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**A PREDICTIVE VALIDITY STUDY OF SEARCH:
A SCREENING INSTRUMENT USED FOR IDENTIFYING
KINDERGARTEN CHILDREN WHO MAY BE
VULNERABLE TO SCHOOL FAILURE**

A Dissertation Presented

by

JOY E. FOPIANO

Submitted to the Graduate School of the
University of Massachusetts in partial fulfillment
of the requirements for the degree of

DOCTOR OF EDUCATION

February 1992

School of Education

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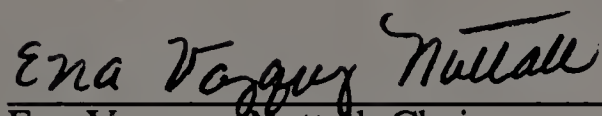
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by

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To Richard F. Fopiano who never loses sight of the
goal; my teacher, my support, my father.

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ABSTRACT

A PREDICTIVE VALIDITY STUDY OF SEARCH: A SCREENING INSTRUMENT USED FOR IDENTIFYING KINDERGARTEN CHILDREN WHO MAY BE VULNERABLE TO SCHOOL FAILURE

FEBRUARY 1992

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This study examines SEARCH, an individually administered screening test used to identify kindergarten children who may be vulnerable to academic failure in school. The public school district in the community studied had used SEARCH as its screening tool for nine years and abandoned it with much controversy as to its usefulness and accuracy as a measure to detect kindergarten children vulnerable to learning failure. If it could be demonstrated that SEARCH is an effective screening instrument, the community would consider renewing its use.

A sample comprised of two years of entering kindergarten children (270) who had taken SEARCH and later taken the Comprehensive Test of Basic Skills (CTBS) were investigated to determine whether SEARCH was successful in its ability to identify young children at risk. Variables including special education services, pre-school experience, retention, and sex were analyzed to determine any relevant effects on

SEARCH scores and academic success. Bivariate and multivariate linear regressions were performed to examine relevant correlations. Stepwise regression was utilized to determine the relative predictive validity of the SEARCH subscales.

A positive correlation emerged when SEARCH was compared to CTBS. Children who scored high on SEARCH tended to score high on the CTBS total score, Reading, Mathematics, and TCS scores. Further, students who scored high on SEARCH tended to succeed in regular education programs with greater consistency than low scorers. The specificity of SEARCH was (.78), the sensitivity was (.37), and the overall hit-rate was greater than 71%. Yet, sixty-four percent of children who scored in the vulnerable range on SEARCH never received special education services and twenty-two percent of children who passed SEARCH received 766 remediation. Still, a strong SEARCH score is more indicative of success than a low SEARCH score. Of the 41 children who scored five and below on SEARCH, 5 (12%) were retained, while of the 229 children remaining who passed SEARCH, 11 (4%) were retained. While the ESI reports greater overall predictive validity than SEARCH, one SEARCH subtest yields important diagnostic information. The Lamb Chop Matching subscale will be recommended as a component of the kindergarten screening program.

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CHAPTER 1

INTRODUCTION

In recent years the National Association for the Education of Young Children (NAEYC), Federal education agencies, parents, and others have joined together to advocate strongly for the special needs of youngsters between the ages of zero through eight years (Bredekamp, 1986). Public school systems are being newly called upon to serve children of pre-school and kindergarten age, and to examine the unique and exciting phases of early developmental stages (Massachusetts Department of Education, 1986; Massachusetts Elementary School Principals' Association, 1986). The addition of a younger population to Massachusetts public schools allows new and exciting opportunities to detect learning problems and implement remediation at an early age (Meisels, 1985).

The NAEYC, the nation's largest professional association of early childhood educators, believes that a major determinant of the quality of an early childhood program is the degree to which the program is developmentally appropriate (Bredekamp, 1986). They redefined developmental appropriateness in 1987.

The concept of developmental appropriateness has two dimensions: age appropriateness and individual appropriateness.

1. Age appropriateness. Human development research indicates that there are universal, predictable sequences of growth and change that occur in children during the first nine years of life. These predictable changes occur in all domains of development--physical, emotional, social, and cognitive. Knowledge of typical development of children within the age span served by the program provides a framework from which teachers prepare the learning environment and plan appropriate experiences.

2. Individual appropriateness. Each child is a unique person with an individual pattern and timing of growth as well as individual personality, learning style, and family background. Both the curriculum and adults' interactions with children should be responsive to individual differences. Learning in young children is the result of interaction between the child's thoughts and experiences with materials, ideas, and people. These experiences should match the child's developing abilities, while also challenging the child's interest and understanding. (Bredekamp, 1987, p.2)

While an early childhood developmental curriculum allows for growth for widely disparate learning styles and rates of development, there may still be young children for whom the added support of special education services is appropriate. Research supports the understanding that children can benefit significantly from intervention services during their early childhood years (Meisels, 1983; Schweinhart & Weikart, 1986). In order to begin to distinguish which children may require special education services, an individually administered early childhood screening is necessary. The process of screening has been defined as "a process of early detection for all those pre-school children, who, for a variety of reasons (social, emotional, intellectual, biological, physical, linguistic, environmental, or any combination of such), will be unable to attain optimum growth and/or normal development" (Barnes, 1982, p.7). According to Meisels (1985) "early childhood screening is performed to identify children who might profit from early educational intervention or from special services before kindergarten or first grade. Developmental screening helps schools meet the federal obligation in P.L. 94-142 to find, identify, and serve handicapped children" (p.2). Meisels (1985) states that "by helping a child obtain early intervention services, developmental screening contributes to the eventual reduction of the number of chil-

dren who experience school failure and who need special education services in later years" (p. 3).

Early childhood screening is a first and important step toward identifying children in need of services. Children with a weakness flagged by a developmental screening instrument may be referred for a more intensive evaluation in order to confirm or deny the results of the non-intensive scan. Screening in and of itself is not a diagnostic tool, but rather it is an indicator of developmental areas which may need further investigation. It is from the results of a formal diagnostic evaluation that, when warranted, an individualized educational plan may be designed and implemented to remediate any weakness detected. Screening is recommended for all children before first grade so that with appropriate planning school failure can be avoided (Meisels, 1985; Silver & Hagin, 1981).

This study examines an early childhood population in one Western Massachusetts suburban community that has focused attention on its early childhood programming since 1986. The suburban town whose children are presented in the study currently supports two integrated developmental pre-school classes and eight developmental kindergarten classes. The community's early childhood research began with a townwide early childhood needs assessment prompted by an unprecedented rate of early childhood special needs referrals (Fopiano, 1987). In response to the results of the needs assessment, teachers, special educators, and administrators reorganized the early childhood curriculum using a more "hands on" approach to better meet the needs of children. Developmentally appropriate activities were planned in a variety of self-directed learning centers which were designed to allow individual children more opportunities to experience success than in the more restricted opportunities typical of a traditional early childhood classroom (Bredekamp, 1986; Massachusetts Department

of Education, 1986; Massachusetts Elementary School Principals' Association, 1986; Peck, McCaig, & Sapp, 1988; Schultz & Lombardi, 1989).

After successfully implementing this developmentally appropriate curriculum model in the community's school system (Fopiano, 1987), it became appropriate to examine the diagnostic screening tool used by the community to identify young children with special needs warranting further investigation. This investigation and evaluation of the kindergarten screening instrument SEARCH, used by this Western Massachusetts suburban community is the topic of this study.

Statement of the Problem

The SEARCH kindergarten screening instrument had been employed by the public school system involved in this study for the nine years between 1978-1987. During those years SEARCH was administered in September to each child beginning kindergarten. The use of SEARCH was abandoned in the community in 1988 with much controversy as school psychologists, early childhood educators, and the Massachusetts Department of Education expressed varying opinions as to its usefulness and accuracy as a screening instrument to detect kindergarten children vulnerable to learning failure. Since the time the use of SEARCH was abandoned, numerous other kindergarten screening instruments were tried by the community, each offering varying degrees of satisfaction. If it could be demonstrated that SEARCH is an effective kindergarten screening instrument, the community would consider renewing its use.

Purpose of this Study

Kindergarten screening may be the first formal procedure a school psychologist has for identifying children who may have a learning disability. Therefore, it is important that the tool employed by the school psychologist succeeds in uncovering children who require further diagnosis in specific areas and perhaps ultimately special education services. The purpose of this research is to conduct a

study of SEARCH in order to assess the screening instrument's ability to predict school success or failure in a young child. In this study, the classes of children entering kindergarten in 1983 and 1984 are examined from their entrance into public school kindergarten through their fourth grade experiences to determine whether there is a correlation between their fourth grade achievement level and their kindergarten SEARCH scores.

Significance of this Study

As a result of Chapter 766, Public Law 94-142, and Public Law 99-457, the Massachusetts Department of Education has taken an active role in supporting public schools in adapting their early childhood programs to include younger children. Public Law 99-457 - Education of the Handicapped Amendments of 1986 states that, "by school year 1990-1991, all states applying for Public Law 94-142 funds will have to assure that they are providing a free appropriate public education to all handicapped children ages 3 through 5" (p.12). Since these laws became enacted, psychologists have been faced with the task of identifying the special needs of this younger population. For staff persons, this may require a careful study of the assessment instruments already used with older children in their district, to determine whether or not they are appropriate for use with the younger child. For others, this may require selecting early childhood screening instruments for districts in which they have never been used before. In all cases, it is important to gather and analyze community data over time to discern whether the particular screening instrument in use has, in fact, successfully identified children with learning problems.

In this study SEARCH will be explored in detail. Careful analysis will reveal which SEARCH subtests may be particularly counted on for specific predictive information. Support for hypotheses will stem from the analysis of many variables. What will be of special interest is the number of special education students with vulnerable SEARCH scores. This research can provide data that educational professionals can examine to determine if SEARCH is a tool appropriate for their public school kindergarten screening. This predictive validity study will enhance existing knowledge and may lead to informed decisions about screening and remediation.

Limitations of this Study

Some limitations of the study are inherent in the fact that SEARCH was administered to children in 1983 and 1984, and any peculiarities regarding the circumstances of the test administration are unknown to this investigator. Although any such variables are uncontrolled, it is known that a school psychologist supervised the entire screening procedure, and was herself familiar with SEARCH. It is the responsibility of the psychologist in the community under investigation to coordinate the kindergarten screening annually.

As with any kindergarten screening results, the young age of the children screened needs to be taken into consideration when examining SEARCH results. For some children kindergarten is a first exposure to public school. The testing site may be an environment unfamiliar to the children. Some children may find the test situation uncomfortable. Small children, some less than sixty months old, introduced to new situations, with multiple adult examiners each previously unknown to them, may not respond as they would were they in a more familiar or natural setting. Certainly if a child is frightened, or not feeling well, or had a rough start at home that morning, one can not expect optimal results.

Finally, the sample used in this study is similar in terms of race, school experience, and socioeconomic background. This community consists of a fairly homogeneous white mainstream population. This may limit generalizations made to other children who do not share comparable backgrounds.

Outline of the Remaining Chapters

The first chapter has reviewed the professional concerns one Western Massachusetts community had expressed regarding the measuring tool it had used for kindergarten screening prior to 1988. Staff wondered if the scanning tool used by the school system was reliable in revealing difficulties which make a child more vul-

nerable to school failure. The purpose of this study is to determine the validity with which SEARCH successfully identifies children vulnerable to school failure. The research reveals whether children who pass SEARCH succeed in school and whether children who fail SEARCH require special education or other remedial services.

Chapter 2 will review similar studies of predictive validity on other early childhood screening tests and will review in depth the significant literature on SEARCH.

Chapter 3 will describe the research hypotheses, provide a detailed description of the design, sample population, variables, and the methods of data acquisition and analysis employed in this study.

Chapter 4 will detail the evaluative data, report the results of the analysis, and present the answers for each hypothesis.

Chapter 5 will summarize the data and discuss its implications for present and future research.

CHAPTER 2

REVIEW OF THE LITERATURE

Public schools have an obligation under Public Law 94-142: The Education for All Handicapped Children Act of 1975 (Federal Register, 1977) to conduct early childhood screening to identify children who may be at risk for a learning disability that could interfere with success in school. This law was passed to ensure that all handicapped children be educated in the least restrictive environment possible on a level consistent with their individual needs. Massachusetts public schools are responsible under Chapter 766 to identify and provide services for any population of young children who may be at risk for school failure beginning at the age of three years (Massachusetts Department of Education Division of Special Education, 1987). The basic assumption is that early identification of a learning problem may allow for early intervention and successful remediation. Through pre-school and kindergarten screening programs early identification of a handicapping condition is sought prior to grade one (Barnes, 1982).

Screening is a process which is employed to identify children who are likely to encounter learning problems that may interfere with appropriate social, cognitive, or motor development (Berdine & Meyer, 1987; Meisels, 1985; Paget & Bracken, 1983). Screening is a brief assessment procedure which can yield results that suggest whether further evaluation is necessary. Children who fail a screening may be referred for an individual diagnostic evaluation. Youngsters identified under this evaluative phase are likely to receive some additional educational services (Salvia & Ysseldyke, 1978).

The importance of screening instrument selection by schools, then, cannot be overemphasized. The purpose of pre-school screening is to identify children early who require a more intensive diagnostic evaluation. When handicapped children are

not identified, their needs are less likely to be promptly addressed. Although a screening instrument is not itself a diagnostic tool, because it is administered to every child who is entering kindergarten in Massachusetts, it behooves a school system to select an instrument which can accurately identify children who may be in need of services.

The National Association of State Boards of Education Task Force (1988) supports the National Association for the Education of Young Children's position "that the most important consideration in evaluating and using standardized tests is the 'utility criterion'--that is, the purpose of testing must be to improve services for children and ensure that children benefit from their educational experiences" (p. 14). A kindergarten screening or scanning instrument, therefore, should be selected not only for its ability to detect youngsters at risk for having school problems, but also for its ability to predict specific areas where learning difficulties may arise in order that an appropriate educational intervention may be planned. The greater the accuracy of the information provided, the more useful the screening may be to educational professionals in planning appropriate early childhood programming.

A proliferation of screening instruments has arisen in response to the demands of the current laws and the needs of schools. It is a complicated task for any district to select a screening instrument that will meet its needs in accurately detecting children who may have special needs. Barnes (1982) recommends that professionals examine a screening measure according to its construction, its standardization, and its ability to predict certain outcome measures. A screening test should be acceptable to the professionals who use it and the children who take it. "To be maximally effective for large-scale screening programs, it should require little or no equipment, be simple to administer and score, be of relatively short duration in time and capable of being given in a wide variety of settings" (Barnes, 1982, p. 27).

Examples of Locally Used Screening Tests

Meisels (1984) designed a developmental screening instrument, the Early Screening Inventory (ESI), which provides both validity data and a description of the relationship between screening data and later school performance. The ESI is a quick to administer (fifteen minutes), easy to score, inventory that includes a parent questionnaire to provide pertinent historical data. The author took into consideration three general criteria which he considers important when selecting a test for young children. The first is that the ESI is a developmental screening instrument rather than a school readiness test. The often confused difference is that a developmental screening "samples the domain of developmental tasks that all children of normal abilities should be able to perform, rather than the domain of specific learned accomplishments that indicate academic readiness" (Meisels, 1984, p. 26). Developmental screening tests are designed to identify children at risk. They differ from readiness tests in their ability to yield more broad-based information about a child than what specific lack of general knowledge may exist. A readiness test is more restricted in the data it can deliver. Readiness tests are concerned with what curriculum related skills a child has previously acquired. Second, the range of content covered by the ESI includes, speech, language, cognition, perception, gross and fine motor coordination. A similar breadth of performance should be sought in other developmental screening tests according to Meisels (1984). Third, Meisels (1984) states, "information is available concerning the ESI's normative development, its reliability, and classical data regarding its validity" (p. 26). The author recommends ascertaining this data in other developmental screening tests considered in order to accurately predict the outcome of individual children.

Long-term predictive validity was assessed by comparing ESI results to a variety of measures of school success for students kindergarten through grade four.

Report card grades, special education services rendered, special education services delivered, and retention were variables considered. Correlation and stepwise multiple regression analyses were performed. Meisels (1984) reports in the results of his study that ESI tends to over-refer rather than under-refer. Long-term predictive validity was established with a sample of low to lower-middle SES urban, white children. "Finally, as shown in the decline in regression and correlation coefficients, the predictive utility of the ESI - the proportion of children referred by the ESI who are later shown to be correctly identified as at risk- decreases over time" (Meisels, 1984, p. 32).

Some detail has been presented regarding the ESI because of its current experimental use in Western Massachusetts (Holyoke, Springfield, Longmeadow and other suburban communities) and its support by the Massachusetts Department of Education as an appropriate developmental screening test. The ESI meets the three screening selection criteria named by Meisels (1984) for developmental screening tests. It compares favorably with other developmental screening tests that Meisels names as also meeting his selection criteria: the Denver Developmental Screening Test, the McCarthy Screening Test, and the Minneapolis Preschool Screening Instrument. Meisels reports that while the ESI compares favorably with the short-term predictive validity data of these other developmental instruments, the longitudinal data available from these tests are not comparable with those reported for the ESI(Meisels, 1984).

The Denver Developmental Screening Test (DDST) is a brief to administer screening instrument designed to detect delayed development in children from birth through six year of age. There are 105 test items to be administered in order which measure development in four areas: personal-social development, fine motor development, language development, and gross motor development. The screening is reported to take between ten and twenty minutes to administer (Barnes, 1982; Lichtenstein & Ireton, 1984; Salvia & Ysseldyke, 1978).

Salvia & Ysseldyke (1978) explain that the test authors never formally discuss the statistical validity of the DDST. Intelligence tests and developmental tests were surveyed and it was from those tests that the content of DDST was selected. Test authors then describe the DDST as demonstrating a strong positive relationship between the Stanford-Binet or the Bayley Infant Scales (Salvia & Ysseldyke, 1978). Lichtenstein & Ireton (1984) indicate that the "DDST does a good job of identifying young children with IQ's less than 70. However, for pre-school screening of 3-5 year olds who may suffer lesser degrees of delayed development or more specific developmental disabilities (e.g., language disabilities), use of the DDST is open to question" (p.156). Barnes (1982) finds the DDST to be one of the more comprehensively researched screening tests developed, but maintains specific concerns about its usage. One of the main concerns Barnes discusses is the lack of predictive validity studies available on the DDST.

The McCarthy Screening Test (MST) is often referred to because of professionals familiarity with the McCarthy Scales of Children's Abilities (MSCA) from which the screening test has been derived. Six subtests were taken from the intelligence scale and those subtests constitute the McCarthy Screening Test. The subtests are: Right-Left Orientation, Verbal Memory, Draw-A-Design, Numerical Memory, Conceptual Grouping, and Leg Coordination. Unfortunately, the MST has not been validated independently from its well researched parent, the MSCA. This screening test is missing the range of content, reliability, and validity of the MSCA (Lichtenstein & Ireton, 1984).

The Minneapolis Preschool Screening Instrument (MPSI) was designed to identify pre-school children at risk for school failure as a part of the mandate of Public Law 94-142 (Lichtenstein & Ireton, 1984). It was standardized on 1320 children

recruited for screening from the Minneapolis area. The screening was performed over a two year period

The instrument takes approximately 12 to 15 minutes to administer. It consists of 11 subtests: Building, Copying Shapes, Information, Matching, Sentence Completion, Hopping and Balancing, Naming Colors, Counting, Prepositions, Identifying Body Parts, and Repeating Sentences. Predictive validity studies were run to compare the MPSI with the DIAL and the MRT. The MPSI had higher predictive validity rates than the DIAL. Correlations with the MRT total score were .70 for the MPSI and .61 for the DIAL. Barnes (1982) considers the MPSI to have "one of the best sensitivity rates and false-positive/false-negative rates of any preacademic screening measure currently reviewed" (p.194). However, both Lichtenstein and Barnes expressed concern about whether the norms can be generalized to the greater population and whether the positive correlations evidenced can be replicated on other samples of children.

The popular use of the Gesell School Readiness Test is discouraged by the Massachusetts Department of Education as a developmentally appropriate screening test. Still, the Gesell test is regularly used in Western Massachusetts public and private schools (Greenfield, Wilbraham and other suburban communities). Graue, and Shepard (1988) examined the Gesell School Readiness Tests (GSRT) in a predictive validity study because of this instrument's frequent use in making placement decisions regarding young children. The "Readiness" title, somewhat of a misnomer, does not accurately describe the breadth of developmental activities assessed by the Gesell test. Unlike most readiness tests, this developmental screening will provide the professional with a wide range of data. Graue and Shepard comment, however, that unlike other developmental screenings, at risk scores on the Gesell will not lead to a more involved evaluation process.

Congruent with the philosophy of the Gesell Institute, the test is based on Gesell's theory of maturational readiness (Grace & Sheppard, 1988). Gesell encourages placement decisions based on the results a child obtains on the inventory. "The problem of lack of readiness is addressed by providing the child with time to develop outside the traditional school progress track. According to the Gesell Institute (1982), 'the gift of time' can be provided through an extra year at home before kindergarten, an additional year in kindergarten or first grade, or in a transitional program between kindergarten and grade one" (Graue & Shepard, 1988, p. 3). Predictive validity is of particular concern here, since when a child is incorrectly identified as at-risk, he or she is retained or held out of school and apart from special education services that may ameliorate a learning difficulty. These "solutions" may impact negatively on his primary school experience. Misidentification is a concern.

In the study by Graue and Shepard (1988) a sample comprised of 45 first graders referred by their teachers for developmental testing and a random sample of 106 children were tested with the GSRT. The correlations were run comparing the GSRT developmental screening scores with other measures such as: report card grades, CTBS Reading and Math scores where available, Metropolitan Readiness Test scores (MRT), and retention information. "A small positive relationship was found between Gesell developmental age and first grade report card grades ($r=.23$). Additional outcome measures were available for a subgroup of the total sample and indicated that the GSRT has modest predictive validity for standardized tests and low validity for teacher judgment of performance in first grade" (Graue & Shepard, 1988, p. 3). Further, research indicated that the performance of children retained changed little after the extra year of school was repeated. In addition to the reservations expressed by the authors concerning the potential for misidentifying children using the

Gesell, they stated summarily that the low predictive validity of the assessment renders it inappropriate for use in placement decisions.

Studies on developmental screening instruments, such as the ones discussed, have permitted investigators an in depth look at the relative abilities of the instruments under investigation to successfully target at risk children. Criteria to consider in selecting a screening test include: that it be developmental and not a readiness test, that the breadth of performance tested be broad-based, that norms, reliability, and validity information be available. The educational decisions made based on information supplied through screening scores, whether placement decisions or identification of children at risk, affect the child's start in formal education.

Overview of SEARCH

SEARCH was the screening test used in the community studied in this investigation. It is a developmental screening test that covers a range of a child's abilities. Cited in Educational Programs That Work, 1983, as part of the National Diffusion Network, the SEARCH & Teach model of screening, diagnostic evaluation and intervention, has been validated by the Joint Dissemination and Review Panel of the United States Office of Education and the National Institute of Education on the basis of its educational impact, cost effectiveness, and replicability. This preventative program has been implemented in schools with widely disparate populations with minimal training and costs. The aim of this scan is to aid children vulnerable to school failure, but who have not yet failed in school (Hagin, 1984).

Archie A. Silver and Rosa A. Hagin (1981), co-authors of SEARCH A Scanning Instrument for the Identification of Potential Learning Disability, designed a screening tool composed of ten subtests to yield a profile of assets and deficits. According to Silver and Hagin, the profiles may be used to begin to understand a child's strengths and weaknesses, and thus guide educational intervention. This instrument is suited for administration during a child's kindergarten school year and requires approximately twenty minutes to administer and score. Although the test is designed to be administered individually to young children between the ages of sixty-three to eighty months of age, the instruction manual provides suggestions for devising local norms, which can encompass a larger age range.

Silver and Hagin (1981) recognize SEARCH as a screening and not as a diagnostic tool. Nonetheless, they indicate that the results of scanning with SEARCH may be used:

1. To predict learning difficulties in individual children.
2. To profile assets and deficits in individual children.

3. To guide educational intervention.
4. To determine the need for further diagnosis (neurological, psychological, psychiatric, and social).
5. To provide the school administrator with a profile of the entire kindergarten or first-grade class. (p. 2).

The authors state that "the purpose of SEARCH is to locate children who are vulnerable to learning failure because they have not yet achieved adequate neuropsychological maturation in those skills that clinical and experimental studies at the New York University Learning Disorders Unit have shown to be basic to academic learning" (Silver & Hagin, 1981, p. 2).

SEARCH is based on the principle that delays in the acquisition of spatial and temporal skills cause learning failures in young children. The authors Silver & Hagin (1981, 1982) cite these skills as being fundamental to success in reading achievement. Since kindergarten and first grade classrooms are preparing youngsters to read, it is at this time that screening and appropriate intervention should take place; before frustration and self dissatisfaction occur. Dr. Silver reports (1983) that studies he and Dr. Hagin conducted at Bellevue Psychiatric Hospital at the onset of their research reveal that children do not outgrow learning disabilities. Silver and Hagin (1981) concur that although a youngster may learn to compensate for a learning problem, unless specific training is provided, a child cannot be expected to outgrow a specific learning disability. Indeed, children may not outgrow a disability even with training and early identification. This fact highlights the need for effective tools for early problem detection.

Standardization of SEARCH

The total SEARCH standardization sample included 2,319 children. Full kindergarten enrollments from four school districts in two states participated. Children came from either an urban area (nine schools in Manhattan) or from small town semi-rural communities (twenty-two schools in North Carolina). Racial and ethnic minority students were included. (See Table 2.1 Racial/Ethnic Distribution of SEARCH Standardization Sample) with many children reporting that they came from bilingual households. English, Spanish and Chinese were the most frequently spoken languages, although other spoken languages included: Arabic, Bengali, Yorubu, Swedish, Greek, Tagalog, Japanese, French, Hindi, and Czech (Silver & Hagin, 1981).

Table 2.1

Racial/Ethnic Distribution
of SEARCH Standardization Sample

17.9%	Black
22.4%	Other, including Oriental, Asian Indian, Arabian, and Filipino
59.8%	White, including Spanish-speaking Puerto Rican and Dominican

Norms

Three categories of norms are available in the manual for the administrator and interpreter of SEARCH: age norms, specialized norms, and local norms. Age norms in each subtest were derived from the standardization sample previously described. Specialized norms were derived from kindergarten and first grade samples in inner city, suburban, small town-rural, and selective independent schools. Instructions are

provided in the test manual for users who wish to compute their local norms, and who have at least eighty cases representing intact, unselected groups. Silver and Hagin (1981) encourage any test user to compute local norms wherever possible for the most meaningful results.

Description of SEARCH Subtests

The 1981 SEARCH kindergarten screening instrument consists of ten subtests grouped to include visual perception tests, auditory tests, intermodal tests and body-image tests. The subtests are categorized as follows: three visual perception tests (discrimination, recall, and visual-motor control), two auditory tests (discrimination and rote sequencing), two intermodal tests (articulation and intermodal dictation), and three body-image tests (directionality, finger schema, and praxis). A brief description of each subtest is reported below (Silver & Hagin, 1981).

Lamb Chop Matching: assesses the ability to discriminate and match asymmetric figures.

Lamb Chop Recall: requires children to observe and to recall immediately the orientation of asymmetric figures.

Designs: a visual-motor task that measures children's ability to copy accurately a series of designs of graduated difficulty. It taps a complex of skills, including visual discrimination, praxis, and fine motor control.

Rote Sequencing: a verbal test which assesses the ability to remember commonly heard rote sequences and to order elements within these sequences according to positional or temporal concepts.

Auditory Discrimination: taps the ability to detect similarities and differences between orally presented words or syllables which are identical or which vary by one phoneme.

Articulation: assesses the ability to deal with one aspect of emissive speech, the reproduction of the sounds of common words.

Initials: (Intermodal Dictation) takes a step from single modality perception to a complex intermodal task involving auditory, visual, praxic, and motor associations.

Directionality: assesses the extent to which children have developed stable concepts of spatial orientation within themselves and projected upon the environment.

Finger Schema: measures the ability to perceive and to localize tactile stimuli and to conceptualize the finger schema, one aspect of body image.

Pencil Grip: a motor task which is recorded in two separate observations as children respond to the Designs and to the Initials components of SEARCH.
(p. 13,14)

Some Significant Studies

Children's learning problems gone undetected can catalyze a variety of problems. Although in young children a quick fix frequently offered to students who are experiencing school failure may be that of the "gift of time" (Ames, 1985) or retention, research suggests that retention alone does not solve a learning problem (Silver & Hagin, 1981). The philosophy behind retention or nonpromotion is that the same concepts introduced in the same order with a group of younger children may benefit a delayed child. Silver (1983) reports that the pattern of failure experienced in pre-school or kindergarten by a youngster with a learning disability may be repeated continually in a variety of other settings over time if no intervention is provided. Some learning disabilities persist as long-term problems even with treatment. Therefore, certainly, an untreated learning disability may be considered a long-term problem (Hagin, 1984; Sanders, 1979; Schweinhart, Weikart, Larner, 1986; Silver, 1983).

Dr. Hagin reports (1984) in her study of the SEARCH identification and intervention model on the Kips Bay School in New York that her preventative approach to learning failure resulted in a decrease in retention to 5% or less. In other words, early identification and treatment can result in school success for a child. Drs. Silver and Hagin instituted the SEARCH model at Kips Bay School for children of birthdate years between 1964-1974. During that time nonpromotion decreased from its high of 12% to a steady rate of 1-3%. Dr. Hagin attributes the decline in the rate of retention in the school to her program's successful prevention of learning disability (Hagin, 1984).

Similar support for the effectiveness of the SEARCH model is garnered from a manuscript prepared by Archie Silver in 1985. The prospectus describes three replications of the SEARCH model in three diverse localities other than in the New York urban and suburban environments. The sites are Gaston County, North Carolina, Columbus, Ohio, and the Seely Place school in New York. Each of the replications was carried out by personnel from the home community with varying levels of support from Silver and Hagin. Each community reported success in using SEARCH to scan kindergarten children and locate those youngsters vulnerable to school failure.

Selma Thackery, the psychologist for Seely Place, described the SEARCH screening and subsequent intervention as the model that minimized the four problems her school was experiencing prior to its introduction: "the lack of consistent norms at a young enough age, the lack of systematic remedial approaches after identification, the lack of parent understanding and involvement, and the lengthy time required for full screening of all children" (Silver & Hagin, 1985, p. 55). Thackery described one of the major problems associated with early identification as being the lack of facility with which findings can be translated to educational process. Thackery found that, with appropriate diagnostic testing of at risk children identified by SEARCH, educa-

tional remediation could be planned to lead the children toward greater academic success.

Seely Place maintained an ongoing connection with both Drs. Silver and Hagin and the New York University medical staff with which they were affiliated. Obviously similar ongoing consultation and professional follow-up expertise may not be available to every school. Yet, in this particular instance the steady communication with the NYU team empowered the school system to begin an approach that provided for successful educational intervention with at risk young children.

Gaston County North Carolina did not have a screening instrument to identify kindergarten children in need of special education services prior to the initiation of SEARCH in 1975. Through grant monies, Dr. Hagin was brought to the school district to train professionals in the scan's methods and usage. Teachers currently employ SEARCH in Gaston County district-wide and report their success in identifying children at risk. However, it is significant to point out that the improvement that they report may result from simply employing a program to screen young children where there was previously no program to screen kindergarten children at all.

The program implemented with SEARCH in Columbus, Ohio seems to differ from North Carolina in both form and substance. In this moderately sized city the desire of the professionals was to replicate the New York SEARCH program in their city. The project, like the research begun at NYU, stemmed from a psychiatric research agency and a medical center. Professionals from Ohio consulted with Drs. Silver and Hagin in New York for one day prior to implementing SEARCH.

The study was designed as a pre-test, post-test research design model. Three groups were identified out of a sample size which included nine first grade classes at three schools including both inner city and middle class neighborhoods. Comparison was sought for children among:

- "(1) the specific intervention group which received a specific perceptual stimulation
- (2) the Hawthorne group which received regular academic tutoring
- (3) the maturation control group which had no intervention contact of any type other than regular classroom instructions "(Silver & Hagin, 1985, p. 2).

Children passing fewer than five of the ten subtests of SEARCH were considered vulnerable to school or learning failure. Eighty-six children identified as at risk by SEARCH were given a more intensive battery of tests. Following the more intensive testing each of the eighty-six children were then assigned to one of the three groups.

Norma Barnaby, reporting on the Columbus study, found at pre-testing that no significant differences existed among the three at risk groups of children. After the completion of first grade, she observed improvement in all three vulnerable groups from the pre-test to the post-test. However, it was reported that the only group of children growing at a statistically significant rate was that of the intervention group. This suggested early on that specific intervention following SEARCH could instigate educational growth.

At the end of the second grade, one year following post-test, each of the youngsters was reassessed with the same battery of instruments that had been administered to them after being identified by SEARCH. "The intervention group showed significant improvement at follow-up on every test except the Wide Range Arithmetic, while neither control group showed any improvement on achievement, behavior, or intelligence test. The control even showed significant deterioration on a few tests" (Silver & Hagin, 1985, p. 63).

Barnaby summarizes, "the data presented demonstrates that for children identified as vulnerable to reading disabilities, spontaneous improvement in growth and

maturation is not accompanied by equally spontaneous improvement in behavior, reading achievement, or IQ scores. On the contrary, without specific intervention, there tends to be deterioration in all three of these areas" (Silver & Hagin, 1985, p. 64). Opportunities for any type of early intervention for children are possible only when a scanning instrument is able to begin to identify children who may be at risk for school failure. The results reported from the Ohio study (Silver & Hagin, 1985) indicate the significance of early identification of any learning problems among school-age children.

Barnaby detailed that significant improvement was made when intervention was applied to every area of weakness tested in the Ohio study except Wide Range Arithmetic. It is not clear whether any specific intervention was designed for any of those youngsters designated as potentially at risk in mathematics, or even what kind of further detailed mathematics testing was completed after the initial SEARCH scan. In another study Dr. Barbara Braude Haber (1985) discerned a positive relationship between neuroperceptual ability and later mathematical achievement in five and six-year-old children. Unlike reading, this subject area has not been specifically identified by Silver and Hagin (1981) as one of the primary foci of SEARCH.

SEARCH includes four subtests of neuroperceptual ability (Visual Perception, Auditory, Intermodal, and Body Image). Dr. Haber administered SEARCH to two groups of age appropriate children. The second sample of youngsters served as a control group. Two years later children were given the Mathematics subtest of the California Achievement Test (CAT). Her results revealed that a relationship did exist between neurological ability and later mathematics achievement. Moreover, the four SEARCH neuroperceptual modality clusters contributed significantly to the prediction of mathematics achievement as reported by Haber.

It cannot be emphasized enough that SEARCH is a screening instrument administered in twenty minutes or less to a child of approximately sixty-three months of age. Decisions regarding placement and educational opportunity should not be based on SEARCH results alone. Children scoring in a designated vulnerable range on the screening need to be referred for further evaluation. It would be after further testing and diagnostic evaluation that intervention may be planned, if determined necessary.

More recently Morrison, Mantzicopoulos, and Stone (1988) studied four school districts in Marin County, California to examine the utility of SEARCH as a predictor of reading problems. The purpose of their research was to "investigate the error rate of SEARCH at the end of kindergarten for potential False Negative and False Positive categories, as well as the long-term rate in the False Positive category in a sample of children representing the full range of Socioeconomic Status (SES)" (p.184). The authors described the hit rate of SEARCH to be "respectable and at the level of a number of other screening instruments" (p. 190).

This group of researchers found SEARCH to be sensitive to the effects of SES. They believe it will identify fewer children from the upper SES groups if local norms are used. Indeed, they state that it is probably the use of local norms that accounts for the significant prediction-performance error rate in the False Positive category. If the majority of a local population of children is environmentally advantaged they may perform with greater ease on SEARCH elevating a locally normed passing score. Students who may fail according to local norms may pass with the identical score if assessed on norms set by Silver and Hagin. Morrison, Mantzicopoulos, and Stone found over 57% of the children studied at the end of first grade predicted to suffer reading problems scored above the third stanine on group achievement tests. It

appeared to the research group that the identified population was reading without any special intervention.

As a screening tool, SEARCH is described by Morrison, Mantzicopoulos, and Stone (1988) as being on par with other scanning tools. They consider a screening instrument to be a cursory survey of a young child. To use a screening instrument as a diagnostic instrument, is to unfairly serve young children. It is imperative that any youngster performing at risk on SEARCH be administered a more extensive evaluation.

Summary

In this chapter the rationale for screening pre-school and kindergarten children was discussed. Results from a number of predictive validity studies were reported. Although a number of screening tests are available, many do not offer hard data with which to evaluate the measures's ability to accurately identify young children at risk. Therefore, similarly organized studies of early childhood screening instruments were selected for presentation in this chapter. Each researcher cited in this chapter who performed a predictive validity study on an early childhood screening test recommended the need for more such studies on early screening instruments.

A thorough background of the development of SEARCH was presented to aid in understanding the screening test and in the study to be presented. Silver and Hagin tested the use of the SEARCH scan in several different regions of the United States. Their discussion highlighted recent research done in New York, North Carolina, Ohio, and California. It is noteworthy to add that both urban, suburban and rural schools were considered in the samples selected, and a diversity of social and economic status and ethnic backgrounds were represented. The authors attempted to design norms that were broad-based and, therefore, useful to public schools nationally.

The degree of involvement of the authors of SEARCH varied with each project presented. Author involvement ranged from participating with the follow-up diagnostic team examining children flagged as at risk by SEARCH, to a one day training session with psychologists who would be training others in the use of the screening tool. Still, each participating group reported an adequate or greater level of success with using SEARCH as a screening tool for identifying children who may be at risk for school failure. The scan is brief to administer and, with training, can be administered by a teacher or other professional.

School systems in Massachusetts each regularly use kindergarten screening instruments. How well the instruments identify children potentially in need of special education services may determine how quickly those children receive the extra help they require. Therefore, it is the responsibility of the school system to utilize a screening tool with an accurate rate of predictive validity.

CHAPTER 3

METHODOLOGY

Research Hypotheses

Massachusetts public schools are currently focusing much of their attention on early childhood populations. State funding has been made available under Chapter 188 to train educators in providing more developmentally appropriate programs for kindergarten children. The State Department of Education and the NAEYC are urging teachers to be accepting of young children's developmental timetables and to plan educationally for them. They encourage that provisions for each child's individual needs be made within the classroom for both regular education and special education students (Bredekamp, 1986; National Association of State Boards of Education, 1988; Peck, McCaig, and Sapp, 1988).

The Western Massachusetts suburban community from which the subjects in this study were drawn is particularly concerned about providing for its early childhood special needs population. The school system is committed to planning appropriately for its special education population knowing that early identification is fundamental to remediation. School staff are concerned about the effectiveness of their kindergarten screening instrument in identifying young children who may be at risk for school failure. Questions have been raised about the accuracy with which the kindergarten screening tool locates handicapped children who may require further evaluation and special education services. The kindergarten screening instrument used has been SEARCH.

This investigation intends to evaluate SEARCH's ability to predict school success or failure through the analysis of the following specific hypotheses:

Vocabulary) and a total mathematics score (derived from Mathematics Computation and Mathematics Concepts and Applications) (Comprehensive Test of Basic Skills, 1982) were also recorded.

Information was collected on whether a child had received any special education services from the Pupil Services Department. If special education services had been rendered, then the specific type(s) of services, as well as the length of time services were received, were documented. This data is particularly relevant in drawing comparisons with the subtest scores of the SEARCH screening instrument.

Whether or not a child had been retained in a grade was discerned. Further, the year of the nonpromotion(s) was also noted when that information was available. If retention occurred more than once, that data was collected and recorded.

The grade children were enrolled in at the time of data collection and their fourth grade Grade Point Average (GPA) completed the profile of information. Unfortunately, it was discovered that GPA's were not computed for elementary children in this community. Youngsters are not evaluated with either a number or a letter report card grade. However, all data collected provide the most recent information available for each child in the sample population. The variables introduced assist in measuring the academic performance of each child enrolled in the classes beginning kindergarten in September, 1983 and September, 1984.

Instrumentation

Two measures are employed in this study, SEARCH and the CTBS. Scores from each of the proposed instruments were recorded as described. Please refer to Appendix C for a sample of the SEARCH protocol.

SEARCH

SEARCH consists of a total battery score comprised of each of ten subtests. Silver and Hagin list, in their 1981 manual, means and standard deviations for each raw score component for age groups ranging from sixty-three to eighty months. They also present the "cutoff score", which they calculated from cumulative percents and which represents the lowest one third of the distribution for each subtest. The cutoff score is the "score at or below which the child is deemed vulnerable in the particular function measured by the subtest component". A Vulnerable At or Below score (VAB score) was identified for each component test of SEARCH (Silver & Hagin, 1981, p. 22). A total SEARCH score is calculated by counting the number of subtests in which a child exceeds the VAB score. Silver and Hagin (1981) describe general interpretation of the total SEARCH score as follows:

Scores of:	10,9,8	predicted to succeed in school
Scores of:	7,6	likely to be non-vulnerable
Scores of:	5,4	vulnerable to reading failure possible developmental problems
Scores of:	3,2,1,0	at risk for neurological problems, should have intensive clinical study

CTBS

The Comprehensive Tests of Basic Skills (CTBS) is designed to measure basic skills achievement in kindergarten through Grade 12 (CTB/McGraw-Hill, 1983). This

battery is designed to test a variety of skill areas including: Reading, Language, Mathematics, Reference Skills, Science, and Social Studies. The series is organized to measure skills commonly found in school curricula.

Standardization of the CTBS was conducted in a large national sample of randomly selected children ranging in age from kindergarten through Grade 12. Both public school and private school children were included. The sample contained different parts of the country and youngsters from urban, suburban and rural environments.

From the six CTBS subtests available, the following subsections were selected for the purpose of this study:

1. Total Reading score: This score is derived from the two subscales of Vocabulary and Reading Comprehension. It is a combined score consisting of the average of the two scores.
2. Total Mathematics score: This score is derived from the two subscales of Mathematics Computation and Mathematics Concepts and Applications. It is a combined score consisting of the average of the two scores.

To facilitate interpretation of the CTBS subtests, scores will be reported in terms of grade equivalents. CTBS (1982) defines grade equivalent as a representation of "the grade and month in school of students in the norm group whose test performance is theoretically equivalent to the test performance of a given student" (p.8). A child succeeding in school, therefore, would logically be any child who achieved grade level or higher performance on both of the CTBS subtests.

The community examined in this study also administers an optional addition to the CTBS entitled Test of Cognitive Skills or TCS (1981). From this instrument Anticipated Achievement Scores have been devised to assist educational professionals in comparing a child's level of achievement with that of students of similar age, grade, and academic aptitude. The Anticipated Achievement Scores are a "function of age,

grade, and scores on the Test of Cognitive Skills" (p. 9). The TCS scores serve as an IQ score, and while reported and used in this research, caution is urged in interpreting any IQ score derived from a group administration. The scores were recorded on the protocols as the anticipated achievement grade equivalent (AAGE).

Data Acquisition and Analysis

The data required to conduct this study were obtained from three sources within the school system: cumulative records, Pupil Services files, and SEARCH protocols. Students' cumulative records, located in guidance offices and in homeroom classrooms, contained the requisite CTBS scores and information on whether and when a student may have been retained. Files in the Office of Pupil Services contained records on tests administered to special education students, services rendered, and the termination of these services. Children's original SEARCH protocols were obtained through the psychologist's office. Each youngster was assigned a code number on the Data Collection Profile to preserve the privacy of the individual.

For 63 of the 270 children in this research group, some information for the Data Collection Profile was incomplete. Some profiles could not be completed because families had moved prior to the administration of the CTBS achievement test. Therefore, those scores were not available and other information located in the permanent files was not necessarily current. Additionally, there were CTBS profiles that did not include TCS scores, or reading or mathematics scores.

Minitab Statistical Software was used for the ordinary least squares regression analysis. Where CTBS information was unavailable it was coded as 0. This occurred when a child did not take the CTBS, transferred schools, or moved. It also occurred when the information simply was never recorded in the master file. Because the number of 0's disrupted the statistical analysis and skewed the regression coefficients, they

were removed, to provide a more realistic interpretation of the correlations. This policy was followed consistently throughout the analysis.

Three other information gathering issues are worthy of note. First, the Office of Pupil Services records were not always consistent as to the language used to describe the services rendered to a youngster. Accuracy demanded that the researcher read some entire files to understand which services were extended to certain individuals. Second, a small number of permanent files reported that a child had been retained, but did not state the year in which s/he had been retained. In both of the above instances significant efforts were made to analyze a child's permanent file to reach a decision concerning the Data Collection Profile in an attempt to maintain the integrity of the study. Finally, as was previously stated, no grade point averages were calculated for any children in this study. Students are promoted on a "Satisfactory"/"Unsatisfactory" system of grading.

In order to examine relevant correlations Minitab was used to run bivariate and multivariate linear regressions comparing the components described in hypotheses 1, 2, 3, 6, and 8. Stepwise regression was utilized to determine the relative predictive validity of the SEARCH subscales. This allowed the researcher to determine which subscales were most highly correlated with academic success.

The hypotheses examined in this study fall into two broad classes. One class assumes that a positive correlation exists between the screening test and later measures. A correlation greater than zero will indicate a positive relationship between the two variables. Hypotheses 1, 2, 3, 6, and 8 fit this class. The second class assumes that the strength of correlation A is greater than the strength of correlation B. Hypothesis 7 fits this class. Hypotheses 4 and 5 are not statistically testable since hard data criteria for "very small" cannot be defined. However, the proportion of students who scored low on SEARCH who have not needed special education services was cal-

culated, and the proportion of students who scored high on SEARCH who have needed special education services was also calculated. The presentation of these findings follows in chapter 4.

CHAPTER 4

FINDINGS

This chapter will detail the results of the regression analyses of the data obtained in this longitudinal study designed to evaluate the SEARCH kindergarten screening scale's ability to predict academic success and vulnerability to school failure. Each of the 270 youngsters studied in this research was exposed to the same curriculum, and while the individual instructional styles of the teachers may have varied, concepts presented annually to those children should have remained fairly consistent. Indeed, educational goals and specific classroom objectives were itemized in Scope and Sequence charts for each grade level.

The sample population of 270 children is comprised of 140 girls and 130 boys. All youngsters completed the same test batteries during their school years in the same order. Results are now presented for each of the eight hypotheses previously described.

Results

Hypothesis (1)

Students who score high on the SEARCH screening instrument in 1983 and 1984 will score high on their CTBS achievement tests in 1987-1988 and 1988-1989.

Silver and Hagin (1981) separate SEARCH total scores into four categories. The test authors evaluate total scores of 0-3 as indicating possible neurological problems. A total score of 4-5 may indicate developmental problems. Total scores of 6-7 they find difficult to predict. SEARCH scores in the 8-10 range are considered non-vulnerable. Silver and Hagin underscore in their test manual that children who score 5

and below are vulnerable to school failure and require some intervention. A clear majority, 229 of the original 270 children who took SEARCH, scored above what the test authors describe as a range vulnerable to school failure.

It is interesting to note the breakdown of the 41 children who scored below 5. A visual presentation of that information, and of the higher scorers is depicted on Table 4.1, Frequency Distribution of SEARCH Scores by Scoring Categories. Thirty-nine percent of the sample scores fell in a range at least vulnerable to school failure. Twenty-four percent of the vulnerable scorers indicate possible neurological problems according to categories determined by Silver and Hagin.

Of the children in the sample who scored above 5, 23% fell in a range the authors find difficult to predict. The greatest number of youngsters who scored in any one category range scored 8. This score is considered nonvulnerable. Eighty-two other youngsters in the sample scored above 8 and in the nonvulnerable range. The discussion of this research details the academic progress of the sample for both the low and high scorers of SEARCH.

Table 4.1
Frequency Distribution of SEARCH Scores by Scoring Categories

Score	N	% of Total	% within Categories
0	1	.37	6.25
1	2	.74	12.50
2	3	1.11	18.75
3	10	3.70	62.50
4	9	3.33	36.00
5	16	5.92	64.00
6	38	14.07	42.22
7	52	19.26	57.78
8	57	21.12	41.01
9	50	18.53	35.97
10	32	11.85	23.02
TOTAL:	270	100%	

Regression analysis of CTBS scores as a function of SEARCH scores yielded a highly significant positive correlation. For the equation $Y = \text{intercept} + \text{beta}(X)$ here the CTBS $Y = 4.63 + .452(\text{SEARCH})$. The t-ratio of 6.74 shows that the beta coefficient is statistically significant at .001 level. The r^2 indicates that 18.3% of the variance in CTBS scores is accounted for in this regression analysis. While factors measured on SEARCH are certainly not the only factors measured with CTBS performance, they do contribute to nearly 20% of CTBS variability. As discussed in Chapter 3, these calculations were computed after 0's encoded (any CTBS scores unavailable to the researcher) were removed from the original sample. The 0's were also removed from each of the subsequent portions to be presented where CTBS is involved.

Breaking down portions of the CTBS offers additional predictive information. Table 4.2, Regressed CTBS and TCS Scores on SEARCH, illustrates the relative strength of the beta coefficients and the r^2 s of CTBS and the TCS subscale when regressed on SEARCH. However, caution must be used in interpretation of these results given the difference in scaling between the two instruments. When regressing TCS on SEARCH the t-ratio of 5.08 is statistically significant at .001. In this examination the regression equation is as follows: where Y, the independent variable, is the TCS(IQ) score = an intercept of 97.4 + beta coefficient of 2.56(SEARCH). The r^2 of .116 indicates that 11.6% of the variance in TCS is accounted for by the regression equation. In other words, the CTBS TCS score, if used alone would provide 11.6% of the information necessary to achieve perfect prediction.

Table 4.2
Regressed CTBS & TCS on SEARCH

	Beta Coeff.	Std. Dev.	T-ratio	r^2
CTBS	.452	.067	6.74	.183
TCS	2.56	.504	5.08	.112
Regression equation CTBS is: $4.63 + .452(\text{SEARCH})$				
Regression equation TCS is: $97.4 + 2.56(\text{SEARCH})$				

CTBS IQ's in this sample ranged from 77 to 141. The majority of youngsters fell in the high average range of intelligence and above with respect to their agemates nationally. Given this unusual distribution, and that 229 members of the original sample passed SEARCH, one may here begin to question why there was such a high teacher and parent rate of referrals.

In an effort to tease more information out of the data an analysis was done breaking the SEARCH scores down into the four interpretive categories; 0-3, 4-5, 6-7,

8-10, defined by Silver and Hagin (1981). See Table 4.1. The regression equations indicated that the t-ratio is statistically significant ($t = 2.33$, $p < .05$) only for total SEARCH scores in the 8-10 range. However, the r^2 indicates that the regression coefficient accounts for only 4.5% of the variance in TCS score in the 8-10 range. More youngsters received scores ranging from 8 to 10 than scores in the other three quadrants combined. One may conjecture that the number of scores in the 8-10 range elevated the statistical significance of the entire sample because of its disproportionate number. However, it is critical to consider the meaning of this examination. That is, that whatever may contribute to a SEARCH score in the vulnerable range, may have little to do with IQ; at least as it is measured by CTBS.

The total CTBS Reading scores were compared to SEARCH scores in two ways. First, the total CTBS Reading scores were regressed on the total SEARCH scores, and second, the total CTBS Reading scores were regressed on each of the three subscales of SEARCH relating most closely to reading skills: Lamb Chop Matching, Lamb Chop Recall, and Designs. A beta coefficient of .647 and a t-ratio of 4.73 reached statistical significance ($p < .05$) when regressing the CTBS total Reading score on the total SEARCH score. This is illustrated in Table 4.3, Regressed Reading vs. Regressed Math Scores. Yet, when each of the three aforementioned reading subscales of SEARCH are scrutinized in a multiple regression, it is only Lamb Chop Matching with a beta coefficient of .295 and a t-ratio of 3.46, that indicates a statistically significant correlation ($p < .05$). This is illustrated in Table 4.4, Analysis of SEARCH Reading Subscales.

The total Mathematics scores on the CTBS were regressed on the total SEARCH scores yielding another positive correlation. The equation illustrates total mathematics CTBS = $5.65 + .228(\text{SEARCH})$. Statistical significance is confirmed by a t-ratio of 3.34 ($p < .05$). R^2 indicates that SEARCH explains only 5.2% of the

variability of the Mathematics total CTBS score. This is 8% less than its contribution to the variability of the total Reading CTBS score, indicating a more pronounced predictive effect on the Reading section than on the Mathematics section. This result is not surprising considering that the authors place overwhelming emphasis on SEARCH as a predictor of potential reading difficulties.

Table 4.3

Regressed Reading vs. Regressed Math Scores

	Beta Coeff.	Std.Dev.	T-ratio	r ²
Reading	.6471	.1368	4.73	.139
Math	.2280	.0683	3.34	.052
Regression equation Reading is: $1.55 + .647$ (total reading score)				
Regression equation for Math is: $5.65 + .228$ (total math score)				

Table 4.4
Analysis of SEARCH Reading Subscales

	Beta Coeff.	Std.Dev.	T-ratio	r^2
Lamb Chop Match	.2952	.0853	3.46	.099
Lamb Chop Recall	-.0027	.0797	-.03	.099
Designs	.1680	.1047	1.61	.099

Regression equation is: $5.73 + .295 (\text{L.C.Match Score}) - .0027 (\text{L.C.Recall Score}) + .168 (\text{Designs Score})$

Formulae: $Y = a + (\beta x)$

$$S = \sum (x - \bar{x})^2 / n$$

$$r^2 = \sum (\hat{Y}_i - \bar{Y})^2 / \sum (Y_i - \bar{Y})^2$$

Note: r^2 of .099 is a combination of Lamb Chop Matching, Lamb Chop Recall, and Designs

The total CTBS score was compared to three specific subscales of SEARCH that may be considered to comprise a speech subsection: Rote Sequencing, Auditory Discrimination, and Articulation. Both Rote Sequencing and Auditory Discrimination yielded a positive correlation with beta coefficients of .1383 and .1908 and t-ratios of 3.67 and 3.44 respectively showing statistical significance at the .05 level. Articulation did not yield such a positive correlation. A t-ratio of .98, less than 1.96 and not statistically significant, suggests that Articulation has no significant correlation with CTBS scores. See Table 4.5.

Table 4.5
Analysis of SEARCH Speech Subscales

	Beta Coeff.	Std.Dev.	T-ratio	r^2
Rote Seq.	.1383	.0377	3.67	.175
Aud.Discrim.	.1908	.0555	3.44	.175
Articulation	.0493	.0504	0.98	.175

Note: r^2 of .175 is a combination of Rote Sequencing, Auditory Discrimination, and Articulation

Finally, the total CTBS was compared to the body image subscales of SEARCH in two ways. First the total CTBS score was regressed separately on the Finger Schema and Directionality subscales of SEARCH. Then the total CTBS score was regressed on the sum of the SEARCH body image subscores. In each case there exists a positive correlation between scores relating to body image on SEARCH and the total CTBS score. Beta coefficients are .1499 and .1476 and t-ratios are 2.23, 3.57 for each regression and are statistically significant at .05 level. See Table 4.6.

Table 4.6
Analysis of SEARCH Body Image Subscales

	Beta Coeff.	Std.Dev.	T-ratio	r^2
Finger Schema	.1499	.0672	2.23	.088
Directionality	.1476	.0414	3.57	.088

Note: r^2 of .088 is a composite of Finger Schema and Directionality

The first hypothesis suggesting that high SEARCH scores yield high CTBS scores is supported as analyzed by bivariate and multivariate regressions of CTBS

totals and subscores on SEARCH totals and subscores. Children who score high on SEARCH tend to score higher on the total CTBS, the CTBS Reading total, the CTBS Mathematics total, and on the TCS subsection of CTBS. Table 4.7, Mean Scores of Sample Total SEARCH Score, contains the scores for each test of the population studied.

One reading subscale of SEARCH, Lamb Chop Matching; two speech subscales of SEARCH, Rote Sequencing and Auditory Discrimination; and two body image subsections of SEARCH, Directionality and Finger Schema each correlate positively with CTBS. The Lamb Chop Recall, Designs, and Articulation subscales of SEARCH do not show a positive correlation with the requisite subsections of CTBS. It is also meaningful to note that according to this preliminary research a low score on SEARCH does not necessarily yield a low CTBS score in later years. This finding will be discussed in Chapter 5.

Reading was particularly emphasized in the statistical analysis because of the SEARCH authors' own emphasis on reading as a predictor of academic success. To further analyze and test Hypothesis (1), a stepwise multiple regression of total CTBS reading scores on eight of the subscales of SEARCH was performed. In step one of the analysis of the subscales, Lamb Chop Matching entered with a beta coefficient of .166 and an r^2 of .0872. This indicates that Lamb Chop Matching is both the most helpful single predictor of the CTBS Reading total, and that it accounts for almost half of the total r^2 of .183. In the second step, Finger Schema entered with a beta coefficient of .117, and raised the r^2 to .1213. In this multiple stepwise regression, these two subscales were the only statistically significant coefficients. In fact, the remaining six subscales together accounted for only slightly more than 6% of the covariance of SEARCH and Reading CTBS.

In summary, students who scored high on SEARCH also scored high on CTBS. Students who scored high on SEARCH scored high on CTBS Total scores, CTBS Reading scores, CTBS Mathematics scores, and TCS scores. The Lamb Chop Matching subscale of SEARCH was found to be the most helpful predictor of the CTBS Reading score. It was also learned that a low score on SEARCH did not necessarily yield a low CTBS score in later years.

Table 4.7
Mean Scores of Sample Total SEARCH Scores

Mean	Median	S.Dev.	Min.	Max.	Bottom 25%	Top 25%
7.3	8.0	1.98	0	10.0	6.0	9.0
Total CTBS Mathematics						
7.3	7.1	1.87	3.3	10.9	5.9	8.5
Total CTBS Reading						
8.3	8.4	2.03	3.7	10.9	6.5	10.1
Total CTBS						
8.0	8.0	1.97	4.0	10.9	6.4	9.7
CTBS TCS						
117	117	13.42	77	141	107	128

Hypothesis (2)

Students who score low on the SEARCH will receive more special education services than those who score high.

Hypothesis (3)

The proportion of students who score low on SEARCH but have not received special education services will be very small.

Fifty-one (22%) of the 229 high scorers on SEARCH received some services from the special education department. The number of services rendered ranged from

one to nine. Table 4.8, Number of Special Education Services Delivered to Sample, demonstrates how many children received services from the Office of Pupil Services and the number of services that they received. Statistically, there is no significant relationship between special education services rendered and SEARCH scores, as determined by a bivariate regression of special education services (regression equation: number of services for the low scorers of SEARCH = $1.36 + .08(\text{low SEARCH score})$ t-ratio = .24, $r^2 = .002$).

Table 4.8

Number of Special Education Services Delivered to Sample

Number of Services Rendered	Number Students Receiving Services	%
0	204	75.56
1	18	6.67
2	11	4.07
3	5	1.85
4	12	4.44
5	8	2.96
6	4	1.48
7	2	.74
8	3	1.11
9	2	.74
11	1	.37

N=270

Forty-one (15%) of the 270 children comprising the full sample scored 5 or below on SEARCH. Table 4.9 Distribution of Vulnerable SEARCH Scores, illustrates

that the majority of the low scores fall in the range from 3 to 5. Twenty-six (63.41%) of those 41 children failing SEARCH received no special education services at any point in their academic career through fourth grade. The remaining fifteen youngsters received anywhere from one to eleven special education services. Table 4.10, Number of Special Education Services Rendered to Youngsters with Vulnerable Scores on SEARCH exhibits the number of services given to each of those fifteen youngsters.

Therefore, students who scored low on SEARCH did not necessarily receive more special education services than those who scored high on SEARCH. In fact, 63.41% of the children who failed SEARCH never received special education services. No statistically significant relationship was discerned between SEARCH scores and special education services delivered.

Table 4.9
Distribution of Vulnerable SEARCH Scores

Low Score	N	%
0	1	2.44
1	2	4.88
2	3	7.32
3	10	4.39
4	9	21.95
5	16	39.02

N=41

Table 4.10

Number of Special Education Services Rendered
to Youngsters with Vulnerable Scores on SEARCH

Number of Services	N	%
0	26	63.41
1	3	7.32
3	1	2.44
4	4	9.76
5	3	7.32
6	2	4.88
8	1	2.44
11	1	2.44
N=41		

Hypothesis (4)

Students who score high on SEARCH will be successful in regular education programs than students who score low on SEARCH.

Hypothesis (5)

The proportion of students who score high on SEARCH but have received special education services will be very small.

As determined by the bivariate regression of special education services on SEARCH scores previously discussed, there was no significant correlation between a SEARCH score above 5 and lack of identified need for remediation. A high SEARCH score may not lead to a successful regular education experience. Indeed, 22% of the high SEARCH scorers were given outside classroom support. Table 4.11, Com-

parison of the Number of Special Education Services Received by Sample According to SEARCH Scores, presents the large number of children who did well on SEARCH, but who received multiple special services. It is an intriguing finding given the fact that 63.41% of those who scored 5 and below received no special education services.

Analysis of the data reveals specifically which special education services were delivered to the 270 student sample population being studied. Those services are named with the number of children receiving each service in Table 4.12, Type and Number of Special Education Services Delivered by Frequency with Which They Were Offered. Twenty different 766 services were rendered to the sample population. The five services administered with the greatest frequency are in order of frequency: speech, reading, language, academic monitor, and mathematics. It is interesting to compare each of the triad of SEARCH score sums (reading, language, and organization) to the type of special education service being delivered. Appendix A shows the descriptive statistics for all children in the sample who took SEARCH and the comparative analyses for the five services extended to children with the greatest frequency: 766 Reading, Speech, Language, Academic Monitor, and Mathematics. Examination of the results reveals that there is a wide spread in scores of students who received each service. An analysis of the data exhibits scores of youngsters receiving services well above the mean of the total sample. This leads one to question the initial criteria for referral, a source apparently other than SEARCH.

Hypotheses 4 and 5 were not supported. No statistically significant correlation was found between SEARCH score and the delivery of special education services. Students who scored high on SEARCH did not succeed in regular education classes with more regularity than students who scored low on SEARCH. The proportion of students who scored high on SEARCH and were given special education services was

not small since almost a fourth of the students (22%) were given such services at some time. This illustrates that 22% of high SEARCH scorers required 766 remediation.

Table 4.11

Comparison of the Number of Special Education
Services Received by Sample According to SEARCH Scores

No.of Spec.Services by Score	Low		High	
	N	%	N	%
0	26	63.41	178	77.73
1	3	7.32	15	6.55
2	-	-	11	4.80
3	1	2.44	4	1.75
4	4	9.76	8	3.49
5	3	7.32	5	2.18
6	2	4.88	2	.87
7	-	-	2	.87
8	1	2.44	2	.87
9	-	-	2	.87
11	1	2.44	-	-
TOTAL:	41		229	

Note: Low: Children who received SEARCH scores of 5 and below
High: Children who received SEARCH scores of 6 and above

Table 4.12

Type and Number of Special Education Services Delivered
by Frequency with Which They Were Offered

Type Service	Frequency	Type Service	Frequency
Speech	29	Fine Motor	7
Reading	29	Adaptive PE	6
Language	26	Science	4
Acad.Monitor	24	English	4
Math	21	Emtl.Support	3
Study Skills	16	Language Art	3
Organization	16	Vocabulary	1
Writing	16	Soc. Studies	1
Work Habit	13	Art	1
Spelling	11	Phys.Therapy	1

Hypothesis (6)

Students who score "at risk" on SEARCH will be retained with greater consistency than students who score high on SEARCH.

Sixteen (6%) of the 270 youngsters in the sample were retained. Of the 41 children who scored five and below on SEARCH, 5 (12%) were retained at some point in their school career. Of the 229 children remaining in the sample who passed SEARCH, 11 (4%) were also retained. It is worthy to examine the percentages here. Proportionately, the higher relative percentage of children retained was in the group

where SEARCH scores were in the vulnerable range. This provides the psychologist with important diagnostic information. Youngsters who score in the range vulnerable to school failure, do tend to actually fail in school three times as often as those who pass SEARCH. Therefore, SEARCH scores under 5 suggest that a youngster may encounter difficulty in the regular education classroom.

Still, while the percentage of children retained is greater among the children who scored in the vulnerable range on SEARCH than among those children who passed SEARCH, it is interesting to note that 4% of children who scored well on SEARCH were retained. A number of variables over time may account for this, yet the majority of these children were retained early in their academic careers; either in kindergarten or in the first grade. A look at when the sixteen children were retained may be useful.

Table 4.13, Retention of High and Low Scorers of SEARCH, portrays the spread of the years in which children were retained. All of the low scorers who were retained were retained in either kindergarten (3) or in first grade (2). This suggests that among the youngsters who scored in the range vulnerable to school failure, those who failed, did in fact fail early in their school careers. Problems were obviously not successfully remediated by the school system without intervention. High scorers who were retained were also retained largely in the kindergarten (3) and first grade (5) years. One each was retained in the second, third and fourth grade. This information shows that most difficulties surfaced for these individual youngsters in their earliest years in school highlighting the need for careful detection of learning problems where possible to avoid and prevent school failure. A t-test was run to examine the statistical difference between the retention rate of children who scored high on SEARCH (above 5) and children who scored "at risk" (5 and below) on SEARCH, and revealed a statistically significant difference between the two groups ($t = -46.49$, $p < .05$). The

mean retention rate (.0480) of those with high SEARCH scores was statistically different (lower) than the mean retention rate (.1219) of those "at risk". Given the data, one can conclude that retention rate is negatively correlated with SEARCH score, thereby substantiating hypothesis 6.

Hypothesis (6) is upheld. Students who scored poorly on SEARCH were more likely to be retained than those who performed well. Children who failed SEARCH and scored in the "at risk" range, were retained three times as often as those who passed SEARCH. In addition, all of the low scorers of SEARCH who were retained repeated either their kindergarten or first grade school year.

Table 4.13
Retention of High and Low Scorers of SEARCH

Grade High Scorers Retained	Number Children Retained	%
0	218	95.20
Kindergarten	3	1.31
1	5	2.18
2	1	.44
3	1	.44
4	1	.44
N=229		
Grade Low Scorers Retained	Number Children Retained	%
0	36	87.80
Kindergarten	3	7.32
1	2	4.88
N=41		

Hypothesis (7)

The predictive validity of the SEARCH will be higher for female students than for males.

When the total CTBS scores were regressed on the total SEARCH scores for females it did not show as high a predictive validity as when the total CTBS score was regressed on the total SEARCH score for males. In fact, the reverse was found. Comparing beta coefficients of .372 for females and .548 for males, r^2 s of .14 for females

and .23 for males, we do not find statistical support for this statement. Indeed, in direct contrast to hypothesis 7, the predictive validity is higher on SEARCH for males than it is for females.

Hypothesis (8)

Students with pre-school experience will score higher on SEARCH than those students who have had no pre-school experience.

Most children in the sample attended some type of pre-school for a two year period. Table 4.14, Comparison of SEARCH Scores with Pre-school Experience, delineates how many years of pre-school each of the high and low scorers of SEARCH attended.

There are 23 children in the sample of 270 who did not attend pre-school. Seven of those youngsters scored 8 and above on the SEARCH. Eight of those youngsters scored 6-7, a range Silver and Hagin found difficult to predict. The remaining eight scored vulnerable to school failure, 5 or below, on SEARCH. Table 4.15, SEARCH Scores without Pre-school Experience, offers a visual portrayal of this data. Data reveal that only 15 (6.5%) of the 229 high scorers of SEARCH had no pre-school experience. In contrast, 8 or 19% of the 41 vulnerable scorers on SEARCH had no pre-school experience prior to entering kindergarten.

A t-test run to examine the statistical difference between the SEARCH score of children with pre-school experience and the SEARCH score of children without pre-school experience, revealed a statistically significant difference between the two groups ($t = -2.9, p < .05$). The mean score (7.43) of those with pre-school experience was higher than the mean score (6.00) of those without pre-school. Given the data, one can conclude that for this sample, experience versus non-experience is positively

associated with total SEARCH score. Furthermore, the data reveal a positive relationship between years of pre-school and total SEARCH score indicating that pre-school experience positively affects SEARCH score. Therefore, hypothesis (8) is substantiated.

Table 4.14

Comparison of SEARCH Scores (High & Low) with Pre-school Experience

Yrs. of Preschool Attended	High SEARCH		Low SEARCH	
	N	%	N	%
0	15	6.55	8	19.51
1	46	20.09	11	26.83
2	132	57.64	19	46.34
3	34	14.85	2	4.88
4	2	.87	1	.44
	N=229		N=41	

Table 4.15

SEARCH Scores of 23 Children without Pre-school Experience

Number of Children	SEARCH Score
1	0
2	2
2	3
0	4
3	5
3	6
5	7
5	8
0	9
2	10

N= 23.

CHAPTER 5

DISCUSSION

During the kindergarten year children are introduced to new challenges daily while developing skills that will lay the foundation for their academic careers. How a child perceives his/her ability to participate in all that is asked of him/her is a function of his/her feelings of positive self worth. It is those feelings of pride in one's developing skills that facilitates the risk-taking behaviors that lead to growth and new learnings. The kindergarten year in public schools is one designed to shore up skills previously mastered and provide a safe arena in which to develop the requisite skills necessary for academic success (Peck, McCaig, Sapp, 1988).

Silver and Hagin have designed a tool to cull out weaknesses a beginning student may have in order to provide an opportunity for immediate remediation. The goal of their instrument, SEARCH, is to determine which youngsters may be vulnerable to school failure before they fail. A kindergarten screening tool that allows diagnosticians to examine new children entering the schools in even a cursory way, can provide information that can promote a successful school beginning. The notion of promoting success in each school-age child cannot be overemphasized. The kindergarten year affords professionals a one time opportunity to ensure a positive school beginning for each child.

The community studied in this research has implemented a town-wide kindergarten screening for nearly two decades. That procedure has evolved to include different staff participants and different screening instruments over time. The kindergarten screening instrument used for the longest time, with the psychologist's report of the most significant results, has been SEARCH. This research may serve to clarify

whether SEARCH was able to identify effectively young children potentially in need of special education services in this suburban community.

A variety of variables must be considered when examining the results of any screening or assessment of a young child. Factors such as what occurred at home prior to coming to school, and the child's health, diet, and personality all must be considered even when testing conditions are ideal (Bredekamp, 1986; Peck, McCaig, Sapp, 1988). These variables may be viewed as compounding factors when considering a kindergarten screening that typically is not administered under ideal testing conditions. In addition, unfamiliarity with an examiner, a new environment, reaction to the new stimulus presented, and the unpredictability of the test situation are among the many situational variables which can affect results. For some the influence of these variables may be stronger than for others. However, incredibly, most children pass screenings.

While it is necessary to consider the many and variable external influences, it is the children who do not pass kindergarten screenings that deserve a second look. If the kindergarten year is an opportunity to remediate weaknesses, then it is at this early juncture that careful assessment must be considered. Therefore, the more valid predictions a kindergarten screening instrument makes, the more the psychologist can rely on it to rapidly determine when and where further assessment is warranted. It is through the early detection of learning problems that school failure can possibly be prevented.

Eight hypotheses were formulated to assist in evaluating SEARCH as a predictor of school success in this study. School failure is defined in this research as the necessity to repeat a year of school, and/or the need for special education services by a student in order to succeed in regular education. For the purposes of this research,

those who required no outside assistance and who were promoted yearly were considered to function successfully in school.

Summary of Results

Hypothesis (1): Students who score high on the SEARCH screening instrument in 1983 and 1984 will tend to score high on their CTBS achievement tests in 1987-1988 and 1988 and 1989.

As hypothesized, children who scored high on SEARCH, in the 8-10 range for a total score, did well on the CTBS achievement tests. Not only did high scorers of SEARCH score well on the CTBS total score, but they also scored commensurately well on the total Reading segment, the total Mathematics segment, and the TCS segment of the CTBS. Results of a comparative analysis of SEARCH subscales with CTBS scores indicated that the Lamb Chop Matching is the most helpful predictor of a Reading CTBS total score. Whether or not the SEARCH screening instrument is reconsidered as the kindergarten screening tool of choice for this sample community, it has been shown that this subscale provides important reliable information. It is a quickly administered scale that asks children to match the direction of a visual indicator (a lamb chop) to an identically directed indicator among a group of randomly placed lamb chops. The predictive validity of this scale was consistently confirmed suggesting that it may even be a useful tool when used alone to garner supportive data about youngsters in this age group.

Hypothesis (2): Students who score low on SEARCH will tend to receive more special education services than those who score high.

Hypothesis (3): The proportion of students who score low on SEARCH but have not needed special education services will be very small.

Hypothesis (4): Students who score high on SEARCH are more likely to be successful in regular education programs than students who score low on SEARCH.

Hypothesis (5): The proportion of students who score high on SEARCH but have needed special education services will be very small.

A goal of this study was to determine whether SEARCH is an adequate screening instrument to use in a kindergarten screening program. The purpose of such screenings is early identification of youngsters who may have a handicapping condition that warrants special education intervention. A referral for further 766 evaluation would then be appropriate. In an effort to determine the predictive validity of SEARCH hypotheses 2-5 were addressed to compare and study kindergarten SEARCH scores with 766 services administered.

A common criticism charged against kindergarten screening measures is their lack of predictive validity statistics or their low rate of predictive validity (Barnes, 1982; Lichtenstein, 1984; Barnes, 1982). Comparing SEARCH with other locally used screening measures that have predictive data available is useful in discussing the utility of the tool. Examining sensitivity, specificity, and overall hit rates of measures of instruments considered provides further information particularly relevant to how well a measure serves to identify handicapped children in need of 766 services. Sensitivity is related to the number of false negatives or to the number of children identified as non-handicapped but later are evaluated as having a handicapping condition. Specificity is related to false positives or to the number of children who were identified as vulnerable to school failure, but later were found not to have a handicapping condition. Lastly, overall hit rates are a composite of the total predictive accuracy of the screening measure (Barnes, 1982). It combines in this study all those children who were correctly identified as normal and divides them by the total number of children screened. It provides an overall accuracy rate.

Not all kindergarten screening measures used have such data available. For example, while they are still currently used for early childhood screening in some

communities, neither the McCarthy Screening Test (Lichtenstein & Ireton, 1984) nor the Gesell School Readiness Tests (Graue & Shepard, 1988), provide useful statistical data for determining predictive validity. Such statistical information is readily available for other screening tests including: the Denver Developmental Screening Test (DDST) (Barnes, 1982), SEARCH (Silver & Hagin, 1981), the Minneapolis Preschool Screening Instrument (MPSI) (Barnes, 1982), and the Early Screening Inventory (ESI) (Meisels, Wiske, & Tivnan, 1984). Comparison of specificity and sensitivity rates can facilitate the process of comparing and evaluating appropriate screening tools.

The specificity of SEARCH for excluding non-handicapped (not retained, no special education services) children from further diagnostic evaluation was strong (.78) and on par with other screening instruments studied (DDST .76, MPSI .93, ESI .90). However, the sensitivity rate of SEARCH (.37) indicated a somewhat low proportion of children at-risk who were correctly identified by this screening test. DDST reports .73, MPSI reports .64 (Barnes, 1982), and the ESI claims the highest rate of .87 (Meisels et al., 1984). Still, the overall hit-rate of correct predictions revealed by SEARCH was greater than 71%.

CTBS IQs in this research sample ranged from 77 (1 child) to 141 (10 children). The majority of youngsters fell in the high average range of intelligence with respect to their agemates nationally. Given this unusual attribute, and that 229 members of the original sample passed SEARCH, one may here begin to question why there is such a high teacher and parent special education rate of referrals. SEARCH seems a less reliable predictor of success when scores are correlated with the provision of special education services. The majority (63.41%) of children in the community under study who scored poorly on SEARCH (5 or below) never received any type of educational support from the Office of Pupil Services. However, 22% of the children who passed SEARCH were later assessed and extended special education support.

Failing to identify 22% of the children who warranted special services is of concern. While a strong SEARCH score is more indicative of success in regular education programming than a low SEARCH score, it is not an assurance. Fifty-one children who passed SEARCH were given academic support outside of the classroom. This negates the original hypothesis that suggested that strong scorers of SEARCH would be given little outside assistance. Indeed, a correlation does not appear to exist between SEARCH score and the rendering of special education services in the sample community.

Further, it is curious how few of the children who scored in the vulnerable range on SEARCH received special education services. While a low score may be the result of the situational anxiety previously discussed, it may also reveal some genuine difficulties. Assessment is the next logical step in determining whether or not any intervention is required. Unfortunately, official records indicating whether each of the low scorers of SEARCH received further diagnostic attention from the department of pupil services were unavailable. The results drawn from the retention hypotheses help to understand this sample of children.

Hypothesis (6): Students who score "at risk" on SEARCH may tend to be retained with greater consistency than students who score high on SEARCH.

Sixteen of the original 270 member sample were retained at some point in their school careers. Of the 41 children who scored five and below on SEARCH, 5 (12%) of those youngsters were retained, while of the 229 children remaining who passed SEARCH, 11 (4%) were retained. As predicted in hypothesis 6, then, a larger percentage of children who performed poorly on SEARCH were retained as compared with the percentage of those retained who had performed well on SEARCH. As discussed in chapter 4, however, doing well on SEARCH is no assurance of future nonretention.

All of the five low scorers of SEARCH who were retained, were retained in either kindergarten or grade one. That they were retained so close in time to the administration of the screening suggests that in these cases SEARCH correctly flagged vulnerable youngsters. This suggests that if remediation had been extended to these vulnerable children, it did not in fact assist them in overcoming their learning difficulties, at least not in time to succeed. One school year may not have provided enough time for full remediation of a serious problem.

Eight of the high scorers of SEARCH who were retained were also held back in either their kindergarten or first grade school years. It implies that learning difficulties surfaced after the SEARCH was administered, but were not successfully remediated during the school year. Either, these children were simply not identified in the screening or in the classroom as exhibiting any problems and were able to mask their early symptoms, or remediation was attempted but was not successful, or these children were retained for some reason other than that of academic ability.

Time is an important variable to consider when attempting to predict any child's potential vulnerability to school failure. There are an infinite number of special circumstances that can affect a child's school success from the time a kindergarten screening is administered through the fourth grade. A kindergarten child enters school at approximately sixty months of age. By the time that same child reaches the fourth grade his age has nearly doubled. Conditions influencing academic change may include such widely disparate variables as physical health, emotional trauma, family or environmental stability.

A child's potential for success may also be influenced by a plethora of school-related variables. Teachers and educational staff can be biased according to their own philosophies and interpretation of information available to them in a student's file. These prejudices can negatively influence a child's chances for promotion. Indicators

such as a child's date of birth upon school entrance may bias the philosophy of some professionals toward retention to encourage the social and emotional growth of a child they consider "young". A credo advocating retention to remediate developmental immaturity is frequently sustained even where the successful academic performance of a child is clear and obvious.

In such potentially dangerous instances to a young child, teacher philosophy adds an invisible low score to a SEARCH interpretation. Retention may be used, not because other interventions have failed, but as an intervention in and of itself. It is believed that when a youngster is developmentally immature, the only cure for this is time to age through nonpromotion. The theory encourages using retention to allow time to wage its curative powers (Ames, 1985).

The National Association of School Psychologists (NASP) argues against this practice in a Position Statement adopted in 1988. Rather, NASP "encourages early identification and intervention of academic behavioral, and/or emotional difficulties to avoid the inappropriate use of retention". NASP stipulates that retention has not been shown to be successful when it is used to remediate developmental immaturity.

The philosophy of retention as an intervention is worthy of consideration in evaluating the findings in this study. Fifty-one of the sample of 270 children are receiving special education services. A positive correlation between SEARCH score and special education services was not determined. Since other determinants in addition to SEARCH score indicate who will receive special education intervention, and the percentage of vulnerable scorers receiving services is small while the retention rate of that group is high, one may conjecture that some of the children vulnerable to school failure are earmarked for retention.

Hypothesis (7): The predictive validity of SEARCH will be higher for female students than for males.

Female children typically mature faster in their early years than their male peers (Maccoby, 1980) and it was thus hypothesized that SEARCH would be a more accurate predictor for their school performance. Interestingly, and valuably, the opposite is true. SEARCH is a more accurate predictor of the academic success or vulnerability to school failure of male children.

Classroom teachers, particularly of kindergarten-age children, have the special challenge of attempting to determine which problems are genuine learning problems requiring support outside the classroom and which problems may simply be a function of an individual's personal rate of development. Teachers report that they deliberate most about whether to make a special education referral regarding the young boys having difficulties in their classes (Ames, 1985). There is a fair amount of misguided public support for extending to male students time, in the form of retention, to mature (Bredekamp, 1986). While professionals are sifting out answers to this common developmental query, referrals for special education services are often unnecessarily delayed. A teacher may decide to observe and simply give a youngster more time in the regular education classroom to see if a difficulty self-corrects. Unfortunately, while that time passes frustration can increase and compensatory strategies are not offered. A faster assessment and delivery of supportive help may keep a negative cycle from establishing.

It is worthwhile to consider the value of employing a kindergarten screening instrument that offers predictive validity in determining potential male children vulnerable to school failure. If a school professional can target a child vulnerable to failure and channel him toward success a service will have been performed. If allowing time to pass often results in retention for those children in the vulnerable range as this research suggests, (especially the male children so often described by teachers as

developmentally immature) then we are responsible for swiftly implementing appropriate remediation and altering that pattern.

Hypothesis (8): Students with pre-school experience will tend to score higher on the SEARCH than those students who have had no pre-school experience.

A number of factors may have contributed to the confirmation of the hypothesis that children with pre-school experience score higher on SEARCH than those who enter kindergarten as a first school exposure. Primarily, children who have had experience in groups may respond more confidently to other new group experiences (Bredekamp, 1987), even a screening. Their pre-school education should have extended opportunities to them to practice developing social skills with other children and adults that built their confidence and encouraged risk-taking. It may also be inferred that the strata of the sample whose families were economically able to provide a pre-school experience, may also have been able to enrich their home environments with vacations, experiences, books, day trips, and classes that are not financially available to everyone. Those experiences and abilities may allow a small child to perform more comfortably in a test situation than another child who is coping with an assault by a host of new experiences with no previous group practice.

Inherent in pre-school is also the scope of concepts that a child is exposed to on a regular basis. Language is likely to be emphasized, paper and pencil opportunities presented, and body parts, letters and numbers introduced. While these concepts may be expected to be learned and mastered in kindergarten, they will not be offered to most children in this suburban sample for the first time. Early exposure may be perceived as an advantage.

It does not have to be the case that a youngster who has not attended pre-school be educationally disadvantaged. Families can independently replicate the kinds of experiences presented in pre-school for their children. However, small group expe-

riences, discovery learning, and the reinforcement of concepts are challenging to organize outside a formal pre-school environment. Indeed, since 30% of the children who had not attended pre-school scored five or below on SEARCH, it appears that in this sample the same opportunities had not been available to the children who had not attended pre-school as to those who had. A structured pre-school experience appears to have a positive effect on SEARCH scores in the population studied.

Data reveals that the majority of the sample attended some type of before-kindergarten school experience for a two-year time period. This afforded these children a measured amount of time during which to practice a variety of developing skills. The pre-school factor may also be taken into consideration when evaluating whether a given school stumbling block hints at a learning problem, or whether time alone may remediate the developmental problem. If a child has been in a pre-school situation for a two year period and a problem has not self-corrected then it may offer further support for considering some educational intervention in the form of an assessment.

According to Meisels' (1984) recent criteria, SEARCH is a developmental screening instrument. It is designed to identify problems in a wide range of areas that children of normal abilities can successfully complete. While similar information can be obtained through other individually administered screening instruments: ESI, DDST, MST, MPSI, and Gesell, SEARCH has demonstrated a measure of predictive validity in the specific sample studied. Yet, SEARCH is only a part of Silver and Hagin's (1981) SEARCH and Teach program. The screening authors recommend individual diagnostic evaluation for children who score at risk on SEARCH, to be followed with specific remediation where warranted. Indeed, by definition, screening is performed to allow for early diagnosis and an educational plan to prevent school failure.

Suggestions for Further Research

Findings of this study suggest numerous other areas for future research. It would be interesting to examine a replication of this study with a much larger and heterogeneous sample. Expanding and diversifying the sample size would provide richer data to study the long-term predictive validity of the screening instrument. Tracking the academic success of low and high scorers of SEARCH on a larger and more varied sample size would offer additional statistical information regarding the ability of SEARCH to identify children vulnerable to school failure. It would also contribute important information about whether the findings of this study can be generalized to different samples.

Replicating this study in the same sample community with the currently used kindergarten screening test would provide more data to determine construct and predictive validity. Given the temporary suspension of the use of SEARCH in the sample community, such a study would be possible assuming one screening test had been used for at least a three-year period. This would enable the researcher to obtain both screening and CTBS scores for contrast. A replication of this nature may provide valuable information for the community concerned about selecting an appropriate developmental screening for their specific population and needs.

Since neither numerical nor letter grades were assigned to children in the primary grades in the sample community, devising a teacher ranking schedule to augment information provided by the screening and CTBS would enable more accurate findings. It would be desirable to verify when a request for a 766 evaluation was submitted, and to learn where possible what assessments were used to identify any handicapping condition. It would also be helpful to learn if classroom teachers were working informally, and independently from Pupil Services, with vulnerable scoring children. Information gathering around any informal procedures used by professionals,

outside of special education, would be useful in following the academic progress of the children.

Conclusions

A positive correlation is evidenced when SEARCH is compared to the CTBS achievement tests administered to the sample population. Children who scored high on SEARCH scored high on the CTBS total score, total Reading score, total Mathematics score, and TCS score. Further, students who scored high on SEARCH tended to succeed in regular education programs with greater consistency than low scorers of the kindergarten screening assessment.

In this study school success was measured by a child's ability to participate in classes without the support of 766 services and her/his ability to be promoted yearly. Yet, when an examination of SEARCH scores is contrasted with the delivery of special education services a consistent pattern is not apparent. More than sixty-three percent of the children who failed SEARCH never received special education services, and 22% of the youngsters who passed SEARCH were provided with special education services. The five services most commonly rendered from the Office of Pupil Services were: speech, reading, language, academic monitoring, and mathematics. Interestingly, these services did not coincide with low subscale scores on the SEARCH screening instrument.

Five per cent of the total sample population were retained. All of the low scorers who were retained repeated either kindergarten or grade one. Eight of the eleven high scorers repeated either kindergarten or grade one. Analysis of the data suggests that retention itself may be used in the sample community as an intervention.

This information intimates that while there is no statistical correlation between special education services rendered and SEARCH scores, perhaps that is because services are not always rendered as early, (targeting specific areas of weakness) as they

might be. The SEARCH has been designed to scan children to find those potentially vulnerable to school failure. The purpose of the tool is to find and assist these potentially vulnerable children before they fail in school. If children who score in the vulnerable range of the SEARCH are not being assisted with special services, but are instead being retained early in their educational careers, then this may not reflect a rate of false positives detected by SEARCH, but an inconsistency in guiding educational intervention.

This research outlined eight hypotheses for examination. The first hypothesis comparing SEARCH scores with CTBS achievement scores offers the researcher clear hard data. The CTBS is a written exam scored identically by a computer for each student. A positive linear relationship was established between SEARCH and CTBS scores. It is worthwhile, then, to consider the correlation between SEARCH and CTBS when evaluating screening instruments capable of predicting academic performance.

Silver and Hagin (1981) acknowledge the danger in making any decision based on screening information alone. They do, however, implore professionals to move to the assessment phase quickly to garner data to foster appropriate understanding of a young child. Effective treatment, where appropriate, is the logical next step.

Learning disability is a long-term, tenacious problem. We cannot wait for spontaneous maturation which may never occur or which, at best, may occur so late that waves of failure have already engulfed the child. The result is missed educational opportunities and reactive emotional problems. (p. 3)

The community studied may wish to reconsider SEARCH as a kindergarten screening tool. However, SEARCH, like any early childhood screening instrument, is only a tool. How the tool is used, what is done with the information garnered from SEARCH, is fundamental to the success of the children being screened. If potential problems are discerned, then assessment procedures should follow. Educational intervention needs to be adopted early if school failure is to be avoided.

APPENDIX A
DESCRIPTIVE STATISTICS OF TOTAL SAMPLE OF STUDENTS WHO
TOOK SEARCH

SEARCH	Mean	Median	S.D.
Reading	13.72	14.0	3.84
Language	42.39	43.0	7.06
Organization	15.44	15.0	4.01

**Numerical Breakdown by SEARCH Subscale Categories of Five
Most Frequently Administered Special Education Services**

766 Reading

Rdg.	N	Lng.	N	Org.	N
1	1	3	1	5	1
5	2	25	1	8	3
6	1	27	1	10	4
7	2	29	1	11	2
10	3	31	2	12	1
11	3	32	2	13	2
12	3	34	2	14	3
13	1	35	1	15	4
14	4	36	1	16	3
15	4	37	1	17	3
16	1	39	1	19	1
17	2	41	1	21	1
18	1	42	2	29	1
21	1	43	3	-	-
-	-	44	4	-	-
		45	1		
		46	2		
		49	1		
		54	1		
x = 12		x = 37.76		x = 13.76	

N=29

766 Speech

Rdg.	N	Lng.	N	Org.	N
5	2	19	1	7	1
6	1	25	1	8	3
7	2	29	1	10	2
12	6	31	2	13	2
13	3	32	1	14	4
14	4	34	1	15	3
15	3	36	3	16	3
16	3	37	2	17	2
17	4	38	1	18	3
18	1	39	2	19	3
-	-	40	1	20	1
		41	2	22	2
		42	1		
		43	2		
		44	4		
		46	2		
		47	1		
		49	1		
x = 12.96		x = 38.38		x = 15.00	

N=29

766 Language

Rdg.	N	Lng.	N	Org.	N
1	1	3	1	5	1
5	2	25	1	7	1
6	1	29	1	10	2
7	1	31	2	12	2
10	3	32	1	13	3
11	1	34	1	14	7
12	2	36	1	15	3
13	5	38	2	16	2
14	3	39	1	18	1
15	2	40	1	19	2
16	1	41	1	21	1
17	2	42	1	29	1
19	1	43	2	-	-
21	1	44	3		
-	-	45	1		
		46	3		
		49	1		
		52	1		
		54	1		
x = 10.90		x = 35		x = 12.97	

766 Academic Monitor

Rdg.	N	Lng.	N	Org.	N
1	1	3	1	5	1
7	2	26	1	7	1
8	1	31	1	8	2
10	3	32	1	10	3
11	1	34	2	11	2
12	1	37	1	12	1
13	3	38	1	13	3
14	2	39	3	14	3
15	5	40	1	15	2
17	2	41	1	16	3
18	1	43	4	19	1
19	1	44	3	20	2
20	1	45	1	-	-
-	-	46	1	-	
-	-	47	1		
-	-	48	1		
x = 10.66		x = 31.69		x = 10.69	

N=24

766 Mathematics

Rdg.	N	Lng.	N	Org.	N
1	1	3	1	5	1
6	1	27	1	10	1
7	1	29	1	11	1
8	1	31	1	13	4
10	2	36	1	14	3
11	2	37	1	15	4
12	1	39	1	16	1
13	1	42	1	17	3
14	4	43	3	19	1
15	2	44	4	20	1
16	1	45	1	29	1
17	1	46	2	-	-
18	1	49	1		
19	1	52	1		
21	1	54	1		
x = 9.17		x = 30.24		x = 10.86	

N=21

APPENDIX B

DATA COLLECTION PROFILE

Name: _____ Code Numeral Designation: _____ Sex: _____

Date of Birth: _____ Age at SEARCH: _____

Total SEARCH score: _____

SEARCH Component Raw Scores:

Lamb Chop Matching: _____ Lamb Chop Recall: _____ Designs: _____

Rote Sequencing: _____ Auditory Discrim. Total: _____

Articulation: _____ Initials: _____ Directionality: _____

Finger Schema: _____ Grip: _____

CTBS Scores:

Reading: _____ Math: _____ AAGE: _____

Pre-school Experience: Yes: _____ How long: _____ No: _____ No Info: _____

766 Services: Yes: _____ No: _____ Years of Services Rendered: _____

Amount of 766 Services Received: _____

Retention: Yes: _____ No: _____ No. of Yrs. retained: _____

Grade enrolled 1987-1988: _____

1987-1988 Grade Point Average: _____

Comments: _____

APPENDIX C

SEARCH PROTOCOL

SEARCH Record Blank

NAME _____ DATE TESTED Year Month Day
 SCHOOL _____ GRADE _____ ROOM _____ DATE OF BIRTH _____
 INITIAL READING ESTIMATE _____ AGE _____
 EXAMINER _____ NORMATIVE GROUP SELECTED _____

<u>SEARCH Component</u>	<u>VAB</u>	<u>Raw Score</u>	<u>Stanine</u>
Lamb Chop Matching (LCM)	()	_____	_____
Lamb Chop Recall (LCR)	()	_____	_____
Designs (DE)	()	_____	_____
Rote Sequencing (RS)	()	_____	_____
Auditory Discrim (AD):Total(()	_____	_____
Objects _____			
Syllables _____			
Articulation (ART)	()	_____	_____
Initials (IN)	()	_____	_____
Directionality (DIR)	()	_____	_____
Finger Schema (FS)	()	_____	_____
Grip	()	_____	_____
SEARCH Score		□	

Percentual Profile



LAMB CHOP

Matching		
Correct Response	Record Position	Score 1 or 0
A (5)		
B (1)		
C (6)		
D (2)		
E (5)		
F (1)		
G (6)		
H (3)		
Total		8

Recall		
Correct Response	Record Position	Score 1 or 0
A (1)		
B (5)		
C (2)		
D (6)		
E (1)		
F (5)		
G (3)		
H (6)		
Total		8

ROTE SEQUENCING

	Value	Score
1. Count my fingers as I touch them.	(1)	
2. What number comes after 5?	(1)	
3. What number comes before 3?	(2)	
4. What number comes after 6?	(1)	
5. What number comes before 9?	(2)	
Examiner says: Today is _____		
6. What day will tomorrow be?	(1)	
7. What day was yesterday?	(2)	
8. Name the days of the week starting with Sunday.	(2)	
9. What day comes after Monday?	(1)	
10. What day comes before Thursday?	(2)	
Total Weighted Score		15

AUDITORY DISCRIMINATION: OBJECTS

Samples: Is this a ...

- A. car
B. hook
C. mar
D. book

Response

- | | |
|-----------------|-----------------|
| 1. hat _____ | 11. soo _____ |
| 2. tea _____ | 12. bed _____ |
| 3. pig _____ | 13. back _____ |
| 4. shoe _____ | 14. bus _____ |
| 5. cloud _____ | 15. comb _____ |
| 6. big _____ | 16. share _____ |
| 7. bat _____ | 17. clown _____ |
| 8. ha _____ | 18. bid _____ |
| 9. buzz _____ | 19. cone _____ |
| 10. chair _____ | 20. key _____ |

Errors

Score*

(4-11) _____

(10-16) _____

(14-9) _____

(1-8) _____

(17-5) _____

(3-6) _____

(20-2) _____

(7-13) _____

(15-19) _____

(12-18) _____

TOTAL

10

AUDITORY DISCRIMINATION: SYLLABLES

Samples:

Sounds:

- | | |
|------------|--------------------|
| A. dăt/dăt | ă - as in apple |
| B. fĭd/sĭd | i - as in Indian |
| C. dăt/dăp | ə - as in elephant |
| D. fĭd/fĭd | o - as in olive |
| | u - as in umbrella |
| | i - as in ivory |

Response

- | | |
|---------------------|---------------------|
| 1. găt/găt _____ | 11. shĕp/sĕp _____ |
| 2. kŏl/tŏl _____ | 12. mĕd/mĕd _____ |
| 3. pĭm/pĭm _____ | 13. văt/văt _____ |
| 4. shĕp/shĕp _____ | 14. nŭs/nŭs _____ |
| 5. zĭn/zĭd _____ | 15. rĕm/rĕm _____ |
| 6. pĭm/bĭm _____ | 16. chĭb/shĭb _____ |
| 7. văt/văt _____ | 17. zĭn/zĭn _____ |
| 8. găt/gă _____ | 18. mĕd/mĭd _____ |
| 9. nŭs/nŭzz _____ | 19. rĕm/rĕn _____ |
| 10. chĭb/chĭb _____ | 20. kŏl/kŏl _____ |

Errors

Score*

(4-11) _____

(10-16) _____

(14-9) _____

(1-8) _____

(17-5) _____

(3-6) _____

(20-2) _____

(7-13) _____

(15-19) _____

(12-18) _____

TOTAL

10

* Check only if both responses are correct.

ARTICULATION					
	Response	Score 1 or 0		Response	Score 1 or 0
1. sled			11. glass		
2. music			12. thumb		
3. stove			13. cherry		
4. yellow			14. cherry		
5. fresh			15. smooth		
6. throws			16. valentine		
7. throws			17. valentine		
8. onion			18. zipper		
9. spoon			19. anything		
10. there			20. flower		
Total					20

INITIALS	
	Score 1 or 0
1. Ted	
2. David	
3. Susan	
4. Richard	
5. Carmen	
6. Nicholas	
7. Barbara	
8. Pedro	
9. Mei Ling	
10. Lucy	
Total	10

DIRECTIONALITY	
	Score 1 or 0
1. Put the car under the table.	
2. Hold the car in your left hand.	
3. Hold the car behind you.	
4. Hold the car in your right hand.	
5. Put the car in my right hand (E).	
6. Put your left hand on your left eye.	
7. Now which hand is the car in? (E left)	
8. Put your right hand on your left eye.	
9. Put your left hand on your right eye.	
10. Take one step to the right and one step to the left.	
Total	10

FINGER SCHEMA					
	Score 1 or 0		Score 1 or 0		Score 1 or 0
1. R-1		5. R-2 L-2		7. R-3 L-5	
2. L-3		6. R-4 L-4		8. R-2 L-4	
3. L-5		Items Correct ____ x 2 = Wtd Score		Items Correct ____ x 3 = Wtd Score	
4. R-4					
Items Correct ____ x 1 = Wtd Score		Total Weighted Score		14	

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