A STUDY OF THE EFFECTIVENESS AND EFFICIENCY OF THE CANADIAN TESTS OF BASIC SKILLS, GRADE POINT AVERAGE AND TEACHER JUDGEMENT IN THE IDENTIFICATION OF INTELLECTUALLY GIFTED CHILDREN

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by

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A Thesis submitted in partial fulfillment

of the requirements for the degree of

Master of Education

Department of Educational Psychology

Memorial University of Newfoundland

March 1983

St. John's Newfoundland

ABSTRACT

This study examined the effectiveness and efficiency of three screening devices for the identification of intellectually gifted children. Effectiveness was defined by the percentage of gifted children a device located and efficiency was defined by the ratio between the total number of children it refers for individual examination and the number of gifted children found among those referred. The study evaluated group achievement test results (Canadian Tests of Basic Skills), grade point averages (G.P.A.) and teacher judgements as identifiers of gifted students. The criterion used to identify the intellectually gifted was a Wechsler Intelligence Scale for Children - Revised (WISC-R) IQ score of 115 or higher. The WISC-R was tabulated for all Grade 4 students from two St. John's schools who were identified as gifted by one or more of the above-mentioned measures in accord with the following criteria: 1) C.T.B.S. local percentile rank of 84 or higher; 2) G.P.A. percentage of 84% or higher; 3) teacher judgement of four or more nominations. The results of this investigation indicated there were individual differences in the effectiveness and efficiency of the C.T.B.S., G.P.A. and teacher judgement. If one is looking for both effectiveness and efficiency, the C.T.B.S. was the best identifier of gifted children. If the area of concern is efficiency, teacher judgement should be considered, and if effectiveness is the area of concern, G.P.A. should be

considered. All three measures used in this study facilitated the identification process. No one approach was sufficient to identify all intellectually gifted children.

ACKNOWLEDGEMENTS

I want to express my appreciation to those who helped me in various ways during the writing of this thesis: to my advisor, Dr. Bryan Hartmann, who gave freely of his time and expertise in the reading and revision of this work; to the School of Graduate Studies for their financial assistance; and to my parents whose unending love and encouragement helped me through some difficult times.

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CHAPTER 1

INTRODUCTION

Purpose

The education of gifted children is becoming an important issue in many educational systems. Deciding how to define giftedness and determining which screening procedures most effectively identify gifted children are two areas of great concern in the present literature on the subject. The literature has generally confirmed that the individual intelligence test, especially the Stanford-Binet Intelligence Scale (S-B) and the Wechsler Intelligence Scale for Children - Revised (WISC-R) are the most precise and most frequently used means of identifying the intellectually gifted (Laubenfels, 1977). Unfortunately these measures are also the most expensive and time-consuming of the various procedures available (Renzulli & Smith, 1977). For these reasons schools frequently use group intelligence tests to identify gifted students. These group tests are relatively cheap and quick to administer. Unfortunately they also have the disadvantage of being poor identifiers of gifted children (Clark, 1979). For these reasons it is difficult to identify gifted children in school settings. More importantly, this identification problem frequently is a major obstacle to the initiation of educational programs for

gifted and talented children. Clearly, this problem must be solved. It is the purpose of this investigation to work toward that end.

Examination of contemporary educational practices in Canada reveals that while measures of intelligence of either an individual or group nature are not available in every school, three other measures are, namely, the Canadian Tests of Basic Skills, students' grade point averages or their equivalents and teacher judgements of the academic and intellectual abilities of their students. The purpose of this study is to examine the effectiveness and efficiency of these measures as identifiers of intellectually gifted children.

Rationale

The identification of gifted children in the schools is the logical first step in the process of setting up programs to meet their special needs. This process is a key concern (Parke, 1981). The United States Office of Education (U.S.O.E.) has defined giftedness in terms of demonstrated achievement and/or potential ability in one or more of the following domains: general intellectual ability, specific academic aptitude, creative or productive thinking, leadership ability, visual and performing artistic ability, and psychomotor ability. These encompass such a broad range of abilities that obviously no single method of selecting

gifted children and no one measurement technique can accurately identify all gifted children (Tongue & Sperling, 1976).

The early work of Terman defined giftedness as an exceptionally high score on the Stanford-Binet Intelligence Scale (Parke, 1981). This scale is Terman's revision of the original intelligence scale developed by Binet and Simon to identify students who were capable of benefiting from an educational opportunity (Clark, 1979). Guilford's Structure of the Intellect Model served as the foundation for the expansion of Terman's view of giftedness (Parke, 1981). This development marked the beginning of a multidimensional concept of giftedness (Parke, 1981). Recognition of the many facets of giftedness and the many instruments developed to measure it, both have brought a need to evaluate the effectiveness of the various measures.

The choice of specific measures, however, invariably depends upon one's definition of giftedness and the areas of concern for programming. Borthwick, Dow, Levesque and Banks (1980) recognized that the definition of giftedness may be classified into three types: objective (concerned with scores on standardized tests), descriptive (concerned with characteristics of gifted people) and comparative (concerned with singling out those students whose achievements are superior). The U.S.O.E. definition of giftedness referred to earlier, also makes reference to objective and descriptive measures. It calls the descriptive measures

"professional evaluation measures". While this label suggests a more precise method of assessment, the process still involves someone's subjective opinion, even though the evaluator is one who is qualified to appraise pupils' special competencies. Of the six domains of giftedness noted in the U.S.O.E. definition, the most clearly defined are: general intellectual ability and specific academic aptitude. These two areas overlap extensively and the academic inclinations of school systems cause them to focus their attention disproportionately on these two areas (Renzulli & Stoddard (Eds.), 1980). The remaining four areas (creative or productive thinking, leadership ability, visual and performing artistic ability, and psycho-motor ability) although important to the education of the gifted, are at present poorly defined and not easily measured. In accord with the current preference of educators, this study has concentrated on the identification of intellectually gifted children as measured by general intellectual ability and specific academic aptitude.

CHAPTER 2

REVIEW OF LITERATURE

Historical Perspective

History reveals that the education of the gifted individual has not been a well-accepted or equitable practice. Plato's ideal of creating social harmony by selecting only the wisest people to become rulers was never attained. During the Roman era only children of wealthy families received education. The Middle Ages brought with it a carry over from the Romans with selection for education based on class. No significant changes were evident with regard to individual talents or intellects during the Renaissance, even though the period was a rebirth of Greek concepts. Throughout history, the quality and quantity of education an individual received was dependent more upon social class than talent or ability.

In the United States, Thomas Jefferson developed a formal education plan for the gifted. It advocated that all able students in the State of Virginia be sought out and given special educational programming. The first systematic approach, however, was recorded in St. Louis, Missouri in 1868 when a system of flexible promotion was introduced in schools. Several other programs for the gifted followed in major cities in the United States. Probably of greatest

impact in the 19th century was the concept of ability grouping for bright students begun in California in 1898. About 1920, Lewis Terman, the Father of Gifted Child Research, launched a longitudinal study of gifted persons (Gowan & Torrance, 1971). This study, entitled "Genetic Studies of Genius", along with the construction of the Stanford-Binet Intelligence Scale (S-B) lead educators and others to an understanding of the human development of such persons over the decades.

The launch of Sputnik by the U.S.S.R. in 1957 prompted unparalleled American interest in the gifted, especially those gifted in the area of science (Khan, Rader, Igbal & Flodder). During the 1960's, interest in the education of gifted students declined. Only 39 research reports on the gifted were published between 1967 and 1974 (Morgan, Tennant & Gold, 1980). One of the biggest boosts for the education of the gifted came in 1970. A United States Congressional Mandate added a section relating to the Elementary and Secondary Educational Amendments of 1969 that related to gifted students. The U.S.O.E. Commissioner, Sidney Marland, in his ensuing report, offered recommendations for the education of the gifted. The Marland Report (1972) provided: "the basic parameters essential for developing differentiated educational programs for the gifted and talented on the State and Local District Level" (p. 4). The report's major contribution was a more precise definition of giftedness. Part of this definition was given earlier but at this point it is given below in its entirety.

> Gifted and talented children are those identified by professionally qualified persons who by virtue of outstanding abilities are capable of high performance. These are children who require differentiated educational programs and/or services beyond those normally provided by the regular school program in order to realize their contribution to self and society.
>
> Children capable of high performance include those with demonstrated achievement and/or potential ability in any of the following areas, singly or in combination:
>
> 1. general intellectual ability
> 2. specific academic aptitude
> 3. creative or productive thinking
> 4. leadership ability
> 5. visual and performing arts
> 6. psychomotor ability
>
> It can be assumed that utilization of these criteria for identification of the gifted and talented will encompass a minimum of 3 to 5 percent of the school population.
>
> Evidence of gifted and talented abilities may be determined by a multiplicity of ways. These procedures should include objective measures and professional evaluation measures which are essential components of identification.
>
> Professionally qualified persons include such individuals as teachers, administrators, school psychologists, counselors, curriculum specialists, artists, musicians, and others with special training who are also qualified to appraise pupils' special competencies.
>
> (Marland, 1972, p. 383)

A cross-Canada survey was conducted in the fall and winter of 1978-79 by the Canadian Education Association. It examined various aspects of the education of gifted and talented students. Borthwick et al. (1980) reported that their pubication is evidence of changing circumstances in special education for Canada's gifted and talented students. The researchers reported, "that one out of three responding school boards was either conducting or planning a pilot project for its gifted and talented students" (Borthwick

et al., 1980, p. 9).

The survey results for Newfoundland revealed several important facts regarding the education of the gifted. Specifically, there is: 1. no written policy for the education of the gifted and talented; 2. no legal provision for establishing such programs; 3. no required teacher qualification for this area and; 4. no research projects on the education of the gifted being conducted by the Department of Education (Borthwick et al. 1980).

The fact that this survey was conducted is proof that Canada is finally making some important advances in the education of gifted children. For too long the issue lay buried beneath the myth that special educational provisions were only needed for the slow or retarded child and that the gifted child could make it through the school system unaided. Many recent publications testify to a changing view that the education of the gifted is not only an important issue but also one which needs much more attention and research (Borthwick et al., 1980; Clark, 1979; Gowan, 1971; Renzulli & Stoddard, 1980).

Clark (1979) posed the question which is at the root of the issue for the justification of programs for gifted students: "How do we answer those people, who block any attempt to provide programs, as undemocratic, elitist or wasteful?" (p. 108). The U.S. Office of Education through the Marland report recognized that such basic questions border on the philosophical and that a direct response from research is

difficult. However, the issues do warrant comment.

In addressing the issue of education for the gifted as undemocratic, a paradox is evident in that the equal treatment of people does not necessarily yield equal results.

> The teacher who treats his students equally will find that they progress at very different rates. As a result of equal treatment, students will advance to very unequal positions. On the other hand, if the objective is to bring students to a common educational level, it will be necessary to treat them in unequal ways. (Emerson, 1979, p. 58)

The U.S. Office of Education Report (Marland Report) of 1972, in reply to the question "aren't special provisions undemocratic", stated that,

> if democratic educational practice is interpreted as the same education for all, the answer is yes. If we believe that democratic education means appropriate educational opportunities and the right to education in keeping with one's ability to benefit, the answer is no. (p. 401)

According to Clark (1979), whether or not the education of the gifted is considered elitist depends upon one's definition of the word. She distinguished between two meanings of the word "elite"; these are, "the chosen ones or the select group; (...and...) a group chosen because of some special skill or ability, which if fostered could become truly outstanding" (p. 109). The former definition implies that programs for the gifted would not be beneficial because the gift is already present in its fullest form. The latter definition, however, implies that programs for the gifted would facilitate the realization of potential. According to

the latter meaning, a school program is inadequate if it fails to assist students to realize their potential, whatever that potential may be.

Stevenson and Wilson (1977) recognized that too often people express the opinion that extra time, money and effort should be granted the less fortunate because the brighter child doesn't need extra educational opportunities. They argue that this attitude not only results in a great waste of creative energy but also it adds to the difficulties within the classroom, often leaving the gifted child being considered a problem rather than an asset. The Marland Report (1972) indicated that larger scale studies have shown the gifted and talented to be disadvantaged and handicapped in the school situation.

Discrepancies are most evident between the mental and chronological ages of gifted students. It is the discrepancy between these two ages that is the focus of the argument about their developmental retardation. Dunlap (1975, as cited in Cruickshank & Johnson, 1967) verified this when they gave possible mental age ranges of students entering different grade levels. An extreme in mental age range on the first day of school could be as high as 6 years and 10 months. When people are restricted in their development, and not allowed to move freely at their own pace, often the results are boredom, anger and frustration. Paquin (1981) stated that "30-50% of gifted children never graduate from high school" (p. 20). "Giftedness itself is

seldom a cause of trouble. It is a lack of recognition and support of its needs by the responsible society which causes the trouble" (Parker, 1975, p. 71). Related to this is the sense of isolation gifted children often feel when they realize their ideas and interests are very different from their agemates (Clark, 1979). Special programs help the gifted child to achieve more academically, socially, and emotionally. Eventually the society as a whole benefits from the talents and gifts of these people. "Unlike other attributes, giftedness is a quality which for the most part is latent, and if undiscovered remains unpolished ... It takes training, motivation, and fellow beings to make it come alive" (Cherry, 1976, p. 11).

Gifted and Talented Categories

It appears necessary at this point to specify and explain different categories of the terms "gifted and talented." These categories have been identified by writers in an attempt to organize our thinking about giftedness.

The literature on the accuracy of the devices used to identify specific aspects of giftedness is extensive. The present study focused on the first two areas of the U.S.O.E. definition; namely, general intellectual ability and specific academic aptitude. Grinter (cited in Rubenzer, 1979) stated that approximately 95% of all children identified as gifted or talented cluster in these two areas. Three possible explanations of this imbalance are: first, a great percentage

of gifted children actually do fall into these two areas; second, the academic nature of programs available for the gifted dictates the largest proportion would fall into these two areas; and third, the lack of specific identification procedures in the other areas inhibits identification. It was thought that a focus on the first two categories would be more relevant than examination of all six categories given that the emphasis of our schools is on academic subjects.

General Intellectual Ability

General Intellectual Ability, in this study, refers to the general intelligence of the person. General intelligence was first defined by Binet and Simon in terms of a Mental (M.A.) and later by Stern as an Intelligence Quotient (IQ) (Khatena, 1977). In recent years, David Wechsler departed from the univariate concept of general intelligence and adopted a bivariate viewpoint that includes verbal and nonverbal intelligence.

Generally speaking, individual tests (especially in the area of general intellectual ability) have been considered more accurate than group tests in identifying gifted individuals. Much evidence supports this view. The often quoted study of Pegnato and Birch (1959) reported that group tests were of little value for the actual identification of the gifted. However, group test utility is recognized by these researchers for screening purposes. Rubenzer (1979) saw the possibility of accurate identification as being greater

with individual rather than group tests, and that group tests may actually penalize the gifted child. Clendening and Davies (1980) made a similar claim by stating, "that the higher the ability, the greater the probability the group test will overlook such ability" (p. 5). Martinson (1966) concurred with this view that the gifted are penalized. She made specific reference to the culturally disadvantaged and cited as evidence a California State Study which claimed that if group tests had been used rather than individual tests, over half of the gifted population under study would not have been identified. This figure is consistent with that reported by Pegnato and Birch (1959). A contributing factor in the California study was considered to be the lack of appropriate items on the group test. The Connecticut State Department of Education has recognized the need for the use of individual tests, "because of errors in measurement, that are inherent in group measures, and because some youngsters simply do not demonstrate their best performance in group testing situations" (Special Learning Corporation, 1978, p. 86). Much support for individual testing in the identification of gifted children is apparent but it should also be noted that many studies (Barbe & Renzulli, 1975; Gallagher, 1966; Pegnato & Birch, 1959) recognize that a group test used as a screening device in conjunction with other measures is effective and useful in the overall identification process.

The two individual intelligence tests which appear to be most frequently used when general intellectual ability is being measured are the Stanford-Binet (S-B) and the Wechsler Intelligence Scale for Children - Revised (WISC-R). According

to Martinson and Lessinger (1960) "Individual administration of the test means that the ability of the gifted pupil is measured more directly and effectively than in a group situation" (p. 238). Clendening and Davies (1980) stated the Stanford-Binet and WISC-R are among the, "best instruments available for identifying children with high general intellectual ability" (p. 16). Other researchers either used or recommended the use of these measures in assessing intellectual ability (Borthwick et al., 1980; Karnes & Brown, 1979; Rubenzer, 1979).

Specific Academic Aptitude

Academic achievement measures have often been used in the identification of gifted students. Specific academic aptitude refers to an above average ability in one or more academic subjects. The literature in this area is much less precise when it comes to the recommendation of specific identification instruments. No one measure stands out from the others. In the Pegnato and Birch (1959) study, the Metropolitan Achievement Tests were administered. Clendening and Davies (1980) recognized the wide use of the Stanford Achievement Test and Clark (1979) listed the following standardized tests as ones used in assessing achievement: 1. California Achievement Tests, 2. Metropolitan Achievement Tests, 3. S.R.A. Achievement Series, 4. Standard Achievement Tests, 5. Comprehensive Tests of Basic Skills and 6. Iowa Every-Pupil Tests of Basic Skills. Rubenzer (1979) identified thirteen different instruments useful in assessing achievement. They included group tests, individual tests and teacher screening devices.

According to Pyrczak (cited in Buros, 1978), the authors of the Iowa Tests of Basic Skills (I.T.B.S.) have been highly successful in developing, "an achievement test that covers generalized intellectual skills and abilities with as much emphasis as possible upon functional values of what has been taught" (p. 57). Pyrczak considered it one of the most carefully constructed achievement tests available. A closer look at the literature relating to achievement tests revealed that the Canadian Tests of Basic Skills (C.T.B.S.) is the Canadian version of the I.T.B.S. According to Buros (1978), it is virtually identical in its form and layout and, "has such a long line of respected antecedents that its status need never be in doubt" (p. 16). One of its stated goals is to provide valuable information for selecting areas for remedial and enrichment activities (King, 1982).

The measurement of achievement has also been done through an examination of a student's grades both past and present and through teacher screening devices (Khan et al., 1976; Rubenzer, 1979). Some controversy does exist over the usefulness of achievement batteries and academic tests in identifying gifted students. Cherry (1976) stated that they may indicate areas in which a student excels, even if he is underachieving in class. Wallach (cited in Tuttle, 1978), however, questioned whether academic tests can predict the accomplishments of students at certain levels of achievement. He further stated that the tests, "will not accurately identify those students who may achieve high academic success" (p. 7). Gallagher (1966) presented yet another

point of view, claiming that individual intelligence tests (the Stanford-Binet or one of the Wechsler Scales) rather than achievement tests were the optimum tools for identifying the academically talented student. No apparent concensus has yet been reached. Additional research is necessary.

Creative and Productive Thinking

The area of Creative and Productive Thinking, even more than Academic Aptitude, is replete with numerous definitions, instruments and measures designed to identify gifted persons. Clark (1979) said that "creativity is a special condition, attitude, or state of being that nearly defies definition" (p. 244). Barbe and Renzulli (1975) complained that few advances in the controversy over the definition and measurement of creativity have been made in twenty years of investigation. Not all researchers, however, are so pessimistic and most recognize that some commonality exists in screening devices (even if only in their frequency of use). In view of the great amount of literature on the subject, it is apparent that no definition or measure of creativity has provided all the answers. Rekdal (1977) noted that "of the (most frequently used) tests of creative thinking available the greater number focus on divergence" (p. 504). Clark (1979) listed the Minnesota Test of Creative Thinking, the Torrance Test of Creative Talent, and the Remote Associates Test as ones which measure creativity from a divergent viewpoint. It appears that the greatest problem in measuring creativity

at present, is that few people can agree on what actually constitutes creativity. Without basic agreement, it continues to be a vague measurement area.

Leadership Ability

Leadership ability, according to Rubenzer (1979), is dependent "almost exclusively on the observations of 'leadership' behavior" (p. 309). Observations are often subjective and subject to personal biases that limit the validity of the conclusions that are based upon the observations. Pegnato and Birch (1959) looked at two specific aspects of leadership, i.e. social and political. They saw these as "a special field of achievement for children who show mental giftedness in few or no other ways" (p. 250). Thorndike (cited in Khatena, 1977) lent support to this view when he referred to leadership ability as "social intelligence". The Council for Exceptional Children recognized, however, that leadership may not be channelled in socially acceptable ways and that the child who gets others in trouble is still a leader. Here again, the lack of an acceptable definition of leadership is a basic problem that hampers attempts to identify persons possessing exceptional leadership ability.

Visual and Performing Artistic Ability

According to Khatena (1977):

> ... ability in these dimensions are [sic] more appropriately considered as abilities in one or more of the areas in the Fine Arts and not some single ability that necessarily enters into all activities defined as visual and performing arts (p. 377).

Objective measures of these abilities are difficult to obtain. For this reason this area relies almost exclusively on expert judgement of the talent, i.e., artistic, dramatic, musical, etc. (Rubenzer, 1979). Few, if any, psychological measures of artistic ability have been developed for measuring abilities in the visual and performing arts. However, Alvino, McDonnel and Richert (1981) have recognized that while many existing tests and instruments have been used to identify these talents, they are antithetical to their intended purpose. For example, IQ and achievement tests have been used to identify talent in the arts. With such an inappropriate use of instruments, one needs to be cautious measuring exceptional ability in the visual and performing arts.

Psychomotor Ability

Psychomotor abilities involve both mind and body. These abilities are found in people who are good athletes, airplane pilots and mechanics (Khatena, 1977). Exceptional athletic talent has received considerable attention while mechanical and reasoning skills have been relatively neglected (Rubenzer, 1979). Our society emphasizes athletic abilities and our school activities reflect this emphasis. Parker (1975) recognized that as a society we justify and

support special programs for children gifted in sports or music, but seldom do we help or reinforce intellectually gifted children.

Identification Practices

After examination of the major areas covered under the term gifted, it appears useful to determine whether or not there is consistency in the use of identification practices. Alvino et al. (1981) conducted a nation-wide survey on the identification practices in the education of the gifted and talented. They found:

> ... abuses of standardized testing and other inappropriate practices, apparent confusion over the definition of giftedness, and lack of understanding regarding what should and should not be used for identification under each category (p. 124).

They also noted that the Marland Report of 1972 has not helped significantly in the progress of clarifying the identification problem. In fact, it may have made the problem more complex. This possibility has raised important questions for the present study which has employed the U.S.O.E. definition of giftedness. Although this definition is not a penultimate solution to the problem of defining giftedness, it is at present the most comprehensive definition available. Although the Alvino study recognizes research support for the use of certain instruments, it emphasizes the instruments' careful consideration before implementation. The present study chose measures which have

been supported by a number of researchers.

Discussion of the six areas in the U.S.O.E. definition has been given in separate sections earlier in this text. The reasons for overlap in the use of instruments for these different areas has not been specifically addressed. The possibility exists that the areas themselves contain common features. For example, someone who is gifted in general intellectual ability may also be gifted in the area of academic aptitude. Gage and Berliner (1979) claimed that high correlations exist between test results for intelligence and general achievement tests. They traced this trend back as far as 1926 when a researcher named Kelley estimated that, with age held constant, the overlap between intelligence and achievement tests is about 90 percent. Measures of both intelligence and achievement have been, shown to be powerful predictors of school success, particularly at younger grade levels (Brody & Brody, 1976). With this in mind, a research study of the effectiveness and efficiency of different instruments used to identify gifted children is obviously an important step in increasing the understanding of this complex construct.

CHAPTER 3

METHODOLOGY

Instrumentation

The Canadian Tests of Basic Skills

The Canadian Tests of Basic Skills (C.T.B.S.) has been designed to provide information on the progress of pupils in five areas: vocabulary development, reading comprehension, mechanics of written expression, application of special reading techniques to work-study materials, and mathematical understanding. Its main purpose is to determine how well each pupil has mastered the basic skills. The C.T.B.S. differs from most other elementary achievement batteries in that they are not concerned with separate measures of achievement. Instead they are concerned with generalized intellectual skills and abilities. No studies were found which correlated the C.T.B.S. (or the I.T.B.S.) and intelligence but Remmers (cited in Buros, 1959) speculated that the content of group intelligence tests and the I.T.B.S. would be highly correlated and "would likely be close to the geometric mean of the reliabilities involved" (p. 36). This lends support to the use of achievement tests in the screening of gifted children.

The C.T.B.S. is administered at three levels: Primary Battery (K-2), Multilevel Battery (3-8), and the High School Edition (9-12). For the purposes of this study "C.T.B.S." refers to the Multilevel Battery (Level 10). Although it covers five areas, there are eleven separate subtests in the

battery. They are as follows:

Test V: Vocabulary

Test R: Reading Comprehension

Test L: Language Skills

L-1: Spelling

L-2: Capitalization

L-3: Punctuation

L-4: Usage

Test W: Work Study Skills

W-1: Map Reading

W-2: Reading Graphs and Tables

W-3: Knowledge and Use of Reference Materials

Test M: Mathematical Skills

M-1: Mathematical Concepts

M-2: Mathematical Problem Solving

Scores are computed as grade equivalents for each area and then a composite score is calculated by averaging the five grade equivalents. The grade equivalent scores are then converted to percentile ranks.

With regard to the validity of the C.T.B.S., its authors have stated that the content of each test has been carefully selected to represent "the best of curriculum practices and to reflect current emphasis upon social utility and relevance for a diverse population" (King, 1982, p. 7). Also, the arrangement of items into levels by chronological age has helped gear test items to the

appropriate level of instruction and development. With regard to reliability, the authors claim that each test on the C.T.B.S. was made long enough "to provide a sound basis for drawing inferences about individual pupils, with regard to the consequent length of the complete battery" (King, 1982, p. 7). No other references were made in the manual with regard to the tests' validity or reliability.

Wechsler Intelligence Scale for Children - Revised

The Wechsler Intelligence Scale for Children - Revised (WISC-R) is designed and organized as a test of general intelligence. It has also, "established itself as a useful clinical and diagnostic tool ... in the areas of educational assessment and the appraisal of learning and other disabilities" (Wechsler, 1974, p. iii). According to its author, the WISC-R is not predicated on any particular definition of intelligence. Wechsler summarized it as "the overall capacity of an individual to understand and cope with the world around him" (Wechsler, 1974, p. 5).

The WISC-R is composed of twelve tests (six on the Verbal scale and six on the Performance scale). The following is a list of the tests. The numbers correspond to the order in which they are administered.

Verbal	Performance
1. Information	2. Picture Completion
3. Similarities	4. Picture Arrangement
5. Arithmetic	6. Block Design
7. Vocabulary	8. Object Assembly
9. Comprehension	10. Coding

The two optional tests are: Digit Span (11) and Mazes (12)

The raw scores obtained for each test are converted to scaled scores according to the age of the child. The combined total of the Verbal and Performance Scaled Scores are then converted to IQ scores. A percentile rank can then be calculated for the Verbal IQ, Performance IQ, and Full Scale IQ. Each of these has a mean of 100 and a standard deviation of 15.

Reliability coefficients for each test except Digit Span and Coding were obtained by the split-half method. For Digit Span and Coding, test-retest correlations were obtained. The average correlation for each test ranged from .70 to .86. The Verbal, Performance and Full Scale IQ reliability coefficents were obtained "from a formula for computing the reliability of a composite group of tests" (Wechsler, 1974, p. 27). The reliability coefficient for the Verbal Scale was .94 while that for the Performance Scale was .91, and that for the Full Scale was .96. With regard to the WISC-R validity, correlation coefficients of

WISC-R scaled scores and IQ's with the Stanford-Binet IQ were reported. The average correlations of the WISC-R Verbal, Performance, and Full Scale IQ's with the Stanford-Binet IQ were found to be .71, .61 and .73 respectively (Wechsler, 1974, p. 51).

Grade Point Average

The Grade Point Average (G.P.A.) of the students involved in this investigation is a composite mark. It includes not only the average results of March exams but also any major projects completed during the term. Seven subject areas were covered: 1. Geography 2. Science 3. Spelling 4. Language 5. Reading 6. Mathematics 7. Religion. One school had common exams in English, Reading and Mathematics and the other had common exams in all areas. The term, "common exams", means one exam for all students.

Morgan et al. (1980) recognized that "school records play an important part in identification but they should be supplemented by other evidence" (p. 39). Khan (1976) expressed a similar sentiment concerning the assessment of intelligence and achievement. He noted that standardized tests along with G.P.A. are the primary identification techniques being used at present.

A Learning Characteristics Rating of Superior Students (LCRSS)

This scale was designed to obtain teacher estimates of

the learning characteristics of superior students. A list of eight characteristics found to be associated with superior students was given to the teachers. They were to consider each characteristic independently and list four students in their class who had most frequently displayed that characteristic in their presence (see Appendix A).

This scale was adapted from the Scale for Rating Behavioral Characteristics of Superior Students by Joseph S. Renzulli and Robert K. Hartman (1971). In addition to Learning characteristics, their scale examines Motivational, Creativity and Leadership characteristics. It is based on a four point Likert format whose poles denote two extreme levels of observation ("seldom" and "almost always") of the characteristics included in the scale. The authors of the scale recognized the subjective nature of teacher ratings and attempted "to provide a more objective and systematic instrument that can be used as an aid in guiding teacher judgement in the identification process" (Renzulli, Hartman, Callahan, 1971, p. 211). The characteristics listed are based on an extensive review of the literature. In order for an item to be included at least three separate studies had to call attention to it. The Learning Characteristics Scale (used in the present study) and the Motivational Scale have been validated. Correlations of .61, .57, and .60 have been found with, "measures that traditionally have been used to select students for academically oriented gifted programs" (Renzulli et al., 1971, p. 213). All four scales (Learning,

Motivation, Creativity and Leadership) have been found to have high test-retest reliability. The reliabilities are as follows: Learning (r = .88), Motivation (r = .91), Creativity (r = .79) and Leadership (r = .77) (Renzulli et al., 1971).

For the purposes of this study it was thought that the adaptation of the Scale for Rating Behavioral Characteristics of Superior Students would improve teachers' abilities to identify gifted students. The Renzulli and Hartman scale was completed for all the students in the class. With the intellectually gifted being the main focus of this study, the Learning Characteristics Scale appeared to be the most relevant of the four.

Procedure

The model for this study was a study conducted by Pegnato and Birch in 1959. These investigators used seven different screening methods in a junior high school in order to identify intellectually gifted students. The methods were: teacher judgement, honor roll listing, creative ability in art or music, student council membership, superiority in mathematics, group intelligence test results and group achievement test results. The Stanford-Binet Intelligence Scale was used to determine whether or not the screening devices actually identified intellectually gifted children. Individual IQ scores were tabulated for all the students who were identified as gifted by one or more of the screening

measures. The effectiveness and efficiency of the screening devices were calculated; effectiveness being defined by the percentage of gifted children a device locates and efficiency by the ratio between the total number of children it refers for individual examination and the number of gifted children found among those referred.

The present study also examined the effectiveness and efficiency of several screening devices for giftedness. It evaluated group achievement test results (C.T.B.S.), grade point averages (G.P.A.) and teacher judgements as identifiers of gifted students. The Wechsler Intelligence Scale for Children - Revised IQ was tabulated for all the students in Grade 4 who were identified as gifted by one or more of the above-mentioned measures in accord with the following criteria: 1. C.T.B.S. local percentile rank of 84 or higher, 2. G.P.A. percentage of 84% or higher, 3. teacher judgement of 4 or more nominations. An attempt was made to examine the theoretical top 15% of the general population. If one assumes a normal distribution of scores, then a G.P.A. of 84% or higher should locate the top 15% of the students. The C.T.B.S. at the 84th percentile locates the top 15% of the Newfoundland population of Grade 4 students. Finally, four or more teacher nominations, when calculated, came closest to identifying the top 15% of the students in the study (i.e., 26 nominations out of a possible 187 or 13.9%). The actual percentages found in the study, however, were different. When the number of students who scored 84% or

higher on G.P.A. was calculated approximately 32% of the sample was included. With the C.T.B.S. approximately 25% was included and with teacher judgement the 15% remained unchanged because the school sample had been used (i.e., the theoretical and actual percentages were the same). These figures compare favourably with Pegnato and Birch (1959). Their equivalent of G.P.A., Honor Roll Listing, included 26.5% of their sample and their equivalent to C.T.B.S., a group achievement test, included 23.8% of their sample. It is also interesting to note that their Group Intelligence test results and this study's G.P.A. results identified the same percentage of students (32%).

Subjects

A total of 67 students from Beaconsfield Elementary and St. Augustine's School in St. John's were identified. Each was administered the WISC-R. Two students were removed from the sample because of their age. When minimum and maximum school admittance ages were considered, two students fell beyond the normal age for Grade 4. It was thought that their scores would not be typical of Grade 4 students; therefore, they were removed from the sample.

Data collection began in May and took approximately three weeks to complete. First, information was gathered on the C.T.B.S. and G.P.A. through an examination of information available at the schools. The teacher judgement scale was

then distributed to all Grade 4 teachers. Once this information was received, an analysis of the degree of overlap among the three measures was made (see Table 1). WISC-R testing of all students who were named in one or more of the measures was the final part of the data collection.

Limitations

The design of the study and the generalizability of its results are affected when research is conducted within a school system. The research is limited not only to specific schools in which research projects are permitted but also to the organization and policies of these schools. In the present study permission to conduct research came from two segregated schools (i.e., the student body being either all male or all female). This nested the sex variable within the school variable. In this study it was also not possible to assign randomly students to each of the four examiners. Time and other considerations limited the examiner's availability to test in more than one school.

Given these limitations, the design of this experiment was considered to be "quasi-experimental" (Campbell & Stanley, 1963) because the variables listed also interacted with every variable studied in this experiment so the whole story has to be considered quasi-experimental. It must also be acknowledged that some gifted children may have been missed by the three measures used; therefore, the effectiveness and efficiency results apply only to students who were identified

Table 1

Distribution of Students by School and Class

School	Class	Total Number of Students	Total Number Nominated	Total Number Gifted
St. Augustine's	1	26	9	5
St. Augustine's	2	22	9	6
St. Augustine's	3	21	9	4
St. Augustine's	4	25	8	8
St. Augustine's	Total	94	35	23
Beaconsfield	1	31	13	6
Beaconsfield	2	31	7	5
Beaconsfield	3	31	10	4
Beaconsfield	Total	93	30	15
Combined	Total	187	65	38

as gifted by one or more of the three measures used in the investigation.

Finally, the elimination of over-age students may limit this study to the identification of gifted students who are enjoying success in school. It should be noted, however, that this elimination involved only two students.

Research Questions

The major focus of this study was an examination of the effectiveness and efficiency of three screening devices. The following is a list of the research questions which were examined.

1. Are the Canadian Tests of Basic Skills, the Grade Point Average and the Scale for Rating Learning Characteristics of Superior Students (teacher judgement) effective and/or efficient screening devices in the identification of intellectually gifted children as measured by a WISC-R of 115 or higher?

2. What is the most effective and efficient combination of screening devices in the identification of intellectually gifted children as measured by a WISC-R IQ of 115 or higher?

3. What differences appear in the effectiveness and efficiency of the three screening devices when choosing the top 15%, 10% and 5% of the theoretical distribution of intellectual abilities in the population?

CHAPTER 4

RESULTS

The results of this investigation indicated there were individual differences in the effectiveness and efficiency of the C.T.B.S., G.P.A. and teacher judgement as identification measures for intellectually gifted children. Effectiveness and efficiency were calculated for the three screening devices (separately and combined) for the top 15%, 10% and 5% levels of the sample. In order to give a clearer picture of this process, information was given on the number of correctly and incorrectly nominated and identified gifted children. The variables examiner and age were also examined. A chi square test of the relationship between the chronological ages of students, nine and ten years, and examiner one through four, indicated that the two variables were independent ($\underline{X}^2$ (63) = 5.0, $\underline{p} > .05$). Of the 65 students nominated, 38 (15 males and 23 females) were identified as gifted as defined by an IQ of 115 or higher on the WISC-R. It should be noted that all references to gifted students in this study are based on this criterion.

Table 2 presents the mean Verbal, Performance, and Full Scale WISC-R scores, as well as the standard deviations for students from each of the two schools involved in the investigation. Figure 1 gives the frequency of WISC-R and C.T.B.S. percentiles as well as G.P.A. percentages for the

Table 2

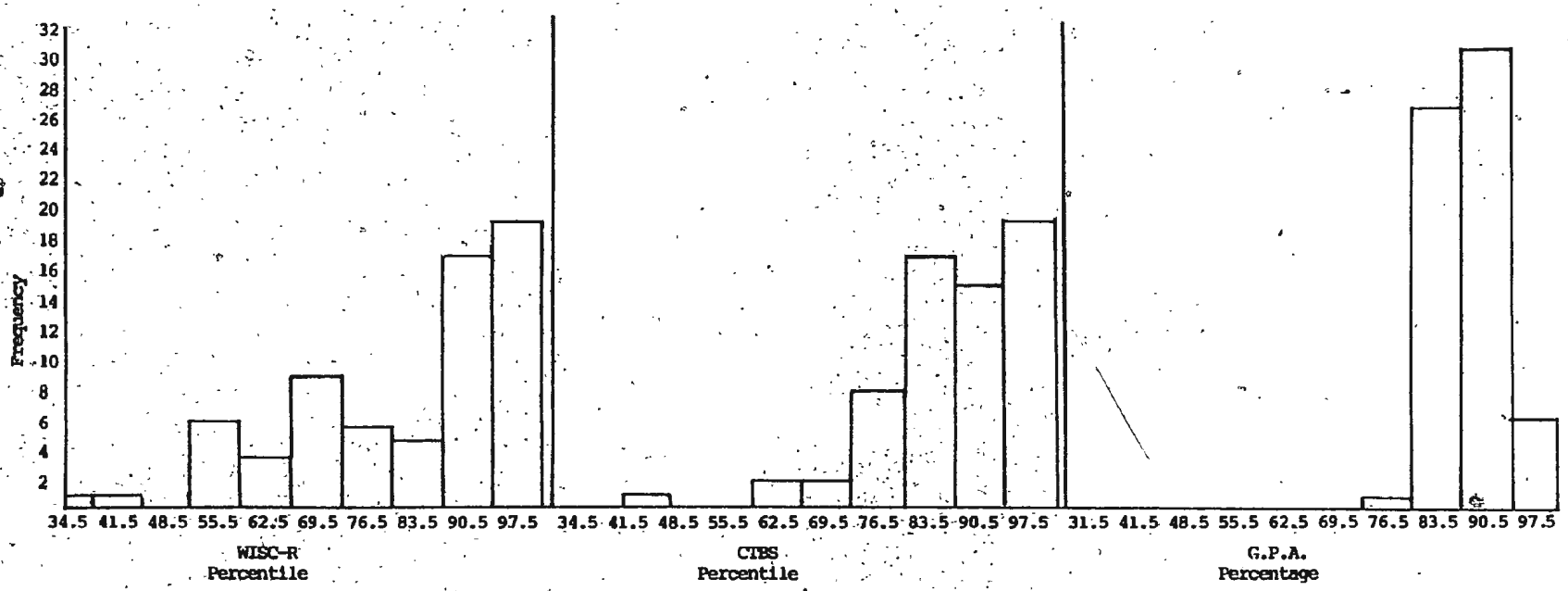
WISC-R Verbal, Performance and Full Scale IQ Means and Standard Deviations for 65 students selected by one or more screening methods

Group [a]	Mean Verbal IQ	Standard Deviation	Mean Performance IQ	Standard Deviation	Mean Full Scale IQ.	Standard Deviation
Beaconsfield	114.33	12.56	111.40	9.79	114.23	11.19
St. Augustine's	120.68	8.66	116.11	13.08	120.91	10.61
Total	117.75	11.02	113.93	11.83	117.83	11.30

[a] Beaconsfield n = 30
St. Augustine's n = 35

Figure 1

Histograms of the Frequency of C.T.B.S. and WISC-R Percentiles and G.P.A. Percentages for 65 Grade 4 Students



65 students.

The effectiveness and efficiency measures used in this study were originally developed by Pegnato and Birch (1959). Effectiveness was defined as the ratio of gifted students identified to the total number of gifted students. Efficiency was defined as the ratio of identified gifted students to the total number screened. Table 3 gives the effectiveness and efficiency of the single screening devices at the top 15%, 10% and 5% levels. The top 1%, the criterion level adopted by Pegnato and Birch (1959), was not calculated because of the reduced numbers at that level for the present sample. It is obvious from the table that as effectiveness increases, efficiency decreases and vice versa. Teacher judgement is much more efficient than either C.T.B.S. or G.P.A., but its effectiveness is much lower (47.3% at the 15% level). Selection of a screening device, however, will depend upon which criterion is most important. Error is present in all three measures but its magnitude varies with the criterion level chosen and the particular selection criterion judged most important; i.e., effectiveness or efficiency.

Table 4 presents the effectiveness and efficiency of compound screening devices. The pattern of effectiveness increasing as efficiency decreases continues here. There are cases, however, where the differences between the two measures are minimal. Grade Point Average and C.T.B.S. combined to yield an effectiveness value of 68.4% and an

Table 3

Effectiveness and Efficiency of Single Screening Devices for Three Levels of Intelligence

Screening Device	Effectiveness[b]	Efficiency[c]	Effectiveness	Efficiency	Effectiveness	Efficiency
Intelligence[a] Level	15%	15%	10%	10%	5%	5%
G.P.A.	$\frac{35}{38}$ = 92.1%	$\frac{35}{60}$ = 58.3%	$\frac{16}{22}$ = 72.7%	$\frac{16}{26}$ = 61.5%	$\frac{4}{8}$ = 50%	$\frac{4}{6}$ = 66.7%
C.T.B.S.	$\frac{29}{38}$ = 76.3%	$\frac{29}{45}$ = 64.4%	$\frac{18}{22}$ = 81.8%	$\frac{18}{29}$ = 62%	$\frac{8}{8}$ = 100%	$\frac{8}{18}$ = 44.4%
T.J.	$\frac{18}{38}$ = 47.3%	$\frac{18}{26}$ = 69.2%	$\frac{14}{22}$ = 63.6%	$\frac{14}{19}$ = 73.7%	$\frac{5}{8}$ = 62.5%	$\frac{5}{9}$ = 55.6%

Note: Sample size at 15% level = 65, at 10% level = 39 and at 5% level = 22.
Total number of gifted in sample at 15% level = 38, at 10% level = 22 and at 5% level = 8.

[a] Criterion Levels for top 15%, 10% and 5% are WISC-R Full Scale IQ Scores of 115, 119, 125 respectively

[b] Effectiveness = $\frac{\text{Identified Gifted}}{\text{Total Gifted}}$

[c] Efficiency = $\frac{\text{Identified Gifted}}{\text{Total Screened}}$

Table 4

Effectiveness and Efficiency of Compound Screening Devices for Three Levels of Intelligence

Screening Device	Effectiveness[b]	Efficiency[c]	Effectiveness	Efficiency	Effectiveness	Efficiency
Intelligence[a] Level	15%	15%	10%	10%	5%	5%
GPA & CTBS	$\frac{26}{38}$ = 68.4%	$\frac{26}{40}$ = 65%	$\frac{12}{22}$ = 54.5%	$\frac{12}{18}$ = 66.6%	$\frac{4}{8}$ = 50%	$\frac{4}{6}$ = 66.7%
GPA & TJ	$\frac{17}{38}$ = 44.7%	$\frac{17}{23}$ = 73.9%	$\frac{10}{22}$ = 45.5%	$\frac{10}{13}$ = 76.9%	$\frac{3}{8}$ = 37.5%	$\frac{3}{3}$ = 100%
CTBS & TJ	$\frac{17}{38}$ = 44.7%	$\frac{17}{23}$ = 73.9%	$\frac{14}{22}$ = 63.6%	$\frac{14}{18}$ = 77.8%	$\frac{3}{8}$ = 37.5%	$\frac{3}{4}$ = 75%
GPA & CTBS & TJ	$\frac{16}{38}$ = 42.1%	$\frac{16}{21}$ = 76.1%	$\frac{9}{22}$ = 40.9%	$\frac{9}{12}$ = 75%	$\frac{3}{8}$ = 37.5%	$\frac{3}{3}$ = 100%

Note: Sample size at 15% level = 65, at 10% level = 39 and at 5% level = 22.
Total Number of Gifted in Sample at 15% level = 38, at 10% level = 22 and at 5% level = 8.

[a]Criterion levels for top 15%, 10% and 5% are WISC-R Full Scale IQ scores of 115, 119, 125 respectively

[b]Effectiveness = $\frac{\text{Identified gifted}}{\text{Total gifted}}$

[c]Efficiency = $\frac{\text{Identified gifted}}{\text{Total screened}}$

efficiency value of 65% at the 15% level. There is a general relationship evident in the data. Effectiveness and efficiency are inversely related. Table 4 shows that at the 5% level the combination of G.P.A. + T.J. and C.T.B.S. + T.J. are 100% efficient but also they are only 37.5% effective. Teacher judgement, when included in a combination decreased the effectiveness (42.1%-44.7%) but increased the efficiency (65% - 76.1%). When all three screening devices were combined, the highest efficiency at the 15% level (76.1%) was observed. The advantage of examining compound screening devices is that one is not limiting evaluation to one device. The G.P.A., C.T.B.S. and T.J. combination, for example, points out that when children's scores overlap on all three measures, the chances of falsely identifying children as gifted is minimized (i.e., 5 out of 21 or 23.8% not gifted).

In summary, if one considers effectiveness and efficiency separately (at the 15% level), the most effective single device is G.P.A., the most efficient single device is teacher judgement, the most effective compound device is G.P.A. + C.T.B.S. and the most efficient compound device is G.P.A. + C.T.B.S. + T.J. When looking for a combination of high effectiveness and efficiency, C.T.B.S. at the 15% level has the best combination (76.3% effective, 64.4% efficient).

The next part of the analysis involves the percentages of correctly and incorrectly nominated and identified gifted children. This is the reciprocal of the previous section in

that the number of errors in identification are noted. In other words, the analysis involves the number of students falsely nominated as gifted and the number of students not identified by one of the screening devices who actually were gifted according to the WISC-R criterion. The various levels given in Table 5 (15%, 10% and 5%) are presented for comparative purposes and analysis is given with reference to the 15% level only. This is in accordance with the original intent of the study; to analyse students in the top 15% of the sample. Of the single screening devices, G.P.A. missed the smallest number of gifted children (3/38 = 7.9%) but it incorrectly nominated the greatest number (25/60 = 41.7%). Teacher judgement, on the other hand, missed 52.6% of the gifted but reduced the percentage of incorrectly nominated to 30.8%. The C.T.B.S. screening device falls between G.P.A. and T.J. in attempting to minimize the number incorrectly nominated and the number missed who are gifted. The C.T.B.S. had 35.6% incorrectly nominated as gifted and 23.7% missed who were gifted.

Consideration of the compound screening devices in Table 6 reveals a pattern of decreasing numbers of incorrectly nominated children from 35% for G.P.A. + C.T.B.S. to 23.8% for G.P.A. + C.T.B.S. + T.J. combined. Corresponding to this, the percentage of gifted children who were not nominated increased from 31.6% for G.P.A. + C.T.B.S. to 57.9% for G.P.A. + C.T.B.S. + T.J. combined. In summarizing this section one can see that the percentage of correctly and

Table 5

Percentages of Correctly and Incorrectly Nominated and Identified Gifted Children for Single Screening Devices

Screening Device	Number[b] Nominated as Gifted			Percentage[c] Nominated as Gifted			Number Identified as Gifted			Percentage Identified as Gifted			Number Incorrectly Nominated as Gifted			Percentage Incorrectly Nominated as Gifted			Number of Identified Gifted - not Nominated			Percentage of Identified Gifted- not Nominated		
Intelligence[a] Level	15%	10%	5%	15%	10%	5%	15%	10%	5%	15%	10%	5%	15%	10%	5%	15%	10%	5%	15%	10%	5%	15%	10%	5%
GPA	60	26	6	32%	14%	3%	35	16	4	19%	9%	2%	25	10	2	42%	39%	33%	3	6	4	8%	27%	50%
CTBS	45	29	18	24%	16%	5%	29	18	8	16%	10%	4%	16	11	10	36%	38%	56%	9	4	0	24%	18%	0%
TJ	26	19	9	14%	10%	5%	18	14	5	10%	8%	3%	8	5	4	31%	26%	44%	20	8	3	53%	36%	38%

[a]Criterion levels for top 15%, 10% and 5% are WISC-R Full Scale IQ scores of 115, 119, 125 respectively

[b]Grade 4 population = 187

[c]Percentage of Grade 4 population nominated

Table 6

Percentages of Correctly and Incorrectly Nominated and Identified Gifted Children for Compound Screening Devices

Screening Device	Number[b] Nominated as Gifted			Percentage Nominated as Gifted			Number Identified as Gifted			Percentage Identified as Gifted			Number Incorrectly Nominated as Gifted			Percentage Incorrectly Nominated as Gifted			Number of Identified Gifted - not Nominated			Percentage of Identified Gifted - not Nominated		
Intelligence[a] Level	15%	10%	5%	15%	10%	5%	15%	10%	5%	15%	10%	5%	15%	10%	5%	15%	10%	5%	15%	10%	5%	15%	10%	5%
GPA & CTBS	40	18	6	21%	10%	3%	26	12	4	14%	6%	2%	14	6	2	35%	33%	33%	12	10	4	32%	46%	50%
GPA & TJ	23	13	3	12%	7%	2%	17	10	3	9%	5%	2%	6	3	0	26%	23%	0%	21	12	5	55%	55%	63%
CTBS & TJ	23	18	4	12%	10%	2%	17	14	3	9%	8%	2%	6	4	1	26%	22%	25%	21	8	5	55%	36%	63%
GPA & CTBS & TJ	21	12	3	11%	6%	2%	16	9	3	9%	5%	2%	5	3	0	24%	25%	0%	22	13	5	58%	59%	63%

[a]Criterion levels for top 15%, 10% and 5% are WISC-R Full Scale IQ scores of 115, 119, 125 respectively

[b]Grade 4 population = 187

incorrectly nominated children depends upon which screening device or combination of devices is used.

The importance of several variables became apparent during the course of the study. These variables were then investigated in order to determine their significance. Four different examiners administered the WISC-R. The investigation also examined the question of whether or not there were any significant differences between the scores of the subjects that were tested by the different examiners. Table 7 gives the mean Verbal, Performance and Full Scale IQ scores of students for each examiner. A one-way analysis of variance revealed significant examiner differences for the following dependent variables: Verbal IQ ($F = 10.491$, $df = 3$, $p < .05$), Performance IQ ($F = 5.112$, $df = 3$, $p < .05$) and Full Scale IQ ($F = 11.288$, $df = 3$, $p < .05$). Subsequent Scheffe Multiple Comparisons indicated that on both the Verbal and Full Scale IQ scores, examiner 2 differed significantly from examiners 1, 3 and 4. Also, on the Performance IQ, examiner 2 differed significantly from examiner 4 ($p < .05$).

Careful examination of some of the characteristics of the student groups assigned to the different examiners suggested that the observed IQ differences were due to the biased assignment of subjects. Time and space limitations did not permit all examiners to test at both schools. A one-way analysis of variance performed on the mean C.T.B.S. composite scores of students assigned to each examiner also

Table 7

Mean Verbal, Performance and Full Scale IQ by Examiner

Examiner	Number of Children Tested	Mean Verbal IQ	Mean Performance IQ	Mean Full Scale IQ
1	30	118.93	113.10	118.06
2	11	103.63	104.18	103.81
3	6	118.66	115.16	119.16
4	18	124.11	120.88	125.55

produced significant differences that partially paralleled those observed for the WISC-R dependent variable. The mean C.T.B.S. composite scores of students assigned to each of the four examiners were as follows: examiner 1 = 92.7, examiner 2 = 79.2, examiner 3 = 90.0 and examiner 4 = 81.5 ($F = 9.276$, $df = 3$, $p < .05$). Scheffe Multiple Comparisons indicated the C.T.B.S. scores of students assigned to examiner 1 differed significantly from those obtained by students assigned to examiners 2 and 4 ($p < .05$). Another source of evidence that supported a selection bias interpretation was the teacher judgement variable. A one-way analysis of variance of the teacher judgement scores of the students assigned to each examiner was also significant ($F = 6.134$, $df = 3$, $p < .05$). Examination of the individual values associated with each examiner indicated that 86.7% of the 30 students tested by Examiner 1 were nominated as gifted students by their teacher. The values for the other examiners were as follows: Examiner 2, 18.2% teacher nominated out of 11 students; Examiner 3, 33.3% of 6 students; and Examiner 4, 50% of 18 students. The evidence combined with that noted for the C.T.B.S. indicated that the students assigned to Examiner 2 scored lower than the students assigned to all other examiners. For this reason the observation of a significantly lower WISC-R score for these subjects was interpreted as selection bias rather than any significant difference in the test administration procedures of the four examiners.

CHAPTER 5

DISCUSSION

Conclusions

Subsequent to the examination of effectiveness and efficiency, several conclusions regarding comparisons of C.T.B.S., G.P.A. and T.J. were apparent: 1. If one is looking for both effectiveness and efficiency, the C.T.B.S. should be considered. It alone identified gifted children better than any other screening device. (The WISC-R is not included in these comparisons.) 2. If one is most concerned with effectiveness, G.P.A. should be considered. It was the most effective of any single device and the most effective compound device when used with C.T.B.S. 3. If one is most concerned with efficiency then T.J. should be considered. It was the most efficient single device and the most efficient compound device when used with both G.P.A. and C.T.B.S. 4. This study also confirmed the general trend in the literature that teacher judgement is not very effective in screening for gifted children. 5. Finally, there was no discernible pattern of effectiveness and efficiency evident for discriminating among the top 15%, 10% and 5% of the sample.

All three measures used in this study were helpful in one way or another in the identification of gifted children. The C.T.B.S. headed the list in importance when both effectiveness and efficiency are being considered. At the 15%

level the C.T.B.S. was 76.3% effective and 64.4% efficient. Remmers (cited in Buros, 1959) stated that the C.T.B.S. is concerned with generalized intellectual skills and abilities rather than separate measures of achievement. With this and the results of the present study in mind, the C.T.B.S. may be a very useful device for the identification of some intellectually gifted children.

Grade Point Average was the most effective of any single screening device or any compound device when used with C.T.B.S. The G.P.A. identified 35 of 38 gifted children or 92.1%. However, it yielded the lowest efficiency (58.3%). In other words, it identified most of the gifted children but also it incorrectly nominated 25 children who were not gifted. The exceptionally high effectiveness of this variable that occurred in this investigation was discrepant with the results reported from previous investigations. Pegnato and Birch (1959) found honor roll listings moderately effective (73.9%), but this value was not as high as that noted in the present study. This may be due to the criterion level used by Pegnato and Birch (i.e., top 1%), or to the method of determining students' G.P.A., or both. Of the two schools sampled, one had common exams in three subject areas and the other had common exams in all examined areas. The G.P.A. also included grades from any major projects or undertakings for the term. This information should be kept in mind when using G.P.A. as a screening device for giftedness. If one is not using similar

evaluation procedures then high effectiveness may not result from G.P.A. It should be noted that teacher judgement in evaluating students must be involved here as well.

The overall effectiveness of teacher judgement in this study (47.3%) was very similar to that reported by Pegnato and Birch (45.1%). Teacher judgement has typically been known as a poor screening device for the identification of gifted children. This study seems to confirm this with regard to effectiveness but not efficiency. Efficiency was also low in the Pegnato and Birch study. The present study, however, placed limits on the number of students to be nominated and on the characteristics involved. These limits were not in place in the Pegnato and Birch study and may have caused the different finding. The present investigation indicated that teacher judgement is the most efficient single device in identifying gifted children and when used in combination with G.P.A. and C.T.B.S. it becomes the most efficient compound device. Teachers may not have nominated a large number of children, but the ones they did nominate were frequently identified as gifted by a standardized individual intelligence test (18 out of 26 or 69.2%). The conservatism in the number of gifted children nominated may be a function of the teachers' opinions, a function of the rating scale they were given or an interaction between the two. Although each teacher could nominate up to a maximum of 32 students (i.e., 4 students on each of 8 characteristics), they could also nominate the same four students (or fewer) on all characteristics, making a total of only

8 different students. It appears from the rating scale that the latter strategy was a dominant tendency. It was concluded that teachers are conservative identifiers of gifted students. They nominate few students, consequently they do miss many who are gifted; but they also tend to nominate very few children who are not gifted. If one of the goals of an identification program is to reduce the number of students that would be incorrectly placed in an educational program for gifted students, then teachers should be included as a valuable part of the identification process.

No discernible pattern of effectiveness and efficiency was evident from discriminating among the top 15%, 10% and 5% of the population. Reduced numbers at the 10% and 5% levels increased experimental error. This gave misleading results because so few children were screened. The higher criterion levels (i.e., 10% and 5%) caused children to be omitted who would have been found to be gifted, had an individual intelligence test been administered.

Summary

This study has confirmed the trend in the literature that the use of multiple screening devices to identify gifted children is a useful practice. No one approach was sufficient to identify intellectually gifted children. This study revealed that Grade Point Average is a much more

effective means of identifying gifted children than had previously been reported. Teacher judgement had approximately the same effectiveness as it had in the investigation reported by Pegnato and Birch (1959). Its efficiency, however, was greatly improved over that reported by Pegnato and Birch (1959). The Canadian Tests of Basic Skills identified gifted children better than any other screening device when both effectiveness and efficiency were considered.

When combinations of screening devices were examined, the ones with low effectiveness were those which included teacher judgement. Conversely, the combinations with high efficiency were also those that included teacher judgement. If effectiveness is the most important concern then teacher judgement should not be considered in combination with other screening devices. However, if efficiency is the most important concern then teacher judgement should be included as a screening measure. The only combination not to have extremes of high and low effectiveness and efficiency was G.P.A. and C.T.B.S. If one is looking for a combination which has a moderate degree of both effectiveness (68.4%) and efficiency (65%) then the combination of G.P.A. and C.T.B.S. is the best choice of the three measures examined in this study.

An important observation regarding the use of an effectiveness/efficiency model in identifying gifted children is that before the process begins the school involved must

have its priorities set. Is identifying as many gifted children as possible the important point? Is the degree of accuracy in the identification of importance? Is a combination of both these issues important? Once these questions have been answered satisfactorily, a screening device or combination of devices can be selected in accordance with the particular priorities established by school authorities.

Recommendations

Through this investigation several important points became apparent with regard to the usefulness of different screening devices.

1. The usefulness of measures readily available in the schools; such as, achievement test scores, grade point averages and teacher judgements should not be underestimated. Instead, such measures should definitely be utilized as part of an overall identification system.

2. A subjective measure, teacher judgement, should be used in conjunction with objective measures, such as C.T.B.S. and G.P.A. results, if high efficiency is sought.

3. Teachers should be given specific criteria with which to judge certain characteristics or abilities of their students. A system in which teachers can nominate students on any criteria they deem suitable may lead to unimportant or

irrelevant factors being considered.

4. It is recommended that in the identification process very high IQ cut-off points should be avoided. Many gifted children are missed by adopting such criterion levels.

5. Future research could examine the effectiveness and efficiency of each criterion in terms of the percentile level of that criterion. Research in this direction may indicate ways to improve both the effectiveness and efficiency of screening.

6. The selection procedures should be validated against success in programs designed for the intellectually gifted.

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APPENDIX A

A LEARNING CHARACTERISTICS RATING OF SUPERIOR STUDENTS

This scale is designed to obtain teacher estimates of the learning characteristics of superior students. A list of 8 learning characteristics is presented for your consideration. Each characteristic has been found to be associated with superior students. Consider each characteristic independently. Some students may display a number of the characteristics, but any single superior student may or may not display a particular characteristic.

With this information in mind, would you consider the behavior described by <u>each</u> single characteristic and identify the <u>four</u> students in your class who have most frequently displayed this particular behavior in your presence. Please repeat this process for each of the characteristics listed. Thank you for your assistance.

Characteristic	Names of Students in your class who most frequently display each characteristic
A. Has unusually advanced vocabulary for age or grade level; uses terms in a meaningful way; has verbal behavior characterized by "richness" of expression, elaboration, and fluency.	1. 2. 3. 4.
B. Possesses a large storehouse of information about a variety of topics (beyond the usual interests of youngsters his age).	1. 2. 3. 4.
C. Has quick mastery and recall of factual information.	1. 2. 3. 4.
D. Has rapid insight into cause-effect relationships; tries to discover the how and why of things; asks many provocative questions (as distinct from informational or factual questions); wants to know what makes things (or people) "tick".	1. 2. 3. 4.
E. Has a ready grasp of underlying principles and can quickly make valid generalizations about events, people or things; looks for similarities and differences in events, people and things.	1. 2. 3. 4.

Characteristic	Names of Students in your class who most frequently display each characteristic
F. Is a keen and alert observer; usually "sees more" or "gets more" out of a story, film, etc. than others.	1. 2. 3. 4.
G. Reads a great deal on his own; usually prefers adult level books; does not avoid difficult material; may show a preference for biography, autobiography, encyclopedias, and atlases.	1. 2. 3. 4.
H. Tries to understand complicated material by separating it into its respective parts; reasons things out for himself; sees logical and common sense answers.	1. 2. 3. 4.

(Adapted from the Scale for Rating Behavioral Characteristics of Superior Students by Joseph S. Renzulli and Robert K. Hartman.)