the VABS. In the one instance, the student's classroom teacher refused to be interviewed; the school vice-principal, who was well acquainted with the subject, agreed to be interviewed instead.

Data Preparation

Scorer reliability was checked as follows:

1. The investigator randomly selected 25% of the subjects evaluated by the assistant, and re-scored test protocols and, in the case of the Snellen and PTAT, re-administered these tests. No errors were found.

2. An independent party checked the addition and conversion to standard scores on all WISC-R, VABS, and BC QUIET protocols. Of the five WISC-R tests, none were found to contain errors, of the 106 VABS tests administered, 12 (11.3%) were found to contain errors, and of the 90 BC QUIETS, four (4.4%) were found to contain errors. All VABS and BC QUIET errors were corrected before data entry.

Data Entry

A summary information sheet containing all test results was maintained for each child. This sheet was coded to
Data Analysis Procedures

The data analysis was completed in four stages. First, a series of preliminary analyses were conducted to determine the correctness of forming an achievement composite score and of pooling data across the two districts. Second, a descriptive summary of demographic and test information was compiled for the total sample and by group (M/EMH or non-M/EMH). Third, placement decisions using IQ and Adaptive Behaviour Composite results and existing two-factor diagnostic criteria were compared to actual placements. Lastly, a series of discriminant function analyses were completed to study the differences between students labelled M/EMH and those not labelled with respect to the predictor variables. Discriminant function analysis is a procedure which may be used when the dependent variable consists of one or more discrete groups, in this case M/EMH or regular education students. Analysis is made to determine the variable or combination of variables (referred to as
discriminating or predictor variables) which best predict membership in the groups, with a minimal number of incorrect assignments to those groups (Ferguson, 1981; Klecka, 1980; Tatsuoka, 1970, 1971).

Given the sequential nature of the analyses, with the analyses at each step dependent upon the results of the analysis at a preceding step, a description of the analysis is provided with the presentation of the results in the next chapter.

**Computer Support**

All computer analyses were performed on the AMDAHL 5860 computer maintained by the Computing Sciences Division of the University of British Columbia, using the Statistical Package for the Social Sciences extended version (SPSS-X) (Nie, 1975).
Chapter 4

Results

This chapter is divided into three major sections. First, a series of preliminary analyses are used to determine the appropriateness of forming an achievement composite and for pooling the data across districts. Second, differences between Mildly/Educably Mentally Handicapped (M/EMH) and Regular Education students with respect to demographic and test results are examined. Finally, group membership is examined in comparison to the two-factor diagnostic model with cut-off criteria set to two possible levels, and a series of discriminant function analyses are used to discover those predictor variables or combination of predictor variables which best describe current placement practice with the sample studied.

Preliminary Analysis

Achievement Composite

To determine the appropriateness of forming an achievement composite score for the BC QUIET, two analysis procedures were used. First, the correlations between the BC QUIET subtests and an achievement composite formed from the mean of these sub-tests were examined within each district. The results are displayed in Table 2. The correlations between the subtests range from .75 to .90 in
Table 2

Correlations Among BC QUIET Subtests and Achievement Composite by District\textsuperscript{a,b}

<table>
<thead>
<tr>
<th>Test</th>
<th>Mean\textsuperscript{c}</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Composite</td>
<td>24.7</td>
<td>32.2</td>
<td>.94</td>
<td>.90</td>
<td>.90</td>
<td></td>
</tr>
<tr>
<td>2. Arithmetic</td>
<td>13.0</td>
<td>18.9</td>
<td>.93</td>
<td>.75</td>
<td>.90</td>
<td></td>
</tr>
<tr>
<td>3. Word I.D.</td>
<td>12.3</td>
<td>17.4</td>
<td>.82</td>
<td>.58</td>
<td>.82</td>
<td></td>
</tr>
<tr>
<td>4. Pass. Comp.</td>
<td>10.2</td>
<td>14.1</td>
<td>.92</td>
<td>.77</td>
<td>.77</td>
<td></td>
</tr>
<tr>
<td>Mean\textsuperscript{d}</td>
<td></td>
<td></td>
<td>19.9</td>
<td>9.8</td>
<td>11.1</td>
<td>9.4</td>
</tr>
<tr>
<td>S.D.</td>
<td></td>
<td></td>
<td>27.9</td>
<td>14.9</td>
<td>16.0</td>
<td>14.9</td>
</tr>
</tbody>
</table>

\textsuperscript{a} All correlations significant at .01 level of significance.
\textsuperscript{b} District 1 correlations above diagonal; District 2 below.
\textsuperscript{c} District 1.
\textsuperscript{d} District 2.
District 1, and from .58 to .93 in District 2. The correlations between the subtests and the achievement composite range from .82 to .94 across the two districts. While the correlations between the reading subtests and the arithmetic subtest were weaker than between the reading subtests, they were considered satisfactory enough to consider combining the subtest scores to form an achievement composite. To account for the attenuating effects due to unreliability (Lord & Novick, 1968, p. 70) the lowest and highest correlations were corrected using the reliabilities for the respective subtests reported for the BC QUIET (Wormeli, 1983, p. 119). The lowest was .62 between Word Identification and Arithmetic in District 2, while the highest was .98 between Arithmetic and Passage Comprehension in District 1. These were considered strong.

Second, a principal components analysis showed that a single factor accounted for 82.0% of the variance in the set of three BC QUIET subtests. The factor loadings were virtually identical for each of the subtests: .88 for Arithmetic, .89 for Word Identification, and .94 for Passage Comprehension. A principal components analysis was also conducted separately for each district. These factor loadings were found to be virtually identical, with the first factor explaining 85.0% of the variance in District 1.
and 80.0% of the variance in District 2. Based on these results, there is strong evidence that forming a statistical composite by summing the scores of the subtests is appropriate, and that decision was taken.

**Pooling of district data**

To decide whether to pool the data across school districts, discriminant function analyses were performed to test whether the relationships between group membership (M/EMH versus regular education) and each predictor variable differed in the two districts. This was accomplished by determining whether there was a statistically significant interaction between district membership and each predictor variable. For example, the first model that was tested included FSIQ, a dummy variable representing district, and a district-by-FSIQ interaction term. For all of the eight models tested, the district dummy variable and the interaction term did not significantly predict group membership at a significance level of .05. This implies that the relationships between group membership and the predictors did not differ significantly between districts. Also, a full model with all eight of the predictor variables, the district dummy variable, and the eight district-by-predictor interaction terms was tested using the Mahanabolis $D^2$ step-wise technique. None of the interaction
terms or the district membership variable were retained in the model. These results also suggest that there were no significant differences in the relationships between group membership and the predictor variables, and therefore, all subsequent analyses were based on pooled data.

Differences Between M/EMH and Regular Education Students

After making decisions with respect to the formation of the achievement composite and pooling data across districts, the demographic and test results obtained for the total sample were examined. Following this, analyses were performed to address the research questions posited in Chapter 1. These questions were:

1. Are there differences between students referred for placement and placed in programmes for the M/EMH and those referred and not placed? More specifically:
   a. are students who have been assessed and placed as M/EMH confirmable in that placement, based on the standards of the two-factor diagnostic model; and,
   b. can students who have been assessed and not placed be confirmed as inappropriate for placement as M/EMH, based on the standards of the two-factor diagnostic model; and,

2. What factors provide the best explanation of current placement decisions? Specifically, what is the contribution of the variables IQ, adaptive behaviour,
academic achievement, maladaptation, and visual and hearing acuity to the placement of these students?

The first two questions (1a and 1b) were investigated through the application of the two-factor diagnostic model with the cut-off criteria for IQ and adaptive behaviour set to the upper extreme of the AAMD parameters (standard score 75) and to the standards currently posited by the draft Ministry of Education Guidelines (standard score 69).

The second question was examined by the use of a series of discriminant function analyses in which variables are included first in an historical sequence reflecting the development of diagnostic models of M/EMH, and then through the use of both forced and step-wise discriminant function analyses. These latter analyses were used to determine which predictor variables best explain the classification decisions made for the population under study.

Demographic Characteristics

The demographic characteristics of the total sample separated by M/EMH and regular education are summarized in Table 3. As previously discussed, an analysis of between district differences revealed that the data could be pooled across districts without loss of information. Table 3 shows that males outnumbered females by approximately 3 to 2, and
Table 3
Demographic Characteristics of Sample

<table>
<thead>
<tr>
<th>Information</th>
<th>Regular Educ.</th>
<th>M/EMH</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>n = 49</td>
<td>n = 57</td>
<td>n = 106</td>
<td></td>
</tr>
</tbody>
</table>

Sex
- Male: 30 (61.2%) M/EMH: 33 (57.9%) Total: 63 (59.4%)
- Female: 19 (38.8%) M/EMH: 24 (42.1%) Total: 43 (40.6%)

Chron. Age
- Mean (yy-mm): Male 9-7, M/EMH 9-0, Total 9-4
- S.D. (months): Female 24.66, M/EMH 24.68, Total 25.09

Race
- Asian: 2 (4.1%) M/EMH: 1 (1.8%) Total: 3 (2.8%)
- Black: 0 (0.0%) M/EMH: 1 (2.0%) Total: 1 (0.9%)
- Caucasian: 43 (87.8%) M/EMH: 49 (86.0%) Total: 92 (86.8%)
- East Indian: 4 (8.2%) M/EMH: 6 (10.5%) Total: 10 (9.4%)
the ratio of males to females was similar in both groups. The mean age of M/EMH students was seven months less than that of the regular education students, while the variation in age within each group was approximately equal. The majority of students were of Caucasian racial origin (86.8%), with non-Caucasian students making up only 13.1% of the total sample. Non-Caucasian students had approximately equal representation in the M/EMH (14.3%) and Regular Education (13.1%) groups. The number of non-Caucasian students present in the sample was small enough that investigation of race as a predictor of group membership was considered inappropriate.

Correlation Matrix for Test Results. Table 4 shows the means, standard deviations, and the correlation matrix for the variables IQ, ABC, Achievement, Maladaption (VMS), Snellen Visual Acuity test (Vision), and Pure Tone Audiometric Sweep test (Hearing). As is shown, positive correlations ranging from .43 to .64 were found between IQ, ABC and Achievement, while negative correlations were observed between these same variables and VMS, Vision and Hearing. In the case of Vision and Hearing, weak correlations were found with IQ, ABC, and Achievement, ranging from -.02 to -.12. Correlations between Vision,
Table 4

Correlation Matrix for Test Results

<table>
<thead>
<tr>
<th>Test</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. FSIQ</td>
<td>1.00</td>
<td>.64</td>
<td>.45</td>
<td>-.44</td>
<td>-.08</td>
<td>-.05</td>
</tr>
<tr>
<td>2. ABC</td>
<td>1.00</td>
<td>.43</td>
<td>-.48</td>
<td>-.12</td>
<td>-.07</td>
<td></td>
</tr>
<tr>
<td>3. Ach.</td>
<td>1.00</td>
<td>-.31</td>
<td>-.02</td>
<td>-.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. VMS</td>
<td>1.00</td>
<td>.07</td>
<td>.05</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Vision</td>
<td>1.00</td>
<td>.22</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Hearing</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mean

- 79.8
- 74.6
- 21.56
- 1.7
- .21
- .10

S.D.

- 14.7
- 18.1
- 29.38
- 0.8
- .62
- .43

a. point biserial correlation
Hearing, and VMS were positive, but weak, ranging from .05 to .22. VMS was negatively correlated with IQ, ABC, and Achievement, the correlations ranged from -.31 to -.48.

Vineland, WISC-R and BC QUIET. Table 5 shows for each group the means and standard deviations for the Vineland Adaptive Behavior Composite (ABC), Vineland Maladaptive scales (VMS), WISC-R, and the BC QUIET. With the exception of the Vineland Maladaptive scale, the M/EMH students had lower mean scores with less score variability than did the regular education students. On the Maladaptive Scale, M/EMH students had higher mean scores, reflecting a greater incidence in socially inappropriate behaviour.

Snellen visual acuity test. Results of the Snellen visual acuity test are displayed in Table 6. As is shown, 82.1% of all subjects passed their first Snellen visual acuity test, while 6.6% were untestable and 11.3% failed. Of the seven untestable students, six (85.7%) were in the M/EMH group. All seven of the students who were untestable on the first administration were also found to be untestable on the second, while one student who had failed test one passed test two.

Pure Tone Audiometric sweep test. The results of the pure tone audiometric sweep testing are summarized in Table 7. Of
### Table 5

**Means and Standard Deviations for Test Results**

<table>
<thead>
<tr>
<th>Test</th>
<th>Regular Educ.</th>
<th>M/EMH</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mean</td>
<td>s.d.</td>
<td>mean</td>
</tr>
<tr>
<td><strong>Vineland</strong>a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Composite</td>
<td>85.2</td>
<td>16.4</td>
<td>65.4</td>
</tr>
<tr>
<td>Maladaptiveb</td>
<td>1.3</td>
<td>0.5</td>
<td>1.9</td>
</tr>
<tr>
<td><strong>WISC-R</strong>c</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbal IQ</td>
<td>87.1</td>
<td>10.9</td>
<td>68.9</td>
</tr>
<tr>
<td>Perf. IQ</td>
<td>95.3</td>
<td>13.9</td>
<td>72.5</td>
</tr>
<tr>
<td>Full Sc. IQ</td>
<td>90.8</td>
<td>10.7</td>
<td>70.1</td>
</tr>
<tr>
<td><strong>B.C. QUIET</strong>d</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arithmetic</td>
<td>22.3</td>
<td>21.4</td>
<td>3.2</td>
</tr>
<tr>
<td>Word I.D.</td>
<td>19.9</td>
<td>18.8</td>
<td>5.2</td>
</tr>
<tr>
<td>Pass. Comp.</td>
<td>19.0</td>
<td>17.0</td>
<td>2.9</td>
</tr>
</tbody>
</table>

---

a. Expressed in s.s. (mean = 100; s.d. = 15).
b. 1 = not maladapted; 2 = moderately maladapted; 3 = significantly maladapted.
c. Expressed in s.s. (mean = 100; s.d. = 15).
d. Expressed in Normal Curve Equivalents (mean = 50; s.d. = 21).
Table 6

Snellen Vision Test Results

<table>
<thead>
<tr>
<th>Results</th>
<th>Test 1</th>
<th>Test 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>M/EMH</td>
<td>(n = 57)</td>
<td>(n = 13)</td>
</tr>
<tr>
<td>Untestable</td>
<td>6(10.5%)</td>
<td>6(10.5%)</td>
</tr>
<tr>
<td>Pass</td>
<td>44(77.7%)</td>
<td>1(1.8%)</td>
</tr>
<tr>
<td>Fail</td>
<td>7(12.3%)</td>
<td>6(10.5%)</td>
</tr>
<tr>
<td>Regular Ed.</td>
<td>(n = 49)</td>
<td>(n = 6)</td>
</tr>
<tr>
<td>Untestable</td>
<td>1(2.0%)</td>
<td>1(2.0%)</td>
</tr>
<tr>
<td>Pass</td>
<td>43(87.6%)</td>
<td>0(0.0%)</td>
</tr>
<tr>
<td>Fail</td>
<td>5(10.2%)</td>
<td>5(10.2%)</td>
</tr>
<tr>
<td>Total</td>
<td>(n = 106)</td>
<td>(n = 19)</td>
</tr>
<tr>
<td>Untestable</td>
<td>7(6.6%)</td>
<td>7(6.6%)</td>
</tr>
<tr>
<td>Pass</td>
<td>87(82.1%)</td>
<td>1(0.9%)</td>
</tr>
<tr>
<td>Fail</td>
<td>12(11.3%)</td>
<td>11(10.4%)</td>
</tr>
</tbody>
</table>

Percent of students passing: M/EMH 78.9%
Regular education 87.8%

Note. Only students who either failed or were untestable at test 1 were administered test 2.
### Table 7

**Pure Tone Sweep Hearing Test Results**

<table>
<thead>
<tr>
<th>Results</th>
<th>Test 1 (n = 57)</th>
<th>Test 2 (n = 13)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M/EMH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Untestable</td>
<td>6 (10.5%)</td>
<td>6 (10.5%)</td>
</tr>
<tr>
<td>Pass</td>
<td>44 (77.7%)</td>
<td>1 (1.8%)</td>
</tr>
<tr>
<td>Fail</td>
<td>7 (12.3%)</td>
<td>6 (10.5%)</td>
</tr>
<tr>
<td>Regular Ed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Untestable</td>
<td>1 (2.0%)</td>
<td>1 (2.0%)</td>
</tr>
<tr>
<td>Pass</td>
<td>46 (93.9%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Fail</td>
<td>2 (4.1%)</td>
<td>2 (4.1%)</td>
</tr>
<tr>
<td>Total</td>
<td>(n = 106)</td>
<td>(n = 16)</td>
</tr>
<tr>
<td>Untestable</td>
<td>7 (6.6%)</td>
<td>7 (6.6%)</td>
</tr>
<tr>
<td>Pass</td>
<td>90 (84.9%)</td>
<td>1 (0.9%)</td>
</tr>
<tr>
<td>Fail</td>
<td>9 (8.5%)</td>
<td>8 (7.5%)</td>
</tr>
</tbody>
</table>

Percent of students passing:  
M/EMH 78.9%  
Regular education 93.9%

Note. Only students who either failed or were untestable at test 1 were administered test 2.
the regular education students, 93.9% passed test one, compared with only 77.7% of the M/EMH students. Of the M/EMH students, 10.5% were untestable on test 1, and 2.0% of regular education students were untestable. All those who were either untestable (n = 7) or who failed test 1 (n = 9) were retested. All subjects who were untestable on test 1 were untestable on test 2, while six of the nine students (5.7% of the total) who had failed test 1 also failed test 2. Only one subject who failed the first administration passed the second. Incidences of untestability were highest (10.5%) for the M/EMH group. The regular education group had a much lower incidence of untestability (2.0%).

The same seven students who proved to be untestable for hearing were also untestable for vision. For both the Snellen and pure tone sweep testing, untestable subjects occurred more frequently within the M/EMH group by a 6:1 ratio.

Comparison With AMMD and Proposed B.C. Two-Factor Criteria

The extent of agreement between current placement and placement determined by applying (a) the AAMD guidelines and (b) the proposed B.C. Guidelines (see Appendix F) is displayed in Table 8. Classification as M/EMH with the AAMD two-factor model requires students to have standard scores
Table 8
Classification Results
Using A.A.M.D. and Proposed B.C. Guidelines

<table>
<thead>
<tr>
<th>Current Placement</th>
<th>A.A.M.D. Guidelines&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Proposed B.C. Guidelines&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Regular Ed</td>
<td>M/EMH</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>n</td>
</tr>
<tr>
<td>Regular Education</td>
<td>45 (93.8%)</td>
<td>3 (6.7%)</td>
</tr>
<tr>
<td></td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>M/EMH</td>
<td>21 (36.8%)</td>
<td>36 (63.2%)</td>
</tr>
<tr>
<td></td>
<td>57</td>
<td></td>
</tr>
</tbody>
</table>

Percent of cases correctly classified:

a. 77.1%

b. 63.8%

---

<sup>a</sup> Both IQ and ABC less than or equal to s.s. 75.

<sup>b</sup> Both IQ and ABC less than s.s. 69.
in both IQ and ABC less than or equal to 75. The table shows that the overall agreement between current placement and placement according to the AAMD guidelines was 77.1%. Large discrepancies are seen between the regular education and M/EMH groups: the classification accuracy for M/EMH students is 63.2%, while that of regular education placements is 93.8%. Thus if the AAMD criteria had been used, fewer students would have been classified as M/EMH.

When the lower M/EMH cut-off criteria proposed in the draft B.C. Guidelines of standard score 69 was applied, the total classification accuracy dropped to 63.8%. The lowering of the cut-off criteria from 75 to 69 resulted in a marginal increase in accuracy for regular education students (93.8% to 97.9%) but in a large decrease in accuracy for M/EMH students (63.2% to 35.1%). If the proposed B.C. guidelines had been applied, 65% of the sample currently in special programmes would have been in regular education.

Sources of disagreement between the AAMD guidelines, draft B.C. Special Education guidelines, and current placements were investigated. The results of this investigation are summarized in Table 9. For the students enrolled in regular education but classified as M/EMH according to the AAMD model, one each was misclassified by
Table 9

Sources of Error for Current Placements Compared With A.A.M.D. and Proposed B.C. Guidelines

<table>
<thead>
<tr>
<th></th>
<th>Current Classification</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Regular Ed</td>
<td>M/EMH</td>
</tr>
<tr>
<td>1. AAMD Parameters</td>
<td></td>
<td>1(33.3%)</td>
<td>11(52.4%)</td>
</tr>
<tr>
<td>Violated</td>
<td></td>
<td>1(33.3%)</td>
<td>6(28.6%)</td>
</tr>
<tr>
<td>IQ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ad. Behaviour</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IQ and Ad. Behaviour</td>
<td>1(33.3%)</td>
<td>4(19.0%)</td>
<td>5(20.8%)</td>
</tr>
<tr>
<td>n</td>
<td>3</td>
<td>21</td>
<td>24</td>
</tr>
<tr>
<td>2. Proposed B.C.</td>
<td></td>
<td>0(0.0%)</td>
<td>19(51.4%)</td>
</tr>
<tr>
<td>Guidelines Violated</td>
<td></td>
<td>0(0.0%)</td>
<td>0(0.0%)</td>
</tr>
<tr>
<td>IQ</td>
<td>1(100.0%)</td>
<td>18(48.6%)</td>
<td>19(50.0%)</td>
</tr>
<tr>
<td>Ad. Behaviour</td>
<td>0(0.0%)</td>
<td>0(0.0%)</td>
<td>0(0.0%)</td>
</tr>
<tr>
<td>IQ and Ad. Behaviour</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>1</td>
<td>37</td>
<td>38</td>
</tr>
</tbody>
</table>

Note. Percentages given are % of column totals.
having too low an IQ, too low an adaptive behaviour composite score, and both of these too low. In contrast, 11 of the M/EMH students classified as regular students by the AAMD model were misclassified because they had IQ scores greater than 75; six because of adaptive behaviour composite scores greater than 75; and four because both IQ and adaptive behaviour composite scores were greater than 75. More than seven out of ten of the students labelled as M/EMH have IQ scores either alone or in combination with adaptive behaviour composite scores which are above those of the AAMD guidelines.

Each case in which current placement was not confirmed was examined to discover which parameters had been violated. The results of this investigation are also displayed in Table 9. For the AAMD model, violations of the IQ parameter accounted for 50% of all misclassifications, while IQ and Adaptive Behaviour combined were responsible for 70.8% of errors.

Under the more rigorous B.C. guidelines, the source of error for the one instance in which a regular education student was found to be misclassified was caused by that student having both IQ and adaptive behaviour scores below the standard score 69 cut-off. Sources of misclassification for M/EMH students were dominated by violations of the IQ
parameter alone (51.4%) or in combination with violations of the adaptive behaviour parameter (48.6%). No violations of the adaptive behaviour parameter alone were found.

**U.S. norms with Canadian students**

At this point in the data analysis it became appropriate to consider the use of U.S. normed tests (i.e. WISC-R and ABC) with the population sample under study. It has been demonstrated that Canadian students score differently on U.S. normed intelligence tests than do American students (Holmes, 1981; Peters, 1976; Kennet, 1972). At the elementary level, Canadian students have been found to score higher than their U.S. counterparts by between 3.4 and 9.8 IQ points depending on student age, while the score variance of Canadian students was less than that of U.S. students (s.d. 12.4 - 12.9 versus 15.0) (Holmes, 1981, p. 114). This makes the application of the proposed B.C. Guidelines cut-off criteria of s.s. 69 questionable because "five times as many children score 70 or below using B.C. norms than using American norms" (Holmes, 1981, p. 114). This problem with the use of foreign intelligence test norms may apply also to tests of adaptive behaviour. At present no studies have been conducted to determine the adequacy of U.S. adaptive behaviour norms with Canadian students. Because complete
Canadian norms are not available for either the WISC-R or the Vineland, it is patently more appropriate to utilize the less rigorous AAMD guideline of standard score 75 than the proposed cut-off criteria of 69 which, while providing great protection against inappropriately labelling students as M/EMH, disqualifies significant numbers of M/EMH students from special education services.

**Discriminant Function Analyses**

**Historic Models of Classification**

Based on the review of the literature presented in Chapter 2, it was observed that four sequential models of M/EMH diagnosis have evolved. In the nineteenth century, adaptive behaviour alone served as the diagnostic criterion, while in the early part of the twentieth century, IQ alone was the criterion. Between the 1930s and the early 1970s the concept of the two-factor model including IQ and adaptive behaviour was developed. Finally, in the 1980s, discussion of the inclusion of measured academic achievement began. Each of these historical models is displayed in the following equations:

**Model 1**

\[ \hat{Y} = b_0 + b_{1X} \]

**Model 2**

\[ \hat{Y} = b_0 + b_{1X} \]
Model 3  \[ \hat{Y} = b_0 + b_1X_{\text{IQ}} + b_2X_{\text{AB}} \]

Model 4  \[ \hat{Y} = b_0 + b_1X_{\text{IQ}} + b_2X_{\text{AB}} + b_3X_{\text{Ach}} \]

where: \( \text{AB} = \) Vineland Adaptive Behavior Composite
\( \text{IQ} = \) WISC-R Full Scale IQ
\( \text{Ach} = \) BC QUIET Composite Achievement Score

Each of these models was investigated by applying it to the sample under investigation as follows:

1. Discriminant function analyses were performed. For each of the four models, all variables were allowed to enter the equations.

2. Using the procedure described in Appendix G, the standardized canonical discriminant function coefficients obtained for each variable within the model were converted to relative percentages.

3. Classification matrices were formed for each model, in which classification accuracy for both regular education and M/EMH placements were reported.

4. The percentage of cases correctly classified by each model was calculated.

The results of these analyses are reported in Table 10. As is shown in Table 10, whenever IQ scores enter into a model, they dominate that model. In Model 3, where IQ and
ABC alone are used, the relative percentage of prediction held by IQ is 58.3%, while the ABC factor accounts for 41.7%. In model 4, where Achievement is added to the previous model, the achievement factor accounts for 34.5% of the prediction, but this factor only reduces the relative percentage of IQ by 10.7%. The ABC factor is, however, reduced from 41.7% to only 17.8%, a drop of 23.8%. Also as shown in Table 10, at each step of the historical development of the diagnostic and classification models for M/EMH, increases in overall classification accuracy were seen. Each step is found to significantly predict classification (p < .001). Some variation is seen in the classification accuracy by group. For regular education students little difference is observed in classification accuracy between the adaptive behaviour alone (79.6%) and IQ alone (80.9%) models. For the M/EMH group, however, Model 2 correctly classifies 11.8% more students than does Model 1.

For regular education students, the combination of the IQ and adaptive behaviour factors of the AAMD two-factor model (Model 3), but without the AAMD cut-off scores, increases classification accuracy by 6.3% over Model 2, while the M/EMH classification rate drops slightly (3.7%) between these two models.
Table 10

Relative Percentages, Classification Matrices, and Accuracy for Historic M/EMH Diagnostic and Classification Models

1. **SDFC[^a]** and relative percentages for historic models

<table>
<thead>
<tr>
<th>PV[^c]</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 106)</td>
<td>(n = 101)</td>
<td>(n = 101)</td>
<td>(n = 100)</td>
</tr>
<tr>
<td>ABC</td>
<td>1.00(100.0)</td>
<td>-</td>
<td>-</td>
<td>0.68(41.7)</td>
</tr>
<tr>
<td>IQ</td>
<td>-</td>
<td>-</td>
<td>1.00(100.0)</td>
<td>0.95(58.3)</td>
</tr>
<tr>
<td>Ach</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

2. Classification results of discriminant function analyses

<table>
<thead>
<tr>
<th>Predicted Placement</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Actual</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reg(n)</td>
<td>39 10</td>
<td>38 9</td>
<td>41 6</td>
<td>42 4</td>
</tr>
<tr>
<td>(%)</td>
<td>79.6 20.4</td>
<td>80.9 19.1</td>
<td>87.2 12.8</td>
<td>91.3 8.7</td>
</tr>
<tr>
<td>M/EMH(n)</td>
<td>12 45</td>
<td>5 49</td>
<td>7 47</td>
<td>4 50</td>
</tr>
<tr>
<td>(%)</td>
<td>21.1 78.9</td>
<td>9.3 90.7</td>
<td>13.0 87.0</td>
<td>4 92.6</td>
</tr>
</tbody>
</table>

3. Percent of cases correctly classified

<table>
<thead>
<tr>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>79.3%</td>
<td>86.1%</td>
<td>87.1%</td>
<td>92.0%</td>
</tr>
</tbody>
</table>

[^a]: Standardized Discriminant Function Coefficient.
[^b]: Variation in n is caused by students who were either untestable or declined testing.
[^c]: Predictor Variable.
The addition of Achievement as a third predictor variable (Model 4), decreased classification accuracy for the regular education students by 2.1%, but resulted in an increase of 3.7% for the M/EMH students. The addition of the VMS, Vision and Hearing variables results in an overall decrease in correct classification of 3.6%, to 87.1%.

Thus, using this series of forced predictor variables, it is seen that the best predictive combination for regular education students is the two-factor model (Model 3). For the M/EMH students, however, the addition of the achievement variable to the two factor model results in a higher rate of correct classification. This addition of the achievement test to the two-factor model resulted in the highest overall classification accuracy of 92.0%.

**Step-Wise Discriminant Function Analyses**

In the previous section of this chapter, Models 1, 2, 3, and 4 reflected the historical development of diagnostic and classification models. It was decided that an investigation of the role of predictor variables other than those included in these models was appropriate. These additional predictor variables were: maladaptation, visual acuity, hearing acuity, and chronological age. Two discriminant function techniques were selected for this
investigation. First, all of the predictor variables (Adaptive Behaviour Composite, Full Scale IQ, Achievement Composite, Maladaption, Visual Acuity, Hearing Acuity and Chronological Age) were entered into a forced discriminant function analysis. The standardized discriminant function coefficients were then used to determine the relative percentage value of each variable. Finally, a classification matrix for this model (Model 5) was assembled.

Following this procedure, these same variables were entered into a step-wise discriminant function analysis using the Mahalanobis $D^2$ technique. In this procedure, only the best combination of predictor variables is retained within the model. Retained variables were then examined, and the relative percentage values of each calculated and a classification matrix for this model (Model 6) generated. The results of both of these procedures are given in Table 11.

As is seen from Table 11, in Model 5, when all of the variables are forced into the discriminant function analysis, the IQ, Achievement, and Maladaption variables dominate, with IQ accounting for 39.3% of the prediction, Achievement for 26.2%, and Maladaption for 15.8%. Adaptive
Table 11

Results of Forced and Step-Wise Discriminant Function Analyses for Models 5 and 6

1. SDCF\(^a\) and relative percentages for models 5 and 6

<table>
<thead>
<tr>
<th>Predictor Variable</th>
<th>Model 5 (forced)</th>
<th>Model 6 (step-wise)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SDFC (rel. %)</td>
<td>SDFC (rel. %)</td>
</tr>
<tr>
<td>ABC</td>
<td>0.13</td>
<td>discarded</td>
</tr>
<tr>
<td>IQ</td>
<td>0.72</td>
<td>0.73 46.5</td>
</tr>
<tr>
<td>Ach</td>
<td>0.48</td>
<td>0.49 31.2</td>
</tr>
<tr>
<td>VMS</td>
<td>0.29</td>
<td>0.35 22.3</td>
</tr>
<tr>
<td>Vis</td>
<td>0.01</td>
<td>discarded</td>
</tr>
<tr>
<td>Hrg</td>
<td>0.14</td>
<td>discarded</td>
</tr>
<tr>
<td>Chr. Age</td>
<td>0.06</td>
<td>discarded</td>
</tr>
</tbody>
</table>

2. Classification results of discriminant function analyses

<table>
<thead>
<tr>
<th>Predicted Placement</th>
<th>Model 5</th>
<th>Model 6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reg. M/EMH</td>
<td>Reg. M/EMH</td>
</tr>
<tr>
<td>Actual</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reg (n)</td>
<td>40 6</td>
<td>39 7</td>
</tr>
<tr>
<td>(%)</td>
<td>87.0 13.0</td>
<td>84.8 15.2</td>
</tr>
<tr>
<td>M/EMH(n)</td>
<td>5 44</td>
<td>4 50</td>
</tr>
<tr>
<td>(%)</td>
<td>10.2 89.8</td>
<td>7.4 92.6</td>
</tr>
</tbody>
</table>

3. Percent of cases correctly classified

<table>
<thead>
<tr>
<th></th>
<th>Model 5</th>
<th>Model 6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>88.4</td>
<td>89.0</td>
</tr>
</tbody>
</table>
Behaviour, which is the necessary second component of the AAMD two-factor diagnostic model, accounts for only 7.1% of the prediction, less than Hearing (7.7%). Vision and Chronological Age accounted for little of the prediction (0.5% and 3.4% respectively).

The combination of predictor variables included in Model 5 correctly classified 88.4% of the total sample, with very similar correct classification rates for both regular education (87.0%) and M/EMH (89.9%) students. When compared to Model 4 (Table 10), it is noted that the addition of the Maladaptation, Vision, Hearing and Chronological Age variables results in an overall decrease in correct classification of 3.6% (from 92.0% to 88.4%), with the regular education and M/EMH groups showing similar declines (2.2% and 2.8% respectively).

Model 6, in which the Mahalanobis $D^2$ step-wise technique was used, resulted in only the variables IQ, Achievement, and Maladaptation being retained as a significant predictor combination. The combination of these three variables predicted present group membership with 89.0% accuracy, with stronger prediction for the M/EMH group (92.6%) than for the regular education group (84.8%). An important observation is that the step-wise procedure retained Maladaptation as a valid predictor while discarding
the Adaptive Behavior Composite, while Model 4, in which Adaptive Behaviour was forced into combination with IQ and Achievement, resulted in a higher overall classification accuracy than was achieved with Model 6. It is apparent that the Maladaption variable, when allowed into the discriminant function analysis with Adaptive Behavior, dominates that variable, and results in its exclusion from the final predictive combination. For both Models 5 and 6, the three variables that clearly dominate current placements are IQ, Achievement and Maladaption. However, as was shown in Table 10, in the absence of Maladaption, the combination of Adaptive Behavior Composite, IQ, and Achievement provides the highest classification accuracy.
Chapter 5

Summary, Conclusions and Implications

In this final chapter a summary of the purposes, procedures, results, and limitations of the study are given; conclusions and implications are presented; recommendations for practice are provided; and directions for future research are suggested.

Summary

Purpose

The purpose of this study was to examine the validity of diagnostic and classification practices with respect to Mildly/Educably Mentally Handicapped (M/EMH) children. Research conducted in the United States suggests that classification decisions for M/EMH students are often inaccurate. Classroom teachers were frequently found to refer children to special class placements for idiosyncratic reasons, while psychologists responsible for diagnosing and labelling students tended to place reliance more on "clinical judgement" than on the careful use of objective data. Although U.S. law prescribes a two-factor (IQ and adaptive behaviour) diagnostic and classification model for M/EMH students, this model is often ignored.

Little research has been done on the diagnosis and classification of M/EMH students in Canada. Since recent
court actions based on the Canadian Charter of Rights and Freedoms suggest that diagnostic and placement decisions will increasingly come under critical scrutiny, it was decided that an investigation of the diagnostic and placement practices with M/EMH students in a Canadian setting was appropriate.

Procedure

Based on the review of the literature, the criterion of the two-factor diagnostic model for M/EMH was selected as the basis for study of the classification process. In addition to the IQ and adaptive behaviour components of the two-factor model, other variables identified in the literature as important to the diagnosis and classification process were identified and examined. These were academic achievement, maladaptive behaviour, and visual and hearing acuity.

Research subjects were students enrolled in two metropolitan Vancouver school districts. In district 1, psychologist records of suspected M/EMH students were available, while in district 2, a procedure for examining district referral records and for re-creating initial referral suspicions was established. In the latter case, an inter-rater reliability study demonstrated the validity of this procedure. All had been suspected of being M/EMH
within the last two years. These subjects (n = 106) formed two groups; those who had been labelled as M/EMH (n = 57) and those who had been retained within the regular education programme (n = 49). Each subject’s records were perused, demographic information was obtained, and recent IQ data, where available, were recorded. The following tests were administered: (1) WISC-R (n = 5), (2) BC QUIET (n = 90), Vineland Adaptive Behavior Scales (n = 106), (3) Vineland Maladaptive Behaviour Scales (n = 106), (4) Snellen Visual Acuity test (n = 106), (5) Pure Tone Audiometric sweep test (n = 106), and (6) re-evaluations with both the Snellen (n = 19) and Pure Tone tests (n = 16).

Data Analysis and Results

Achievement composite. The feasibility of forming an achievement composite score from the word identification, passage comprehension and arithmetic sub-tests of the BC Quick Individual Educational Test (BC QUIET) was investigated. Two analysis procedures were used. First, the correlations between the subtests and an achievement composite formed from those subtests was examined within each district. Then, the highest and lowest correlations were corrected for attenuation using the subtest reliabilities reported for the BC QUIET. Second, a principal components analysis showed that a single factor
accounted for 82.0% of the variance in the set of three B.C. QUIET subtests, with virtually identical factor loadings for each of the subtests within each of the districts. Based on these findings the formation of an achievement composite was considered appropriate.

Pooling data across districts. Data were then analyzed with respect to pooling across districts. Discriminant function analyses were performed to test whether the relationships between group membership and each predictor variable differed in the two districts. In each case a predictor variable, a dummy variable representing district, and district-by-predictor variable interaction term were tested using the Mahalanobis D² technique. In no instances did the interaction term predict group membership at the .05 significance level. In addition, a full model including all eight of the predictor variables, the district dummy variable, and the eight district-by--predictor interaction terms was tested using the same Mahalanobis D² procedure. None of the interaction terms or the district membership were retained within the model. These results suggested no significant differences between group membership and the predictor variables, and the decision to pool the data across districts was taken.
Visual and hearing acuity. Results of the Snellen vision and pure tone audiometric hearing tests were examined to see whether there was a relationship between classification decisions and visual and hearing acuity. Although a relationship between these variables and M/EMH placement decisions could not be demonstrated, a disproportionate group of untestable subjects was found. Overall, seven subjects proved to be untestable on both the Pure Tone Audiometric Sweep test and the Snellen visual acuity test. Six of the seven were enrolled in M/EMH classes. It was noted that in only 3.8% of all cases (n = 4), were documented efforts to have more sophisticated hearing and/or visual acuity testing performed after a subject had proved untestable. It was apparently assumed that untestable subjects were able to see and hear within normal tolerances. Furthermore, it could not be shown that regular use of visual and hearing acuity data occurred prior to the administration of psychometric tests. Rather, testing appeared to constitute checking the students records to see whether a school wide sweep test had been performed in the previous few years, and recording that data only as a requisite to making referral to a special education screening committee.
Classification accuracy. Each subject’s IQ and adaptive behaviour composite score was examined, and based on the standard scores, subjects were classified by the two-factor diagnostic model using the cut-off criteria of both (1) the American Association on Mental Deficiency (AAMD), and (2) the draft B.C. Special Education Guidebook. Errors in classification were examined to determine which two-factor parameters were violated. The classification accuracy of a series of models representing the historic development of M/EMH classification models (see Chapter 2) was then explored through a series of discriminant function analyses. Based on the argument that the standard score cut-off criterion of 75 is more appropriate for B.C. students than the standard score 69 cut-off currently proposed in the B.C. Special Education (draft) Guidelines, the former cut-off criterion was used. Overall correct classification occurred in only 77.1% of all cases, while incorrect classifications among students currently enrolled in M/EMH classes were almost one in four. Violations of the AAMD IQ parameter were found to be responsible for 70.4% of the misclassifications, either alone (52.4%), or in combination with Adaptive Behaviour (19.0%)

Historic models. As described in Chapters 2 and 3, a series of four historic models for the classification of
M/EMH students were drawn from the literature. These models were analyzed in the sequence in which they appeared historically, being labelled Models 1 through 4 (i.e. Adaptive Behaviour alone (19th century); IQ alone (first half of 20th century); IQ and adaptive behaviour (later 20th century); and IQ, Adaptive Behaviour and Academic Achievement (1980s)).

Correct classification was found to improve at each historic step. Regular education classification accuracy was greatest with the IQ and ABC model (87.2%), while the M/EMH classification rate was highest with the IQ, ABC and Achievement composite model (92.6%).

Although the IQ and ABC model correctly classified more regular education students than did any other model, the addition of a measure of academic achievement had an important impact. The expansion of the historic two-factor model through the inclusion of achievement resulted in the highest rate of correct classification for M/EMH students as well as for the total sample (92.0%).

**Full Model Analysis.** A full model which included the variables ABC, IQ, Achievement, Maladaption (VMS), Vision, Hearing, and Chronological Age were analyzed using two techniques. In the first all of the variables were forced into a discriminant function analysis (Model 5). In the
second (Model 6), these same variables were included in a step-wise discriminant function analysis using the Mahalanobis $D^2$ technique to determine the order in which they discriminated group membership, and to find the variable or combination of variables that most accurately predicted that membership.

Model 5 showed that the three most important discriminating variables in determining present group placement were IQ (39.3%), Achievement (26.2%), and Maladaptation (15.8%). Adaptive Behaviour accounted for only 7.1% of the prediction in Model 5, less even than Hearing (7.7%). Overall classification accuracy with this model was 88.4%.

In Model 6, only the IQ, achievement composite, and maladaptation variables were retained after the step-wise procedure was completed. This combination of variables correctly predicted group membership for the sample with 89.0% accuracy. M/EMH membership was predicted with 92.6% accuracy and regular education membership with 84.8% accuracy.

Limitations of the Study

Limitations to the study relate to representativeness, sample size, and possible treatment effects. First, the recreation of the M/EMH decision-making process in district 2,
even though supported through an interrater reliability study, is a weakness of the design. Although strong agreement was achieved between the two raters, this may not adequately represent the decisions made in the field by the nine psychologists employed in District 2.

Secondly, the possible treatment effects of students being in either the M/EMH or left in the regular education programmes between the time of referral for psycho-educational assessment and the time that they were tested for this study cannot be accounted for. For example, it is possible that the students enrolled in the M/EMH classes have made significant gains in their adaptive behaviour or achievement as a result of that placement, while the reverse might also be true.

Thirdly, subjects tested had already spent some time in their respective placements subsequent to being considered as possibly M/EMH. The possible treatment effects of either being retained within a regular education classroom or being placed into an M/EMH classroom cannot be accounted for within this study.

Conclusions and Implications

Conclusions and implications based on the research results presented in Chapter 4 follow. These will be presented under three headings: (1) two-factor model, (2)
visual and hearing acuity, and (3) summary of recommendations for practice and research in B.C.

Two-Factor Model

Misclassification Rate

The application of the two-factor model using the AAMD cut-off criterion of s.s. less than or equal to 75 to the M/EMH group results in a correct classification rate of only 63.2%. Thus, 36.8% of the students presently labelled and enrolled as M/EMH in this sample are not appropriately placed according to this internationally accepted standard. When the more rigorous cut-off criteria of the proposed B.C. Guidelines are applied, the misclassification rate rises significantly to 64.9%.

IQ, Maladaption and Achievement

It was demonstrated in Model 6, that the three factors accounting for 92.6% of the placements into M/EMH programmes in this sample are FSIQ, Achievement, and Maladaption (Table 11). Each of these will be dealt with separately.

IQ. In each of the six models presented in Chapter 4, the IQ score was found to dominate. Regardless of other variables entered with IQ, it consistently ranked first. This finding parallels those reported in Chapter 2 (Knoff, 1984; MacMillan, 1982; Reschly, 1988; Turnbull & Turnbull, 1986). It is also noted that, based on the relative
percentages found for each variable under the six models studied, not only did IQ dominate each model, it tended to be reduced in importance least of all variables studied when other variables were added. For example, when Achievement was added to the IQ and adaptive behaviour model (Model 3), the relative percentage of the IQ variable was reduced by only 10.7%, while that of adaptive behaviour was reduced by 23.8%. Clearly, in this study, IQ has been found to be both a consistently dominant and robust factor in classifying children as M/EMH.

**Maladaption.** In the research of Ysseldyke et al. (1983), it was stated that the primary reason for teacher initiation of referrals to special education programmes was idiosyncratic, with teachers tending to refer students "who bother them" (p. 80). The presence of a measure of social maladaption as a viable predictor of classification (Models 5 and 6), and one which displaces a measure of social adaptation as a valid predictor, is an important finding.

It has been shown that teacher response to inappropriate student behaviour is the key factor in the ultimate decision to identify a child as special needs. A decision is then supported and expedited by the testing and screening process (Reschly, 1982; Ysseldyke et al, 1983; Tymitz, 1984). The presence of the Maladaption test score
as a valid and important predictor of group placement for this sample, and one which statistically displaces social adaptation when run in competition with it, is indicative of a similar process; one in which socially inappropriate behaviours have become a part of the referral and placement process. Measured social adaptation, the key second component of the two-factor model, simply failed to discriminate student placements when placed in competition with maladaptation. This suggests a phenomenon in Canada like that seen in the United States, that many students are referred, tested, and labelled as M/EMH not because they meet an accepted criterion, but because they demonstrate behaviours that bother teachers.

Achievement. A strong argument has been made in favour of the inclusion of academic achievement as a valid component of measured social adaptation (Grossman, 1983; Reschly, 1982, 1986, 1988; Reschly & Gresham, 1987). In this study, composite academic achievement, using a B.C. normed test, was found to be a valid co-factor with IQ and Adaptive Behaviour in correctly predicting 92.0% of M/EMH placement decisions.

Although the maladaptation test measures a variable which ought not predict membership, it is argued that academic achievement is a variable that should replace maladaptation.
A claim has been made (Grossman, 1983; Reschly, 1982, 1986, 1988; Reschly & Gresham, 1987) that achievement is a part of social adaptation to a school environment. In this study it is apparent that academic performance is a very important variable in both referring and placing students. Indeed, the case is made that in the absence of social adaptation, a combination of maladaptive behaviours and academic achievement deficits has emerged as a functional measure of social adaptation at the school level. The M/EMH students in this study appear to have been referred and placed on the basis of idiosyncratic classroom behaviour, coupled with academic weaknesses, and as confirmed through the use of IQ test scores. However, this process is not anchored to the AAMD standard score cut-off criterion.

An Erroneous Three-Factor Model

Eighty-nine per cent of the subject's placement decisions can be accounted for by a combination of IQ, Achievement, and Maladaption. The IQ score is a variable quantified, usually, by school psychologists. Achievement and Maladaption are variables observed, and to some degree measured by classroom teachers. It is the classroom teacher who usually makes the initial decision to refer a child for assessment. It is patent that that decision is based on a combination of inappropriate student behaviours and poor
academic achievement. Functionally, these two variables appear to merge to form a type of social maladaptation measure which is then supported through the administration of an IQ test. It is this process of teacher observations of maladaptive behaviour and academic achievement, supported by psychologist's interpretations of IQ tests, and decision making directed by district policies and procedures, that results in one out of four students currently placed in M/EMH classes being inappropriately labelled. They may be helped or hindered by their placement, but they have arrived by way of a flawed process, one which does not recognize diagnostic "best practices," and which does not challenge the regular education programme or other components of the special education system to meet their needs.

An Improved Two-Factor Model

The critically important factor of IQ appears solidly in place in the districts studied. What is required is the inclusion with IQ of measured Adaptive Behaviour. It has been noted (Chapter 2) that few adaptive behaviour tests include measures of academic achievement. The suggestion has been made (Reschly 1982, 1986, 1988; Reschly & Gresham, 1987) that the concept of adaptive behaviour, certainly at the school age level, must include a measure of academic achievement as a legitimate domain of adaptation. This
research supports that idea. Not only is it reasonable to say that very poor academic achievement is not good adaptation to the classroom, teachers recognize it as such. If, as Ysseldyke et al. (1983) have pointed out, bad behaviour triggers referrals for testing, the same is proved true in this study both for maladaptive behaviour and poor academic performance. That social adaptation has not emerged as a predictor when examined along with social maladaptation is indicative that psychologists and others in charge of psychoeducational evaluations rely on clinical judgement and the reported perceptions and observations of classroom teachers, rather than on empirical measures of social adaptation.

Teacher observation of classroom behaviour, both social and academic is central to the educative process regardless of the type of student involved. In order to safeguard against the kinds of misplacements seen in this study, as well as to improve the model used in measuring adaptive behaviour, it is suggested that academic skills be included as a factor in measured adaptive behaviour. For students who are suspected of being in the M/EMH range, a composite reading and arithmetic score should be a factor in measured social adaptation. Although further research is required to determine the best loading that achievement should have as a
domain of adaptive behaviour, it is suggested that the use of a valid and reliable measure of academic achievement weighted equally with an adaptive behaviour composite is an appropriate interim step, particularly since a test of achievement with B.C. norms is readily available. Thus, IQ would remain as an equal factor with adaptive behaviour, in keeping with the AAMD two-factor model, provided that the adaptive behaviour composite score is calculated with an achievement composite score weighted equally with adaptive behaviour.

**Reasons to use the two-factor model.** The maintenance of students with special needs in regular classrooms, as much as their maintenance in special education programmes, requires some form of identification to determine eligibility for funding. Without access to funding, special services, regardless of which environment they are offered in, will suffer. The present system of diagnosis and classification of M/EMH students is seriously flawed and may be doing considerable damage to children.

That those students who are misclassified have special needs is not called into question. Doubtless these students have some demonstrated educational needs, certainly if they did not they would not have been taken through the referral, testing, classification, and placement process. The
previous discussion suggests that they are experiencing academic achievement problems, and may be showing atypical student behaviour. What is called into question is the appropriateness of labelling non-M/EMH students "retarded" in order to obtain these services. Clearly either different classifications of exceptionality should be considered in seeking special education services for such students, or better levels of regular education instruction and support should be implemented to meet the needs of these children within the regular education programme.

The labelling of students as M/EMH does not, of itself, assist students in educationally meaningful ways. Instead, the pragmatic application of labelling as a means of obtaining money for the provision of educational services is the primary reason for the classification process. However, given the potentially negative effects of being labelled as M/EMH, the use of a label for pragmatic funding reasons should be more carefully regulated.

Visual and Hearing Acuity

Similar findings, conclusions and recommendations emerged from the study with respect to both visual and hearing acuity. First, general findings, common to both vision and hearing will be presented, and then separate recommendations for assessing untestable subjects made.
General findings

A statistical association between hearing and visual acuity and M/EMH classification decisions was not found. However, two findings of this study are of importance. First, more than one in 10 M/EMH students were found to be untestable using the pure tone audiometric sweep test and the Snellen visual acuity test. Secondly, although both of the districts require that student's hearing and vision be checked before screening for entry into M/EMH classes, neither district requires that psychologists obtain test results before performing initial psycho-educational evaluations. Since decisions about whether to proceed with a referral to M/EMH are based on these evaluations, there is no requirement to ensure that critical visual and hearing acuity testing has been done before the important decision to refer a child for placement is made.

Where such testing does take place, normal practice appears to take the form of relying on the most recent school-wide screening of vision and hearing performed by the public health department which the majority of students pass. In only 3.8% (n = 4) of the cases examined could it be demonstrated that special requests were made for vision and hearing testing beyond that normally performed on all school children. All of the students found to be untestable
in this study had been placed into their current programmes in the absence of any objective measures of sensory acuity. It is concluded that hearing and visual acuity, as they relate to the diagnosis and placement of M/EMH students, is not considered important enough by those testing and placing students to take the extra time and effort to ensure that examination beyond that performed routinely in the schools is undertaken. Although requirements for the inclusion of such data before screening into special programmes are in place, they often take the form of using outdated school-wide sweep test results. Furthermore, subjects found to be untestable with such sweep procedures are very seldom referred for more sophisticated assessment. Instead, the assumption appears to be that, if the child is untestable, he can't be tested at all, and by default his hearing and vision are treated as within normal limits.

Administering educationally significant tests, the results of which may in large measure determine a child's educational future, without prior investigation of visual and hearing acuity is inappropriate. Indication that a child's sensory integrity has been screened should not be a requirement for placing that child's needs before a classification and placement committee; it should be a
requirement before any psycho-educational testing takes place.

The literature supports the use of the pure tone audiometric sweep test and Snellen visual acuity test as ways of screening large populations of students for sensory deficits. However, for students who are often difficult to test, and who have higher than average frequencies of middle ear infections, such as the M/EMH (Nolan & Tucker, 1984, 1981; Cunningham & McArthur, 1982; Brooks, 1978) such sweep testing is often insufficient. That more than 10% of the M/EMH students in this study were untestable using standard sweep procedures underlines this problem. To declare a student untestable for sensory acuity and to then proceed with the administration of psycho-educational tests assuming that their sensory acuity is within normal limits is patently inappropriate.

Alternate Testing Procedures

Hearing tests. There are several alternative procedures for testing students found to be untestable using standard sweep procedures. Students for whom reliable sweep test procedures cannot be obtained should be referred to a competent audiologist or other appropriately trained person for a hearing evaluation before psycho-educational testing proceeds. Such procedures include (1) play audiometry (Bess
& McConnell, 1981; Roesser & Northern, 1981); (2) speech screening (Griffing, Simonton, & Hedgecock, 1967); (3) acoustic impedance audiometry (Northern, 1984; Jerger, 1970); and (4) acoustic reflectrometry (Bess, 1986; Teele & Teele, 1984). Such procedures should always be used prior to the administration of psycho-educational tests for classification purposes when accurate sweep testing is impossible. The best course of action is to arrange a referral to an appropriate audiologist.

Vision tests. The same observations made with respect to the testing of auditory acuity apply to visual acuity. Where students are found to be untestable using the Snellen test, recourse to other test procedures prior to the administration of psycho-educational tests should be made. The literature suggests that when a child either fails a sweep vision test, or is found to be untestable, or is too young to respond to techniques commonly used in sweep testing, referral to an optometrist, preferably one specializing in pediatric optometry is appropriate (Hallahan & Kaufmann, 1988; Barraga, 1983). Techniques used to test such a youngster can include the Diagnostic Assessment Procedure (Barraga, 1983), ocular examination, and play ophthalmological procedures (Hallahan & Kaufmann, 1988).
The best recourse is to arrange a referral to a competent optometric or ophthalmological specialist.

**Those who pass.** It has been noted that approximately 80% of all of the subjects screened in this research passed both the Snellen and Pure Tone Audiometric Sweep tests. These figures may not adequately represent what actually occurs in practice. As mentioned, it appears that the collection of hearing and visual acuity information is an afterthought, taken between actual testing and the filling in of the application for special education services forms. It is apparent that reliance is often placed on hearing and visual acuity results that are not recent. In one case, the use of Snellen test results more than three years old were used in the application of a child. Best practices in screening children for special education programmes, indeed whenever detailed and possibly critical psychoeducational tests are administered, should require that testing be recent, and certainly no more than one year old (Bess & McConnell, 1981; Barraga, 1983). Furthermore, where a child is found to be untestable, the procedures outlined in the sections above should be followed before testing begins. It will be argued that this is a time consuming procedure, and indeed it is. However, the results of generating spurious test scores, of labelling and inappropriately placing a
child because of a hearing or vision acuity deficit make the use of such time essential.

Recommendations for Practice

Basis for Recommendations

Reflecting the findings of many U.S. authors (Knoff, 1984; MacMillan, 1982; Reschly, 1988; Turnbull & Turnbull, 1986), IQ scores appear to dominate placement decisions. If the AAMD two-factor diagnostic model were underlying placement decisions, it would be expected that the adaptive behaviour composite score should have consistently emerged as a valid discriminator of student classifications.

While adaptive behaviour did not emerge as a discriminator of group placement in the presence of measured maladaptation, academic achievement, a variable that is arguably a valid domain of school social adaptation (Reschly, 1982, 1986, 1988; Reschly & Gresham, 1987) did. This relationship between academic achievement and classification as M/EMH supports the argument that poor academic performance serves as a trigger for referrals to M/EMH programmes. The inclusion of a valid and reliable measure of academic performance as a sub-domain of social adaptation is supported.

The finding that maladaptive behaviour is a predictor of M/EMH classification is of considerable interest, as is
its effect on social adaptation when the two are run in competition. The Vineland Adaptive Behavior Scales do not include the Maladaptive Scale in the calculation of the overall adaptive composite score. Indeed, the maladaptive scale is not considered to be a sub-domain of adaptive behaviour. Although maladaptive behaviours can be associated with lowered adaptive functioning (Sparrow, et al, 1984), they are not considered as valid measures of social adaptation. This is particularly significant when it is noted that the presence of atypical behaviours, while associated with mentally handicapped students, is certainly not exclusive to that population. The fact that maladaptation overrides social adaptation as a predictor of M/EMH placement suggests that referrals of students for M/EMH placement may, in part, occur because of the presence of disruptive behaviours in the regular classroom. That a measure of socially inappropriate behaviour as reported by classroom teachers serves as a predictor of M/EMH classification, suggests that inappropriate student behaviours are fuelling, at least in part, inappropriate placements into M/EMH classes. Thus, instead of "...the standards of personal independence and social responsibility" (Grossman, 1973, p.11) serving as a determinant of M/EMH placement, "undesirable behaviors"
(Sparrow, et al., 1984, p. 3) are serving that function. The findings of this study are that undesirable student behaviour, along with poor academic achievement, forms a primary basis for labelling children as mentally handicapped and placing them in special education classrooms. Referrals made on the basis of these two variables, often without objective verification, are supported by IQ scores performed without reference to sensory acuity information, or to internationally recognized cut-off criteria. Present practice in classifying students as M/EMH results in large numbers of students being inappropriately labelled as "retarded." A clear pattern of overidentification has emerged.

Recommendation 1

That the two-factor diagnostic model, with the cut-off criteria for each factor set to the upper limits suggested by the AAMD (standard score 75), and with valid measures of academic achievement included as 50% of overall social adaptation, be adopted.

Supportive statement. The evidence of this study supports the AAMD two-factor diagnostic model as being the most appropriate. In addition to the support that this model receives internationally, for the population studied it provided the highest level of protection against
inappropriately labelling children as M/EMH. The use of the currently suggested standard score 69 cut-off is inappropriate for use in British Columbia and should be abandoned.

Throughout, every effort should be made to avoid the use of "clinical judgement" in making placement decisions. Repeatedly, clinical judgement has been shown to be both an ineffective and dangerous tool in decision making. The use of a variety of objective evaluation techniques should be the basis of sound diagnostic and placement practice.

Recommendation 2

Educational policy should be articulated that guarantees that student’s visual and hearing acuity has been assessed appropriately before the administration of psychoeducational tests, that such information be no more than six months old, and that in cases where students are found untestable using normal school procedures, referral for specialist assessment be made.

Supportive statement. Psycho-educational tests can have tremendous effects in the lives of students. The importance of quantifying sensory acuity has been clearly demonstrated. Where students fail sweep testing, psychologists should not proceed with testing until the
results of more detailed investigations of hearing and visual acuity have been performed.

Where students are found to be untestable, an assumption that the child is not sensorially impaired should never be made. Referral to appropriate persons capable of testing difficult to test students should be made, and further testing not performed until results are received. Under no circumstances should any child be administered a psycho-educational test without visual and hearing acuity information being available which is less than six months old and which has addressed problems of untestability.

Directions for Further Research

Based on the results of the present study, several recommendation for further research are provided. In each case, a brief rationale for the recommendation is given.

Recommendation 1

A replication of this study but with a larger sample size drawn from a wider variety of school districts and from other Canadian provinces should be undertaken. This study should seek to quantify all predictor variables under study before subjects begin their educational placements to eliminate possible treatment effects generated by those placements.
The current study was restricted to two metropolitan school districts. The inclusion of an appropriate mix of urban and rural districts, drawn from more provinces would improve the generalizability of results, as would control for treatment effects.

Recommendation 2

An investigation of the reasons teachers refer students as suspected M/EMH is needed.

This research suggests that maladaptive behaviour and poor academic achievement are major determinants of placement decisions. This hypothesis could be investigated by tracking referrals back to the originating teacher and analyzing how and why the referrals are made.

Recommendation 3

An investigation of the efficacy of placements into M/EMH programmes should be made.

The present study did not examine the efficacy of M/EMH versus regular education placements. A longitudinal study in which pre and post classification measures of intelligence, social adaptation and achievement are made may address the question of placement accuracy not just in terms of a classification standard but also in terms of classification efficacy.
Recommendation 4

An investigation of the accuracy of classification decisions for Moderately/Trainably Mentally Handicapped (M/TMH) versus M/EMH is needed.

This study has focussed on the accuracy of placing a student in either M/EMH or regular education programmes. At the lower end of the M/EMH range, decisions to classify a student as M/EMH or M/TMH are regularly made. The classification accuracy of such decisions could be studied using a format similar to this research.
References


Constitution Act (1867). (U.K. 30 31 Vict.) c.3 (Formerly British North America Act), 1867 (U.K. c.3).


Diana v. State Board of Education c-70 37 RFP District Court of Northern California, 1972.


Foster, G., Ysseldyke, J., E Reese, J.H. (1975). I wouldn't have seen it if I hadn't believed it. Exceptional Children, 41, 469-473.


APPENDIX A

District One Psychologist Case Log
APPENDIX B

District One Referral to Psychologist Form
KEY CODES:

GRADE (OR CODE ONLY IF IN SPECIAL CLASS):

K – 12

Primary = PS
Intermediate = IS
Junior Secondary = JS
Senior Secondary = SS

CASE STATUS: Yes = Y
No = N

ACTION BEING TAKEN:

New Action = ACT
Continuing Action = CON
Completed Action = FIN
No Action = NO

PROBLEM AREA:

Limited Intellectual Functioning = MH
Learning Disabilities = LD
Giftedness = G
Behaviour: Social Relationships = SB
Work Attitude = WB
Other = OTH
SCHOOL DISTRICT NO.
DISTRICT PSYCHOLOGIST REFERRAL FORM

DATE: __________________________ DISTRICT PSYCHOLOGIST: _______________________

PUPIL'S NAME: ___________________ SCHOOL: ___________________

BIRTHDATE: Y / M / D AGE: ______ SEX: ______ GRADE: ______ DIV: ______

FIRST LANGUAGE: ___________________ TEACHER: ___________________

PARENTS OR GUARDIANS: Mother's Name: ___________________

Father's Name: ___________________

WRITTEN PARENTAL PERMISSION GRANTED FOR ASSESSMENT OR DIRECT SERVICES: Yes No ______

PHONE: __________________ Home __________________

Mother's Work No. __________________ Father's Work No. __________________

HOME ADDRESS: __________________________ (Postal Code) __________________

MEDICATION REGULARLY TAKEN: __________________

POSSIBLE SIDE EFFECTS: __________________

OTHER SPECIAL PROGRAMME PERSONNEL OR OUTSIDE AGENCIES CURRENTLY INVOLVED:
Speech/Language Pathologist Teacher of the Hearing Impaired __________
Physiotherapist Teacher of Visually Impaired __________
Elementary Counsellor Other __________

SIBLINGS: ___________ AGE: ______ GR: ______; ___________ AGE: ______ GR: ______

SCHOOL HISTORY:
(____) Number of school moves (____) Accelerated; grade(s) ______
(____) 4 year primary program (____) Enriched; grade(s) ______
(____) Repeated; grade(s) ______ (____) Special Class; type ______

Last year's teacher: __________________ School: __________________

OTHER SERVICES PRESENTLY OFFERED:
(____) L.A.; No. of hours/week (____) Group (____) Individual
(____) E.S.L.; No. of hours/week Language in home: __________________
(____) Special Class; type ______ Integrated subjects: __________________

Other additional service: __________________

Date: __________________________ Principal __________________________

Date Forwarded to District Psychologist: __________________

Date Action Taken: __________________ Initial Action Taken: __________________

cc: School G4 File
District Psychologist
REASON FOR REFERRAL - WHAT ARE YOUR MAIN CONCERNS?


EXPECTATIONS FROM REFERRAL - WHAT SPECIFICALLY WOULD YOU LIKE TO SEE RESULT FROM THIS REFERRAL?:


CLASSROOM TEACHER'S OBSERVATIONS:


CLASSROOM TEACHER: 


L.A. TEACHER/COUNSELLOR'S OBSERVATIONS: (Including test results, corrective measures tried.)


L.A. TEACHER/COUNSELLOR: 


PRINCIPAL'S COMMENTS:


DISTRICT PSYCHOLOGIST'S NOTES:


HANDICAPPING CONDITION: 
(To be completed by Psychologist)
S100
88/01
APPENDIX C

District Two Referral to Psychologist Form
PUPIL REFERRAL FOR SPECIAL EDUCATION SERVICES

NAME: _______________________ M □ F □ GRADE: _______ BIRTHDATE: ________________
SCHOOL: ___________________ TEACHER: _______________ DIV.: _______ ROOM: _______
HOME ADDRESS: ___________________________ POSTAL CODE: __________
TELEPHONE: ___________ DATE OF REFERRAL: __________________________
PARENTS/GUARDIANS: __________________________ 
NAMES & AGES OF SIBLINGS: (1) ___________________ (2) ___________________
(3) ___________________ (4) ___________________ (5) ___________________

ALL INFORMATION MUST BE PROVIDED BEFORE ACTION CAN BE TAKEN
PLEASE SUBMIT IN DUPLICATE

TYPE OF SERVICE REQUESTED (Please check one or more)
☐ Psychoeducational Assessment ☐ Another placement (specify) _______________________
☐ Occupational Therapy Consultation ☐ Psychoeducational Consultation

REASON FOR REFERRAL
What questions do you hope to have answered by this referral?
This section MUST be completed by the School Based team.

TEACHER: ____________________________ Signature: ____________________________
L.A. TEACHER: ____________________________ Signature: ____________________________
COUNSELLOR: ____________________________ Signature: ____________________________
PRINCIPAL: ____________________________ Signature: ____________________________
SPEECH/LANGUAGE PATHOLOGIST: ____________________________ Signature: ____________________________
E.S.L. TEACHER/OTHER: (Language spoken at home): ____________________________ Signature: ____________________________
Efforts by school personnel within the current school year (Please check and Indicate dates)

☐ Parent conference ____________________________  ☐ Speech/Language therapy ____________________________
☐ Learning assistance ____________________________  ☐ Visits by helping teacher ____________________________
☐ E.S.L. instruction ____________________________  ☐ Parent helper ____________________________
☐ Counsellor intervention ____________________________  ☐ Other (specify) ____________________________

Previous efforts by school personnel (Please check and Indicate dates)

☐ Counsellor intervention ____________________________  ☐ Remedial reading ____________________________
☐ Reading enhancement ____________________________  ☐ Special class ____________________________
☐ Speech therapy ____________________________  ☐ E.S.L. instruction ____________________________
☐ Visits by helping teacher ____________________________  ☐ Other (specify) ____________________________
☐ Referral for special services ____________________________
☐ S.A.E.C.E. ____________________________

ACADEMIC INFORMATION
Please provide information as requested.

☐ Reading

(1) Present reading program and instructional level:

__________________________________________________________________________________________

__________________________________________________________________________________________

(2) Describe achievement and progress:

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________

☐ Arithmetic

(1) Describe achievement and progress:

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________
Language

(1) Describe strengths (e.g. spoken language, written language, listening comprehension):

___________________________________________________________________________

___________________________________________________________________________

(2) Concerns:

___________________________________________________________________________

___________________________________________________________________________

Behavioral/Social

(1) Describe strengths:

___________________________________________________________________________

___________________________________________________________________________

(2) Concerns:

___________________________________________________________________________

___________________________________________________________________________

SCHOOL INTERVENTIONS

Academic
Describe any special curriculum programs or academic assistance that has been provided for the pupil. How long has this program/these programs been used with this pupil and what gains have been made as a result?

___________________________________________________________________________

___________________________________________________________________________

Behavioral/Social
Describe special help or special behavioral/social programs the pupil has received or is currently receiving. How long has this program/these programs been used with this pupil and what gains have been made as a result?

___________________________________________________________________________

___________________________________________________________________________
### SCHOOL HISTORY

Names and dates of other schools attended (attach copy of PR card if desired)

<table>
<thead>
<tr>
<th>School</th>
<th>Location</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Did pupil attend Kindergarten? YES
Has pupil repeated a grade? YES
Has pupil a history of excessive absence or tardiness? YES
If "YES," when did it start? Specified

### TESTING HISTORY

Report the most recent results for each test. If achievement testing is more than one year old, please update prior to submission of referral.

**PEABODY PICTURE VOCABULARY TEST-REVISED (PPVT-R)**

Date: Form: Standard Score: Percentile: 

**DURRELL ANALYSIS OF READING DIFFICULTY**

<table>
<thead>
<tr>
<th>Date:</th>
<th>Grade Placement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grade Placement</td>
</tr>
</tbody>
</table>

Oral Reading: Grade Score
Silent Reading: Grade Score
Listening Comprehension: (please include) Grade Score
Flash Words: Grade Score
Word Analysis: Grade Score
Spelling: Grade Score

**GROUP ACHIEVEMENT TEST**

Name of Test: Date: 

Scores: 

**WECHSLER INTELLIGENCE SCALE FOR CHILDREN-REVISED (WISC-R)**

Date: Full Scale IQ: Verbal IQ: Performance IQ: 

OTHER: 

---

175
APPENDIX D

Letter of Contact With School Principals
A Study of Diagnostic and Placement Practices

To: The principal, ___________ School

Dear ___________,

After application to the ___________ School Board, I have received the permission of ___________ to contact you by letter.

I am a doctoral student in the Department of Educational Psychology/Special Education at the University of British Columbia. Under the supervision of Dr. P. Leslie, Dr. T. Rogers and Dr. D. Williams, I am conducting a study of the accuracy of diagnostic and placement practices in making educational decisions about children.

Two groups of students are included in the study: (1) elementary age children who have received standardized, individual educational assessments since September, 1987, and who are currently enrolled in regular class elementary programmes, and (2) elementary aged students who have received standardized individual educational assessments over the same time, and who are currently enrolled in elementary special education programmes.

We wish to include a random sample of students from group 1, and all of the students in group 2. Each student in the study will be administered an individualized assessment given by either myself or a qualified research assistant under my supervision. All testing will be conducted by experienced and licensed teachers acting as research assistants.

The study will provide valuable information with respect to the use of standardized, individual educational assessments. Each student included in the study will be
APPENDIX E

Letter of Contact With Parents/Guardians and
Parent/Guardian Consent Form
A Study of Diagnostic and Placement Practices

Dear Parent/Guardian,

I am a doctoral student in the Department of Educational Psychology/Special Education at the University of British Columbia. Under the supervision of Dr. P. Leslie, Dr. T. Rogers and Dr. D. Willms, I am conducting a study of the accuracy of diagnostic and placement practices in making educational decisions about children.

Two groups of students are included in the study: (1) elementary age children who have received standardized, individual educational assessments since September, 1987, and who are currently enrolled in regular class elementary programmes, and (2) elementary aged students who have received standardized individual educational assessments over the same time, and who are currently enrolled in elementary special education programmes.

We wish to include a random sample of students from group 1, and all of the students in group 2. Each student in the study will be administered an individualized assessment given by either myself or a qualified research assistant under my supervision. All testing will be conducted by experienced and licensed teachers acting as research assistants.

The study will provide valuable information with respect to the use of standardized, individual educational assessments. Each student included in the study will be administered the following tests:

- British Columbia Quick Educational Achievement Test (reading and arithmetic subtests only)
- Snellen visual acuity test
- Pure Tone Hearing Acuity Test

The total testing time for this battery of tests is estimated at approximately 45 minutes to 1 hour.

In addition, a small group of students (estimated at 10%) who have not had a test of general cognitive ability since September, 1987, will be administered the Wechsler Intelligence Scales for Children - Revised. This will be administered separately from the other test battery, and is estimated to take from 1 to 1 1/2 hours. Classroom teachers
APPENDIX F

British Columbia Ministry of Education
Draft Special Education Guidelines for
Identifying Mentally Handicapped Children
STUDENTS WITH MENTAL HANDICAPS

(3.20.3.21, 3.27)

DEFINITION

Primarily because their cognitive development differs from that of their peers, students with mental handicaps require additional resources in order to develop their abilities to the fullest extent. With ongoing support, these students can become valuable contributors to school and community life.

The classification system for mental retardation is based, in part, on degrees of intelligence as measured on one or more standardized tests. Levels of retardation are based on the IQ score. For purposes of determining program funding in B.C., the following classifications are currently used. (AAMD 1973)

**Classifications of Retardation by American Association on Mental Deficiency**

<table>
<thead>
<tr>
<th>Level of Retardation</th>
<th>Standard Deviation Range</th>
<th>IQ Range by Test</th>
<th>B.C. Spec Category Funding</th>
<th>Estimated prevalence in B.C.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>-3.00 to -2.01</td>
<td>52-68, 55-69</td>
<td>3.27</td>
<td>1.35%</td>
</tr>
<tr>
<td>Moderate</td>
<td>-4.00 to -3.01</td>
<td>36-51, 40-54</td>
<td>320</td>
<td>.36%</td>
</tr>
<tr>
<td>Severe</td>
<td>-5.00 to -4.01</td>
<td>20-35, 25-39</td>
<td>321</td>
<td>.09%</td>
</tr>
<tr>
<td>Profound</td>
<td>-5.01 and below</td>
<td>19 and below</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

IDENTIFICATION AND ASSESSMENT

The identification of both severely and moderately mentally handicapped students will likely occur before they enter the school system. The initial identification may occur at birth if definite physical characteristics are evident. And measurable delays in a child's general cognitive development will occur in the first five years of life. A complete assessment of the child, involving an interdisciplinary team, should be obtained as early as possible, preferably before the child reaches school age.

Mildly mentally handicapped students may not necessarily be identified before they enter the school system, especially if their verbal and social skills are not delayed significantly. The handicap may, however, appear later in life as a result of illness, accident, or trauma.
In order to assess mentally handicapped students it is first necessary to observe the learning strengths and needs of the student. The findings from these observations may indicate when and if the student requires additional educational support so that the student may attain age-appropriate coping skills and develop educational potential.

The second step is a formal psychoeducational assessment to determine the student's level of functioning. At minimum, assessment should include measures of mental ability and adaptive behaviour.

The most frequently used tests in assessing mental ability are the Stanford-Binet (revised), and the Wechsler Intelligence Scale for Children (revised). The results of these tests are only general indicators of present mental development, and schools are urged to use them with extreme caution.

Assessment of adaptive behaviour should include such instruments as the Vineland Social Maturity Scale and the Adaptive Behavior Functioning Index (A.A.M.D.). The assessment should provide a profile of the child's performance level in all skill areas. The purpose of the assessment is to aid in the placement of a student and in program design.

A mental ability score alone is not sufficient for a diagnosis of mental handicap. Unless students are equally delayed in their adaptive behaviour and functioning, they should not be considered mentally handicapped.

Before placement decisions are made, students should have a recent individual psychoeducational assessment, which includes information regarding academic and life skills, language, perceptual disorders, personal and social adjustment and specific aptitudes. It is considered good practice to formally re-assess these students at least every three years. Results of the assessment should be reported to and discussed with parents or guardians.

A medical assessment provides an indication of visual, auditory, motor or other physical deficits, and should be carried out on all students prior to their placement.

Parental approval must be obtained in writing before an individual psychoeducational assessment and before any medical or psychological reports are obtained. Parents or guardians should also be consulted when the school-based team or district team determines the "most enabling environment" for the child.
APPENDIX G

Procedure for Determining Relative Percentages from Standardized Canonical Discriminant Function Coefficients
Two procedures were reviewed in selecting the procedure for calculating predictor variable percentages. Klecka (1981) outlined a system for comparing the relative magnitude of the eigenvalue of each predictor variable (p. 35). In this procedure the ratio between selected eigenvalues is examined to provide a measure of the "discriminating power that each has" (p. 35). A further step suggested in this technique is to convert the eigenvalues to relative percentages by summing them to form a measure of the total discriminating power of the predictor variables, and then dividing each individual eigenvalue by this total.

This procedure was previously questioned by Tatsuoko (1971) who noted that the calculation of relative percentages without comparison to a standardized scale is inappropriate. The wide variation in the metric of the predictor variables used in this study (IQ scores, Normal Curve Equivalents, etc.) would make comparisons on the basis of unstandardized results inappropriate.

A second procedure suggested by Klecka (1981, p. 29) was selected as the most appropriate way of addressing this problem. In this procedure, the standardized canonical discriminant function coefficients obtained from the discriminant function analyses provided the basis for computation of relative percentages. The standardized coefficients for all of the variables are summed and then divided into the standardized coefficient of each predictor
variable. This provides a percentage measure of the amount of contribution of each predictor to the total discriminant function.