Prediction of children's school readiness by parent and teacher reports and individual testing

Ralph Jeffrey Worthing
Iowa State University

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PREDICTION OF CHILDREN'S SCHOOL READINESS BY PARENT AND TEACHER REPORTS AND INDIVIDUAL TESTING

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Prediction of Children's School Readiness by Parent and Teacher Reports and Individual Testing

by

Ralph Jeffrey Worthing

A Dissertation Submitted to the Graduate Faculty in Partial Fulfillment of the Requirements for the Degree of DOCTOR OF PHILOSOPHY

Major: Child Development

Approved:

Signature was redacted for privacy.

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For the Graduate College

Iowa State University
Ames, Iowa

1986
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ABSTRACT

The purpose of this study was to develop a comprehensive screening instrument to assess the competencies of young children as they enter kindergarten. A broad range of intellectual, social-emotional, and physical characteristics were evaluated through parental reporting, teacher rating, and direct testing of the children. Each of the three data sources proved to be valuable assets to the screening process. Parents contributed to the screening battery by significantly predicting the success of their children in kindergarten and by rating their children on various competency areas. In addition, such demographic variables as parents' education significantly predicted students' school success.

The results of the present study also confirmed previous research demonstrating the effectiveness of teachers' ratings in predicting school success. In a very short period of time (one to four days), the teachers were able to assess a child's academic competency and readiness for the school experience.

Direct testing using the Worthing Early Screening Test (WED), which was developed for the study, complemented the other data sources in predicting concurrent achievement (measured by the Kaufman Assessment Battery for Children - Achievement Scale) and kindergarten success (assessed by the kindergarten teachers' ratings). As hypothesized, the ability to recognize and segment the component sounds of words was an important indicator of early academic achievement. Skills such as
counting, short-term memory, and drawing a person were also significant predictors of standardized achievement measures and the teachers' ratings.
INTRODUCTION

The purpose of this study is to develop a comprehensive screening instrument to assess the competencies of young children as they enter kindergarten. A broad range of intellectual, social-emotional, and physical characteristics will be evaluated either directly or indirectly to identify children who may be at risk for school-related difficulties. As a result of this effort, it is intended that the decisions regarding school readiness will be based on dependable data.

The passage of the Education For All Handicapped Children Act (P.L. 94-142) required that all school districts in the United States provide a free and appropriate education to any child who manifests a handicapping condition. Appropriate education has different meanings for different students. However, the intent of the law is to ensure that specialized services are delivered to those students who are in need of more than is offered in the regular curriculum (Shrybman, 1982). Examples of handicaps which require special education efforts include mental disability, learning disability, emotional/behavioral disability, speech and/or language impairment, sensory impairments, and any type of physically-disabling condition. Before the educational team at the school can develop an individual educational program (I.E.P.) to meet the needs of children with handicaps, it is necessary for the school to identify those students who, in fact, are educationally handicapped. The earlier these children are identified and provided with an individually tailored intervention, the greater is the chance for success (Kaufman & Kaufman, 1977; Keogh, 1983;
Leigh, 1983; Mardell & Goldenberg, 1975; Reynolds, Egan, & Lerner, 1983). It follows, then, that the development of strategies to identify handicapped students as early as possible would be of importance.

Statement of Problem

The problem being addressed in this study is the inconsistency among schools in screening incoming kindergarten students for potential learning problems (Gracey, Azzara, & Reinherz, 1984). Furthermore, the existing screening procedures are frequently not based on a solid theoretical base (Gracey et al., 1984; Simner, 1983). Taken on face value the present study could be interpreted as simply a response to the need for the early identification of special needs students. In fact, the proposed outcome of this investigation is to develop a comprehensive screening battery that will identify at risk students. However, the rationale for the development of this instrument runs much deeper than merely a response to recent legislation. Rather, the theoretical basis for this study dates back several hundred years to those philosophers and educators who developed theories explicating sound educational practices. For example, the importance of early intervention was emphasized as far back as the 1700s by John Amos Comenious (in Morrison, 1980).

Theoretical Framework

Two primary educational principles have withstood the test of time and are the foundation for the rationale behind the present project. The first principle has been espoused by numerous theorists and maintains that no
individual should be expected to perform a task for which they are not
developmentally or experientially prepared (Cole, 1955; Comenious in
Morrison, 1980; Hunt, 1961; Rousseau in Morrison, 1980). Therefore, it
becomes the responsibility of the teacher to provide an accurate match
between the individual's competencies and the expectations placed upon
him/her. Closely associated with this first principle is the principle
that the most effective interventions are those that are "one step" ahead
in difficulty of the child's current level of knowledge. This position has
been promulgated by learning theorists dating back to the early British
empiricists such as John Locke and advanced by such contemporaries as
Skinner (1972), Gewirtz (1971), and Baer (1970). In their view, the
essence of teaching is to establish the point in the sequence of
instructional tasks over which the student has achieved mastery and then to
present the next task in the hierarchy. This method places the emphasis of
learning on environmental factors rather than on the individual.

Cognitive-developmental theorists echo the importance of matching
environmental stimulation to present capabilities, but more emphasis is
given to the organism's role in the learning process. Piaget proposes that
cognitive development occurs as a result of resolving the disequilibrium
that occurs when an individual's present cognitive structures are not
sufficient to assimilate the information being presented (Brainerd, 1978;
Flavell, 1963; Piaget, 1952). Through interacting with the environment the
individual discovers the principles underlying his/her observations and
thus becomes more proficient and accurate in interpreting his/her
observations. However, if the information being presented is too difficult
or too easy, then no disequilibrium is experienced and thus no learning occurs (Flavell, 1963).

Despite the sometimes conflicting explanations found in the literature on the learning process, the two principles stated above remain consistent throughout that literature. Therefore, the assessment of a child's capacities as he/she enters school is necessary to ensure that the school will not incorrectly assume a certain level of knowledge and thus present too difficult a level of instruction. Further, through information that such a process of assessment yields, instruction can be modified to match the child's current level of knowledge. Although the requirements of current legislation are compatible with these principles, the principles are really long standing tenets of education which should stand on their own merit without having to be mandated.

The question then becomes, "How can the task of matching the child's capabilities with instructional techniques best be accomplished?" Obviously, it would be impractical and unnecessary to thoroughly test every child entering kindergarten. What is needed is a screening measure that will identify those students who may be at risk for school failure so that they can be more fully evaluated and, if necessary, provided with specialized instructional services (Zeitlin, 1976).

The development of screening tests is not a new enterprise. Numerous tests have been published which purport to identify at risk students (Adair & Blesch, 1965; Mardell & Goldenberg, 1975; McCarthy, 1978). Many of these tests are effective in that children who do poorly on them also experience failure in school. However, it is not always clearly defined what
underlying deficits the child manifests which prevents success in school. Often the tests are comprised of items measuring acquired knowledge based on past opportunities and learning experiences, an approach that does have validity since much learning is a sequential process where prerequisites are essential to comprehend subsequent information. However, such an approach does not differentiate among students who have a bonafide disability from those who are in some way culturally deprived or poorly motivated. Although the manifest problems may appear similar for the two groups, the prescribed treatment may vary greatly. For example, although underachieving students may primarily need exposure to an abundance of enriching experiences or skillful behavior management techniques the truly disabled student may need a uniquely developed curriculum that will accentuate their strengths and avoid reliance on their weaknesses (Gaddes, 1981). The term disabled, as used here, refers to students who have been identified as having significant learning difficulties not related to a lack of appropriate educational opportunities (Gaddes, 1981).

The Screening Instrument

The ability to recognize the invariant features which define different syllables and phonemes has been shown to be an essential skill in the reading process (Gibson & Levin, 1975). The process of such pattern recognition is the hallmark of Gibson's (1969) theory of perceptual learning. Thus, according to Gibson, the inability to profit from repeated exposure to different exemplars of a concept, e.g., the recognition of the phoneme "p" despite different pronunciations and locations in a word, is a
pathonomic sign predicting inefficient learning. The recognition of invariant features is a skill evident in many types of learning, but its application to reading, which receives the greatest emphasis in school (Gibson & Levin, 1975), is especially relevant to a school readiness test. The specific application of this skill to be measured in the proposed instrument is the ability to recognize and manipulate individual speech sounds. Eventually a child should become proficient in segmenting words and syllables into their component sounds (Fox & Routh, 1975, 1976, 1980). However, a prerequisite to this skill is the ability to blend component sounds into words; which is one of the skills to be assessed in the screening test presented in this study.

Another cognitive function essential to school learning is memory (Cole & Scribner, 1977). Memory is a term used for a variety of cognitive processes such as encoding, retrieval, rehearsal, search, clustering, elaboration, etc. (Kail & Hagen, 1982). However defined, the retention of information gained through some type of practice is tantamount to learning (Postman, 1976). Although memory is a complex construct that has received a great deal of research attention in the last ten to fifteen years (Hagen & Kail, 1982) certain discrete memory tasks, such as number recall, have been found to be effective predictors of general mental ability (Jensen, 1970; Kaufman & Kaufman, 1983a).

A telling difference between young children and older children (and likewise good versus poor learners) is the ability to apply strategies to facilitate recall in memory problems, i.e., mnemonic aids (Cole & Scribner, 1977). Prior to age five virtually no strategies are used by children to
aid in their retention of stimuli. It is not until close to age ten before strategies are consistently used by children to aid in remembering (Flavell, Beach, & Chinsky, 1966).

The recall of a series of words requires a certain amount of rehearsal to maintain the stimuli in short-term memory or else it will be lost (Atkinson & Shiffrin, 1968). Failure to use rehearsal will result in an inability to recall the words. Considering that five-year-olds do not generally employ memory strategies, a task was selected for this battery that includes repetition of trials. Hence, the children receive "external" rehearsal. Those who do not benefit from repeated trials are more deficient in memory skill than those who are able to recall the words.

Another important area for assessment is the student's level of cognitive development and reasoning. Historically, advocates of the psychometric and Piagetian approaches to intellectual assessment have focused on the differences between the two orientations. Clarizo (1982) suggests that inclusion of both methods of assessment in a single test battery would enhance the validity of the results. The importance of reasoning tasks such as conservation and classification in school success has been well-demonstrated. For example, Kaufman and Kaufman (1972) constructed a battery of tests to assess concrete operations which was a better predictor of future achievement than a conventional group intelligence test. Silliphant (1983) also demonstrated the importance of logical reasoning (classification, seriation, and conservation) to future academic performance. In a longitudinal investigation, Silliphant found that children whose reasoning was better developed in kindergarten
maintained higher achievement scores throughout the length of study (through third grade). The child's performance on such tasks of conservation and/or classification gives an indication of their readiness for more formal types of instruction.

In addition to the cognitive skills which here are being labeled process-oriented, other abilities will be measured such as vocabulary and counting that would be considered acquired knowledge items. These are included in the battery for several reasons. First and foremost, these skills are criterion measures of school success. In fact, range of vocabulary is an excellent measure of overall intellectual ability (Jensen, 1980) and ability to learn from context (Sternberg, 1984). Furthermore, the inclusion of such items increases the range of skills on the test; a practice recommended by Zeitlin (1976) to increase the value of the battery.

A computer analogy depicted in Figure 1 is used to explain the intellectual skills involved in cognition. The analogy is purposely simplistic. Its function is to provide a model for understanding the cognitive processes being evaluated by the proposed screening measure.

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<td>Cognitive Output (i.e., Acquired Knowledge)</td>
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Figure 1. Computer analogy of cognitive functioning

Phase I is defined as the cognitive "hardware", i.e., those innate capacities inherited by an individual which set the limits for cognitive
functioning. These innate capacities have been described by Cattell (1963) as fluid intelligence, by Jensen (1970) as Level I or associative abilities, by Atkinson and Shiffrin (1968) as structural features and by Campione and Brown (1978) as architectural features. Although these descriptors define slightly different concepts, the commonality among all three is that of abstractness and difficulty of assessment. The level of present technology makes it impossible to measure precisely the level of an individual's innate intelligence. In fact, Bayley (1955) suggests that such an endeavor would be impossible since the very nature of an individual's intelligence changes over time. Therefore, any measurement would be considered temporary.

For that reason, the abilities assessed in this battery will focus on Phase II and III skills. Phase II is here compared to computer "software" or the programs or strategies needed to fully access the innate capacities. Campione and Brown (1978) refer to these strategies as control processes. One example of a Phase II skill is the ability to recognize invariant features and patterns in environmental stimuli which in turn increases the efficiency of information manipulation and storage. While the ability to recognize patterns is obviously related to innate intelligence it is an ability which can be measured and has direct implications to the learning process (Gibson, 1969). When invariant features and patterns are immediately detected and processed, then the individual is able to devote more attention to higher-level conceptualization (LaBerge & Samuels, 1974). For example, when a student has mastered the phonetic component of word recognition in reading more emphasis can be given to comprehension of what
is read. Other examples of Phase II skills include mnemonic strategies such as rehearsal, clustering, and elaboration. These are the skills that enable the stimuli to be retained in memory.

The rationale for focusing on Phase II skills for assessment is that the efficiency with which a person utilizes his/her inherent capabilities is critical to learning and can be improved through remediation (Stanovich, 1982b). For example, a person with a moderate Phase I memory, but excellent Phase II mnemonic skills may supersede a person with an excellent innate memory capacity who is very inefficient in evoking mnemonic strategies.

Phase III, or "output", reflects the fruits of learning efforts. Included in this category is acquired knowledge. Academic skills such as reading, arithmetic, spelling, writing, and the individual components thereof are measurable evidence of learning.

It must be noted that in reality it would be very difficult if not impossible to artificially separate the three phases. The division is made here to clarify the goals of this study and to provide a model for assessment.

Some types of information relevant to the child's school adjustment cannot be collected through direct assessment. An example of such information is the child's developmental history which would need to be provided by parents. Colletti (1979) demonstrated that a strong relationship exists between a child's prenatal birth complications and learning disorders. Awareness of such complications would alert the school personnel to the potential need for special education services. While
parents often are asked to provide cursory background information about their child, little attention has been given to the systematic use of parental input in preschool screening (Iretan, Shing-Lun, & Kampen, 1981). This is unfortunate as the parents hold a wealth of information about their child which would be useful for education programming. A beneficial side-effect of soliciting parental input for kindergarten screening would be the generation of cooperation and mutual support between home and school.

Additionally, the accuracy of teachers' ratings for predicting school success has been well-documented (Glazzard, 1979; Perry, Guidubaldi, & Kehle, 1979). In fact, teachers' ratings have been found to have equal or higher predictive values than psychometric measures (Perry et al., 1979). However, these ratings have been completed by teachers who over the course of several months have gained extensive knowledge of their students. In contrast, the present screening test will assess the accuracy of teachers' reports after relating to the child in a classroom setting for as little as one day. It will be necessary to determine if such a short exposure to the student results in valid ratings.

Operational Definitions

Through direct testing of the child and both parental and teacher report, a thorough screening of the child's academic potential will be attempted. School success is the dependent variable in question and will be operationalized through the use of two measurements. Each child will be administered the achievement section of the Kaufman Assessment Battery for
Children (K-ABC) (Kaufman & Kaufman, 1983a). The K-ABC consists of the following subtests: Expressive Vocabulary, Faces and Places, Arithmetic, Riddles, Reading/Decoding. The second measure will be obtained through a rating done by the kindergarten teacher. He or she will rank each child as to whether they (the children) are near the bottom, middle, or top of the class academically. The stated Null Hypotheses which follow refer to the above two measures in identifying academic success.

The predictor variables for school success include the parent ratings of their child's competencies, teacher ratings taken during kindergarten roundup, and the screening instrument developed for this study entitled the Worthing Early Screening Test (WEST). The entire set of predictor variables shall be referred to as the Comprehensive Screening Battery (CSB).

Null Hypotheses For Study

1. No significant relationship will exist between the Comprehensive Screening Battery and performance on the criterion measures of school success.

2. There will be no significant relationships among the variables, including demographics, WEST performance, K-ABC performance, and teacher ratings.

3. No significant relationships will exist among the subscores within the predictor measures.
REVIEW OF LITERATURE

Reading Readiness

School success is largely contingent on learning to read proficiently (Gibson & Levin, 1975). Because of its important role in education the reading process has been thoroughly analyzed in an attempt to identify what types of cognitive skills are involved in comprehending written language. One of the keys to comprehending written language is to access the meaning of individual words. Debate persists as to the most efficient method to gain such lexical access. One theoretical perspective suggests that the ability to conceptualize the component sounds in words is highly related to the ease in which reading is acquired (Calfee, Lindamood, & Lindamood, 1973; Rozin & Gleitman, 1977). Conversely, Smith (1978) asserts that a more direct access to meaning occurs through the visual mode without a reliance on phonological encoding. The purpose of this section is to examine the developmental progression from a reliance on phonological coding in early readers to the use of more direct, i.e., visual, lexical access as reading proficiency increases. Specific emphasis is given to studies examining phonological analysis skills in children as they are beginning to learn to read.

The importance and uniqueness of speech to human beings has been well-demonstrated. From a very early age, perhaps even from birth, the infant is able to distinguish human speech from all other sounds (de Villiers & de Villiers, 1978). Eimas, Siqueland, Jusczyk, and Vigorito (1971) demonstrated that one-month-old babies were able to discriminate between the syllables "ba" and "pa" even though they differed by only one phoneme.
The infant's sensitivity to human speech was also shown by Condon and Sander (1974) when they observed that very young infants synchronize their bodily movements to the accents of human speech. The remarkable thing in respect to this finding was that the infants were reacting to a tape recording, so extraneous visual cues were not present. Furthermore, the subject's reactions were similar for both Japanese and English language samples.

The predisposition to processing oral language is an adaptive mechanism for future academic learning. In analyzing both speech processing and reading, Spoehr (1981) concluded that the development of mechanisms for reading is dependent on the mechanisms utilized for speech processing. Spoehr's conclusion is based on the fact that at sensory levels, speech and reading use analogous processes and memory stores.

The common denominator between speech processing and reading is memory (Shankweiler, Liberman, Mark, Fowler, & Fischer, 1979). According to Shankweiler et al., working memory in both reading and listening may rely on phonetic coding of the information to be retained. The importance of phonetic coding for memory has been well-established. For example, the well-attested difficulties of deaf children learning to read implies that non-phonetic strategies may not be very effective for decoding words (Swisher, 1976). Shankweiler et al. (1979) demonstrated the superiority of phonetic coding in good readers through a procedure which required the subjects to recall a string of letters; some of which rhymed (e.g., G, D, Z) and some of which did not (e.g., H, L, S). The sample included groups of second graders who were reading either above grade level, slightly
below, or significantly below grade level. Interestingly, the superior
readers demonstrated significantly better memory skills for the non-rhyming
letter strings, but no difference was evinced on the rhyming series. It
would appear that the superior readers were using a phonetic code to store
the information in memory while the poor readers were not. Hence, the poor
readers were not adversely affected by the confusability of the rhyming
letters while the superior readers were. This finding persisted whether
the letters were presented visually (both simultaneously and sequentially)
or auditorily. The design of the experiment controlled for rehearsal
effects such that it could be concluded that the primary problem for the
poor readers was the availability of a phonetic representation.

In a related study Tzeng, Hung, and Wang (1977) established that
phonemic encoding in working memory is not unique to the English alphabet.
Tzeng et al. tested Chinese speaking college students using two different
Chinese language tasks to assess the influence of phonemic encoding in the
reading process. In the first experiment, the students were exposed to a
list of words they were to remember followed by an inhibiting task. It was
found that the level of phonemic similarity of the interference task was
related to recall of the original word list. That is, even though the
Chinese orthography relates directly to meaning, the subjects involved
utilized a phonemic strategy to code the words into working memory. In the
second experiment, reaction times in a judgement task were compared between
phonemically similar and dissimilar sentences. Again, the phonemically
similar sentences created more interference than the dissimilar sentences.
The conclusion drawn by the authors was that even if lexical access may
occur directly from visual input, speech encoding is still needed to retain the information in the short-term working memory.

A particular phonological skill that is highly predictive of reading success is the ability to analyze and segment words into their component sounds. This is a task which requires an abstraction on the part of the listener as the acoustic stream in which the words are embedded is continuous (de Villiers & de Villiers, 1978). That is, the individual sounds comprising the words are not discrete, but overlap one another. They cannot be physically isolated as in recording a word on tape and then cutting the tape into segments corresponding to separate phonemes (Wallach et al., 1977). Through hearing the sounds at the beginning, middle, and end of words and in different contexts, the individual comes to recognize the invariant characteristics and identify the sound as a discrete category (Gibson, 1969). Most children manage to learn phonemic segmentation in the process of beginning reading. However, many children do not and these are the individuals who may have difficulty in becoming proficient readers (Helfgott, 1976). Moreover, phonemic segmentation is not easily taught (Calfee et al., 1973) so a deficit in segmentation at the stage of beginning reading may presage chronic reading difficulties.

In a series of experiments, Fox and Routh (1975, 1976, 1980) demonstrated the importance of speech-sound segmentation in the reading process. Fox and Routh developed a procedure whereby subjects segment sentences into words, words into syllables, and syllables into phonemes. In Fox and Routh's initial study (1975), 50 children ranging in age from three to seven years were tested with this procedure. The subjects were
also given tests of word recognition and reading comprehension. The results revealed significant correlations between reading level and the ability to segment syllables into phonemes and to segment words into syllables. However, these skills were not completely mastered by even the oldest subjects. Children at age three were able to segment into words the majority of the sentences presented and were able to break up most words into subunits. Three-year-olds were able to segment only a small percentage of syllables into phonemes. A significant improvement was noted in four-year-olds in this skill and steady improvement was observed in five- to seven-year-olds. By age five or six, the children were capable of segmenting words into syllables (although not necessarily at the conventional syllable boundary) virtually without error.

In a follow-up study, Fox and Routh (1976) analyzed the relationship of segmentation in learning a novel blending task. The task involved the association of letter-like forms to individual sounds. The forms were then combined to form new sounds. After the 40 four-year-olds involved in the study were tested with the blending task, they were given the segmentation test. The authors found that the ability to segment syllables into sounds was a good predictor of performance on the reading analogue exercise. In fact, the children who were not proficient in breaking down syllables into sounds were completely unable to learn the novel words. It was, therefore, concluded that a minimal level of segmentation ability was necessary to profit from blending training.

In an attempt to further define the importance of segmentation ability in beginning reading, Fox and Routh (1980) studied 45 first graders of
average intellectual ability who were judged to be either average readers, slightly below average, or significantly below average. While there were no significant differences between the group of average readers and the group with a mild reading disability in their ability to proficiently segment syllables into individual speech sounds, the poor readers revealed a striking deficit in phonemic analysis. Fox and Routh were able to distinguish the severe reading disability group from the other two groups with perfect accuracy using the phonemic analysis scores.

To sound out a word using its phonemic components, the reader must understand the relationship between phonemes in isolation and in words (Helfgott, 1976). Helfgott provides three reasons why the beginning reader may not recognize this relationship. The first possibility is immaturity in phonological processing which may be related to variant speech patterns. Another reason is that phonemes must be abstracted from the sound stream; they are not concrete. The third reason is that the speech stimulus is fleeting and fluctuating so the phonemes are not consistent.

Helfgott (1976) found that beginning readers (at the end of their kindergarten year) had difficulty in segmenting C-V-C words (consonant-vowel-consonant). Further, the students were more able to segment the initial consonant while they were more proficient in blending the final V-C. Overall, the subjects had more difficulty with segmentation than blending, but the segmentation task was a better predictor of first grade reading (r = .72) level than blending (r = .49).

Calfee, Lindamood, and Lindamood (1973) view the ability to conceptualize the component sounds in words as a skill that is related to
the ease in which children learn to read. However, they believe that this ability is not present in young children and that it is difficult to teach. Using a procedure developed by Lindamood and Lindamood (1971) to test their hypothesis, the student was asked to arrange colored blocks to represent sound sequences. The sequence of blocks is rearranged to match each change in the sound sequence introduced by the examiner. The match between the color of the block and the particular sound is arbitrary and could change from one item to the next. Calfee et al. (1973) evaluated the development of this skill in a sample of 660 children ranging in age from kindergarten through the 12th grade. At each grade level, they found correlation coefficients of .70 or higher between the auditory conceptualization task and word recognition on a standard reading test. Hence, it was demonstrated that relatively simple phonological skills are significantly related to reading performance throughout elementary and secondary school.

Zifcak (1981) hypothesized that part of the linguistic knowledge necessary for successful reading is the awareness that the orthography is a representation, albeit abstract, of the phonological segments of spoken language. Zifcak maintains that the young child needs to learn that the symbols of the written language make contact with oral speech at the abstract phonemic level rather than the syllable level. In testing this hypothesis, Zifcak subjected 49 first-grade grade students to three different phonological awareness tasks. In the first task, the children were asked to spell certain consonant, vowel, nasal, and stop consonant words so the experimenter could observe how each child categorized the sounds they hear. The second task—phoneme and syllable segmentation—
required the child to tap a plastic hammer for each phoneme they heard. The final task involved sound elision, i.e., after a subject pronounced a word they were asked to say it again, but this time omitting one sound. Each child was also given two reading tests, an intelligence screening test, and an assessment of their socioeconomic status. The results indicated that phonological awareness is highly related to successful reading performance. Furthermore, phonological awareness was not appreciably affected by intelligence or social-economic status.

A serious question that arises from studies such as the ones cited thus far is that of causation. The preceding review has documented that phonological awareness is highly related to success in reading. However, these studies cannot unequivocally state that the phonological skills were a prerequisite to reading. An alternate explanation could be that increased experience in reading resulted in a concomitant growth in phonological awareness. The studies presented in the following section address the question of causation through a variety of experimental techniques.

One method of determining the causative role of phonological analysis in reading is to compare younger/normal readers with older/backward readers. Hence, the two groups would be at the same reading level and the phonological skills, if different, could not be attributed to reading experience or skill level. Bradley and Bryant (1978) compared 60 backward readers with an average chronological age of 10 years, 4 months and a reading age of 7 years, 7 months to 30 normal readers with an average age of 6 years, 10 months who were reading at the 7 year, 6 month age level.
Both groups had equivalent mean intelligence scores. The experimenters asked the subjects to perform two phonemic tasks. First of all, the students were asked to identify which word in a group of four differed by one phoneme. They were also asked to produce a word that rhymed with those presented. In spite of the fact that the backward readers had over three years more of reading instruction, they performed significantly worse on both tasks. Therefore, it was determined that the superiority in phonological skills was not a result of reading experience. Rather, skill in phonological analysis appeared to be a causative factor in reading achievement.

In a longitudinal study, Mann and Liberman (1984) also sought to identify a causal role of phonological analysis in reading acquisition. They originally tested 62 kindergarten students with a battery of tests assessing phonemic segmentation, verbal and non-verbal memory, and receptive vocabulary. One year later these children were again tested with the verbal and non-verbal memory tests plus a standardized reading test. Based on their first grade reading performance, the subjects were classified into three groups: good readers, average readers, and poor readers. Significant differences were noted among these groups and performance on the kindergarten segmentation task. The verbal memory task required the students to recall a list of words that contained either confusable (rhyming) or non-confusable (non-rhyming) words. As the authors predicted, the good and average readers made more errors on the confusable word strings than did the poor readers. Hence, the better readers were employing a phonemic system of short-term memory storage. In contrast, no
significant differences emerged among the groups on non-verbal memory tasks. The longitudinal design of Mann and Liberman's study suggested causality between skill in phonetic analysis and subsequent reading ability. That is, poor performance on such tasks portends reading difficulties.

As Spoehr (1981) reports, some studies fail to replicate the causal nature of such skills as phonemic segmentation in reading acquisition.

There exists a prominent theoretical base that phonological encoding is not necessary for lexical access, but rather reading is accomplished by reading off the pronunciation of a word already located in long-term memory via a visual code with this direct access especially true for proficient readers (Barron & Baron, 1977; Smith, 1978). The question then becomes "What is the developmental sequence for the acquisition of phonological skills? Do all children initially encode words phonetically then rely on a direct visual strategy when word recognition becomes more automatic, or is there no identifiable sequence?" Reitsma (1984) sought to answer these questions through a series of experiments with children of various ages and reading levels. The experiments involved a procedure whereby a sound was presented immediately prior to the presentation of two words. The priming sound either facilitated or inhibited the selection of the correct word (the subject was provided with a proposition that could be answered correctly by one of the words) depending on whether or not the subjects utilized a phonetic code in their short-term memory storage. The dependent variable was the response latency and the independent variable was the type of sound presented (rhyming or non-rhyming) and the effect these sounds had on subsequent decisions. The priming sound interacted with the decision to be
made in a different manner if a child encoded words phonetically than if the words were encoded via visual features. If the primer sound rhymed with the correct choice, the response latency was lowered while if the sound rhymed with the incorrect choice, the latency was increased. On the other hand, children who did not encode phonetically did not experience this facilitative and inhibitory interaction.

Ehri and Wilce (1985) also investigated the developmental progression of phonetic/visual encoding in beginning readers. The subjects, who had a mean age of 67 months were designated into one of three groups on the basis of performance on a word identification test. Each of the subjects was presented with the task of learning words through a paired associate technique. One series of words included phonetic cues and one included visual cues. Ehri and Wilce found that "prereaders" learned significantly more visual than phonetic spellings while the "novice" and "veteran" readers learned significantly more phonetic than visual spellings. These results supported the authors' contention that, while young children can learn to recognize words via visual cues such as logos, color patterns, and distinctive print styles, effective word reading requires a shift from visual to phonetic processing to enable children to being reading their first words reliably.

The results of Ehri and Wilce (1985) and Reitsma (1984) provide evidence of a developmental trend in learning to read. It appears as if beginning readers naturally translate print to sound before the meaning is retrieved. Although Ehri and Wilce admit that proficient readers probably translate directly from visual cues to meaning, Reitsma holds that word
identification is considerably facilitated even when the beginning readers have practiced and are familiar with the words to be identified.

In sum, the research cited herein suggests that phonemic awareness and encoding is a prerequisite to normal reading development, an assertion antithetical to assertions which suggest that phonological analysis could be a consequence of reading experience or that this skill facilitates, but is not necessary for reading (Backman, 1983). Furthermore, evidence based on the design of several of the studies reviewed would lead to the rejection of another alternate hypothesis suggesting that phonemic awareness and reading are related via a third variable such as general intelligence (Backman, 1983).

Evidence has accumulated that links phonological awareness with reading acquisition. Hence, an assessment of this construct is included within the Worthing Early Screening Test (WEST). However, reading is a complex process and when a reader is deficient in one particular skill he or she will rely on other sources of information to decode the message (Stanovich, 1982a). One such strategy is the use of context clues to identify an unknown word. It appears that poor readers rely as much or more on contextual clues for decoding than do good readers (Stanovich, 1982a). One excellent source of contextual clues is general word knowledge. When the surrounding text contains familiar words, it becomes easier to predict an upcoming unfamiliar word (Smith, 1978). Furthermore, word knowledge is an excellent predictor of the ability to learn from context and general intelligence (Sternberg, 1984). Therefore, a brief vocabulary text also is included on the WEST.
Memory

Memory is the label given for a variety of cognitive processes such as encoding, retrieval, rehearsal, search, clustering, and elaboration (Kail & Hagan, 1982). Memory has received extensive attention because of its relationship to cognition and cognitive development. In fact, according to Flavell (1971), "memory is in good part applied cognition. That is, what we call 'memory processes' seems largely to be just the same old familiar cognitive processes, but as they are applied to a particular class of problems" (p. 273). Furthermore, memory performance has been traditionally regarded as an important index of intelligence (Campione, Brown, & Bryant, 1985). For example, Ellis (1963) proposed that memory traces decay more rapidly in retarded than in non-retarded individuals. However, as Belmont and Butterfield (1969) suggest, differences in performance among individuals may be due more to the mobilization of memory strategies than decay of the stimulus trace.

Atkinson and Shiffrin (1968) developed a model of memory which defined the process of memory storage and differentiated between structural features and control processes. Structural features refer to those limitations imposed by the biology of the organism and includes three stages. In the first stage, referred to as the sensory register, a literal copy of the stimulus remains very briefly -- about one second. This memory trace is virtually the same in the five year old as in the adult. The second stage, namely short-term storage or the working memory, has a duration of several seconds. Rehearsal is necessary for the information to be retained for longer periods of time. Long-term memory is the final
stage within the structural features. This storage bank is the accumulation of all the individual's knowledge.

Atkinson and Shiffrin (1968) also refer to control process or mnemonic strategies which are under the control of the individual and influence what is learned and how it is retained. The distinction between structural features and control processes is an important one and has been the focus of developmental research.

Flavell, Beach, and Chinsky (1966) investigated the development of one mnemonic strategy, rehearsal, in children between the ages of five and ten. The children were asked to remember a series of pictures, but no clues were given as to how best to retain the pictures. Only ten percent of the five year olds used a rehearsal strategy, albeit inconsistently. Of the seven-year-olds, 60% rehearsed sometimes and 25% rehearsed consistently. It was not until age ten that most of the children (65%) utilized a rehearsal strategy consistently. Moreover, 85% of the ten year olds rehearsed the pictures at least part of the time. Flavell et al. (1966) and other investigators (Kail & Hagen, 1982) have demonstrated that, unless specifically instructed to do so, rehearsal is not a common cognitive activity prior to nine or ten years of age.

The relationship of school performance and memory skills has been documented both in this country (Kagen, 1983) and through cross-cultural research (Cole & Scribner, 1977). One of the most consistent characteristics of reading-disabled children is their poor performance on tests of short-term memory (Kagen, 1983; Stanovich, 1982b; Torgesen and Greenstein, 1982). Stanovich (1982b) offers two explanations for this
deficit. 1) Learning-disabled students are less prone to employ active, planful memorization strategies such as verbal rehearsal, imagery, and elaboration that would facilitate memory performance; and 2) the observed memory deficit may be due to deficient phonological coding processes. In support of Stanovich's first point, Torgesen (1982) concludes "that LD (learning disabled) children as a group, will have difficulties on almost any task which requires that information be processed in an active, organized, or planful manner" (p. 156). However, regarding Stanovich's second point, Torgesen and Greenstein (1982) emphasize that the teaching of efficient short-term, memory strategies will not be helpful to students deficient in phonetic encoding.

In a comprehensive examination of cognitive tasks and reading skills, Das, Bisanz, and Mancini (1984) compared the performance of average and backward readers in grades two (N = 120), four (N = 118), and six (N = 134). Das et al. (1984) found no differences between matched groups (e.g., backward fourth grade readers and average second grade readers) on the tasks; three of which were memory exercises. In fact, the two highest correlations between the cognitive tasks and word recognition were found for recall of a series of numbers (r = .58) and memory-for-designs (r = .49).

Gustavson, Golden, Wilkening, Hermann, Plaisted, MacInnes, and Leark (1984) administered a battery of neuropsychological tests to both children who had documented brain damage and unimpaired children. Again, the children's performance on the scale of memory tests accurately discriminated between the two groups. Given the demonstrated relationship
between memory and school performance and the fact that memory is tantamount to learning (Postman, 1976) an assessment of memory skills was included on the WEST. Both traditional digit recall (e.g., Kaufman & Kaufman, 1983a & b) and word lists (Golden, 1981) were utilized in the WEST to evaluate the subjects' memory spans and emerging rehearsal strategies.

Cognitive Reasoning

Historically, advocates of the so called psychometric and Piagetian approaches to intellectual assessment have focused on the differences between the two orientations. To be sure, a fundamental difference does exist in that Piaget was not interested in individual differences, while Binet and Wechsler indeed were (Clarizio, 1982). However, empirical investigations have demonstrated a great deal of communality among Piagetian measures and psychometric tests which would suggest that in spite of the theoretical differences underlying the construction of these different types of tests, each is capable of effectively predicting future academic performance (Dudek, Lester, Goldberg, and Dyer, 1969). Furthermore, Clarizio (1982) suggests that inclusion of both methods of assessment in a single test battery would enhance the predictive ability of the battery.

In a longitudinal study, Dudek et al. (1969) administered a battery of tests to 100 children in kindergarten, first, and second grade. The battery included two standard tests of intelligence (the Wechsler Intelligence Scale for Children and the Lorge-Thorndike), a test of motor proficiency (Lincoln-Oseretszki), and nine selected pre-operational
Piagetian tests. The criterion for these predictors was the California Achievement Scale given at the end of grades one and two. Among the tests given in kindergarten, the Piagetian tests best predicted performance in first grade. However, the WISC was just as accurate as the Piagetian tests in predicting second grade performance. Dudek et al. conclude that while the WISC and Piaget tests measure a great deal in common, each test also accounts for different aspects of intelligence not tapped by the other.

Silliphant (1983) conducted a longitudinal study to determine the efficacy of Piagetian and other tasks in predicting future school success. Fifty-two kindergarten students were evaluated on tests of visual-motor integration, receptive vocabulary, and traditional Piagetian tasks. Standard achievement tests were subsequently given at the end of the kindergarten through third grade years. While visual-motor integration and receptive vocabulary demonstrated no relationship to later achievement, the Piaget reasoning tasks continued to correlate highly with school performance throughout the length of the study.

Kaufman and Kaufman (1972) conducted a similar validation study which compared the predictive ability of the Gesell School Readiness Tests, a Piaget Battery, and the Lorge-Thorndike Intelligence Test. The 80 children's performance on these tests given in kindergarten was compared to their scores on the Stanford Achievement Test given at the conclusion of first grade. Taken individually, the predictive power for the Gesell and Piaget tests was equivalent (.64) and was followed closely by the Lorge-Thorndike (.58). Interestingly, the Gesell and Piaget tests both added significantly to the multiple correlation coefficient while the
Lorge-Thorndike's contribution was negligible. Consistent with Clarizio's (1982) assertion that inclusion of both psychometric and Piagetian measures in a test battery enhances the predictive validity of the assessment, a brief test of number conservation was contained within the WEST. Immediately following a counting task, the subjects were administered a standard number conservation exercise.

**Teacher Ratings**

Teachers' extensive contact with students throughout the school day makes the teacher an important source of information in predicting academic risk (Becker & Snider, 1979). Numerous rating scales have been developed in the last decade to assist the teacher in evaluating students' performance. In this section, the efficacy of these rating scales in predicting school success will be reviewed.

Feschbach, Adelman, and Fuller (1974, 1977) conducted a longitudinal study involving two cohort groups (888 and 844 students, respectively) which compared teacher ratings using a 41-item rating scale to traditional psychometric measures (e.g., Wechsler Preschool and Primary Scale of Intelligence and the Bender Gestalt). The children were evaluated periodically from kindergarten through the third grade. Two interesting findings resulted from this project. First, the teachers' rating of their students was at least as effective as the psychometric measures, while being more economical to administer. Secondly, the teacher rating scale consisted of individual factors which evinced higher correlations with similar skills measured by other indices than with dissimilar skills
measured by other instruments. For example, a factor labeled perceptual-motor skills on the rating scale correlated more highly with the WPPSI Performance IQ and the Bender Gestalt (a visual-motor copying test) than did other factors on the rating scale. This result suggests that the teachers discriminated among different components of the child's functioning and were not influenced by a simple "halo" effect. The lack of strong intercorrelations between rating categories was also observed by Stevenson, Parker, Wilkinson, Hegron, and Fish (1976) which further substantiates teachers' ability to accurately discriminate among student behaviors.

Several other longitudinal studies using different rating scales and psychometric tests have resulted in similar findings. Perry, Guidubaldi, and Kehle (1979) assessed children from kindergarten to third grade and found that teacher ratings of affective social characteristics and specific academic measures had equal or higher predictive value than did a global measure of aptitude (Stanford-Binet). Kindergarten teachers included in the study by Stevenson et al. (1976) were able to accurately predict third grade performance after three months exposure to the students. These ratings were shown to be stronger for cognitive measures than personal/social attributes. Hartsough, Elias, and Wheeler (1983) identified children's ability to adapt to new learning situations as an especially sensitive measure predicting future school success. Hartsough et al.'s sample of 536 kindergarten children showed significant relationships between teachers' predictions of academic performance and standardized measures of academic aptitude. In fact, the teachers
correctly predicted 91% of subsequently identified educably mentally handicapped students and 86% of future gifted students.

Tollefsen, Rodríguez, and Glazzard (1985) further demonstrated the cost effectiveness of teacher ratings in two separate studies; each involving over 270 kindergarten children who were followed through the second grade. The teacher rating scale accounted for approximately 30% of the variance in subsequent second grade reading achievement while a standardized reading readiness screening test accounted for only 10% of the variance. Glazzard's (1979) longitudinal assessment of 107 kindergarteners through the 4th grade compared a teacher rating scale to a standard reading readiness scale and a test of actual reading achievement. The results of this study demonstrated that the teacher scale and the readiness test were equally effective in predicting reading achievement.

While a body of research studies have demonstrated the effectiveness and efficiency of utilizing teacher ratings as a prediction of future academic performance, some cautions are necessary when utilizing teacher ratings. Partenio and Taylor (1985) asked teachers to rate children from different ethnic backgrounds. Although the data were only suggestive, the results of the study indicated that teachers do in fact rate children of different ethnic backgrounds in different ways. The relationship between measured IQ and teacher ratings was higher for white students than for minorities. Although the majority of studies cited in the previous section did not find any gender differences in teachers' rating, Stevensen et al. (1976) found that teachers consistently gave higher ratings to girls than to boys. Obviously, many other variables may interact to result in these
apparent biased ratings (such as SES and socialization factors). However, researchers and school personnel need to be cognizant of the potential for bias when evaluating teachers' ratings of student behavior. Biased ratings become a major issue when referrals for special education services are made since it has been demonstrated by Foster, Ysseldyke, Casey, and Thurlow (1984) that the teacher referral is the single most important deciding factor in the ultimate decision to place a child in a special education program.

Without question, teacher ratings can be an effective and efficient method of identifying students at risk for school difficulties (Tollefsen et al., 1985). Teachers not only accurately identify students, but the process of teacher rating, especially for screening purposes, is much less time consuming than individual testing. For these reasons, a teacher rating was included within the Comprehensive Screening Battery of the present study to complement the other forms of assessment.

Parent Ratings

Much effort has been expended in identifying preschool children who are at risk for academic failure. However, considerably less attention has been devoted to the systematic utilization of parental input in this identification process (Ireton, Shing-Lun, and Kampen, 1981). Parent reports can serve two functions in the identification process. First of all, the parents are in a unique position to provide the most comprehensive developmental history of the child. This information can alert school personnel as to the possible need for special attention. For example,
Colletti (1979) thoroughly examined 50 seven- to twelve-year-old, learning disabled children and found significantly more pregnancy and birth complications than in a normal comparison group. Other information available to the parents, such as general environmental quality and maternal educational level, are also highly predictive of future success (Bee et al., 1982).

The second function in which parents can serve is as a member of the evaluation team. Mothers and fathers have a wealth of information regarding their children's behavior outside of the school setting which can be very helpful in diagnosis of learning problems and subsequent educational planning. A study conducted by Meltzer, Levine, Hanson, Wasserman, Schneider, and Sullivan (1983) demonstrated the parents utility in the evaluation process. The parents responses on a 34-item checklist were generally consistent with the results of a professionally administered battery of tests. A factor of the parent rating scale identified as Scholastic Interest was an especially accurate predictor of psychometric performance. Thus, a collaborative effort involving parents in the assessment process has been justified by several sources as being a good practice. These findings serve to legitimate the mandate of P.L. 94-142 which requires parent participation in all phases of special education services. Hence, for the present study a parent report component was included in the Comprehensive Screening Battery.
METHOD

Subjects

The purpose of the study is to develop a broad-based screening instrument to assess competencies of entering kindergarten children. The 133 subjects included 71 male and 62 female children between the ages of 56 months and 71 months with a mean age of 62.8 months and a standard deviation of 3.8 months. The children were all attending pre-kindergarten round-ups at the time of testing and would be enrolling in kindergarten the next fall. Contact was made through the principal and kindergarten teacher at the school where the child would attend the round-up. Seven different schools were included, all of which were located in Iowa communities ranging in population from 800 to 3,000. All testing was completed in the school building with the exception of 21 students. These children were tested in private preschools adjacent to the public schools that they would be attending the next year. Subjects were all English speaking Caucasians. The majority of the children were tested during the kindergarten clinics at each of the participating schools. Prior to the clinics, parents were informed about the testing and they granted their implied consent for such screening by sending their children to the clinics. For any child who was not tested during a kindergarten screening clinic, informed consent was obtained from the parent(s) prior to testing. A copy of the consent letter is included in Appendix A. Approval for the investigation was granted by the Iowa State University Committee on the Use of Human Subjects in Research (Appendix B).
Instruments

Each of the 133 children was administered the Worthing Early Screening Test (WEST) (Appendix C). The WEST is a screening instrument designed to assess school readiness in children about to enter kindergarten. The test requires ten to fifteen minutes to administer and is given by a professional (such as a school psychologist or speech clinician) with experience in testing young children. The following is a discussion of the development of the WEST.

The first section on the WEST is the Draw-A-Person and is scored using criteria established by Zeitlin (1976). Two points each were given for the presence of a head, eyes, nose, mouth, body, legs, and arms. In addition, one point each was given for the drawing of hair and feet. The total possible score was 16.

The second section on the WEST is entitled Word Memory 1 and was designed after an item on the Luria-Nebraska Neuropsychological Test Battery (Golden, 1981). The examiner orally presents five words (house, forest, cat, night, table) and the child is asked to repeat as many of the words as he or she can remember. To obtain a score, the child must recall all five words. The child is given five points if he or she is able to recall all of the words on the first trial; four points on the second trial, etc. If the child is unable to name all of the words after five trials, a score of zero is given. Word Memory 2 is administered after all other items on the WEST have been presented. At this time, the examiner does not repeat the five words. Rather, the child is asked to recall the words that the examiner had asked him or her to repeat earlier.
The third and most extensive section of the WEST is a series of tasks requiring the subject to first recognize the segmentation of words then to define several words. On the first task of this section, the examiner verbally presents the two component syllables of a two-syllable word with a pause between each syllable. For example, ta-ble = table. The child is then asked to say the intended word and is given one point for each word correctly named. Prior to the administration of this section, it is recommended that evaluators familiarize themselves with the Test of Auditory Comprehension (TAC) (Lindamood & Lindamood, 1971). The TAC instructs examiners on how to verbally present isolated phonemes without providing blending cues to the subject. This task is followed by the presentation of the three component phonemes of a three-phoneme word that the child is again asked to pronounce in full. For example, b-a-t = bat. On the original version of the WEST, the child was asked to provide the component syllables and phonemes of a word presented by the examiner. This latter section was dropped from the battery when it proved to be too difficult for virtually all the children to comprehend unless extensive explanation was provided.

Rhyming is also a segmentation task as the child must recognize and isolate the ending sound in order to provide a like-sounding word or pretend word. On the rhyming task, the child is presented with a word and asked to tell the examiner a word or pretend word with the same ending sound as the word presented. In the final task of the third section of the WEST, the child is asked to define seven words. All of the words used in the this section were selected from a word list determined to be highly
familiar to all kindergarten students (Buckingham and Dolch, 1936).

In summary, section 3 of the WEST includes: a) pronouncing words presented by their two-component syllables; b) pronouncing single syllable words presented by their three component phonemes; c) giving a rhyming word to a presented words; and d) defining familiar words.

Section four of the WEST is a standard number recall test. The child is asked to repeat number strings presented orally by the examiner. A three numeral string is presented first followed by four and five numeral strings, respectively. Two trials, using different numbers each time, are given for each string length.

The fifth and final section of the WEST is an exercise combining counting and number conservation. The child is first asked to rote count as high as he or she can (up to a maximum of 20). Next, the child is asked to count ten blocks one at a time using their finger. After counting the blocks, the child is presented with sets of blocks consisting of two rows each. Set one has three red and two green blocks. Set two has six and five, and three has ten and nine, respectively. The child is asked to determine whether the two rows are equal in number or if one of the rows consisted of more/less blocks.

The rationale for including the items described above was outlined in Chapter Two. In addition, a pilot study was conducted in January, 1984, where an early version of the WEST was administered to twenty kindergarten students. It became clear during the pilot that the early WEST was too long to sustain interest. As a result, several items on the test were modified or dropped to keep the administration of the test under fifteen
minutes. As already noted, a part of section three was dropped due to the difficulty of the task. The original items of the segmentation tasks contained ten words. Again, to maintain the interest of the students, these items were reduced to five words.

Each child was also administered the achievement section of the Kaufman Assessment Battery for Children (K-ABC) (Kaufman & Kaufman, 1983a). This instrument provides an assessment of the child's acquired knowledge and beginning academic skills through five subtests. The Expressive Vocabulary subtest requires the subject to provide the name for an object displayed pictorially. The subtest denoted Faces and Places taps the child's fund of general information by asking the names of various famous people and places displayed pictorially. Next, arithmetic skills are assessed by the Arithmetic subtest which, at this level, includes mainly counting and numeration, simple addition, and subtraction. The Riddles subtest requires abstraction and reasoning. The examiner provides three "clues" such as "What is long, has an eraser, and is used for writing?" The child must grasp the intended object or concept. Finally, the subjects are given the Reading/Decoding subtest which requires the naming of letters and simple words. For all the subtests the criterion set by the manual were followed for establishing a basal level and discontinuing a subtest. A total Achievement Score can be derived from the component subtests. However, this global score consists of the Expressive Vocabulary, Faces and Places, Arithmetic, and the Riddles subtests for children under five years of age while Reading/Decoding is used in place of Expressive Vocabulary for children five years and older. Therefore, this
total score represents different skills for different ages and could not be used for direct comparisons and, thus, was not computed for the subjects.

The parent(s) of each child was/were asked to complete the Iowa Inventory for Parent Assessment of Children's Competencies (IIPACC) (Clark, Crase, & Pease, 1983). This questionnaire consists of 40 items which evaluate the competencies of the child in six areas defined through factor analysis (Clark, Crase, & Pease, 1985). Factor I is labeled Mentally Alert and describes a child who can utilize events to learn readily, remember accurately and communicate effectively. Factor II, Motorically Skilled, describes a child who moves with speed, strength, balance, coordination and flexibility. The third factor, entitled Pleasant, refers to a child whose behaviors toward others are characterized by affection, sharing, thoughtfulness and positive affect. Factor IV, Responsible, describes a child who works carefully and conscientiously at self-initiated and assigned tasks. Factor V, Artistic, describes a child who exhibits interest, involvement and skill in making pictures and crafts. Factor VI, Musical, describes a child who has rhythm, repeats tunes, sings in tune, and makes up words to go with tunes.

The parents also completed a kindergarten developmental survey which provides general demographic data on the child's family (Zeitlin, 1976). In addition, the experimenter added several items which asked the parent to review the child's health history and to predict what level of success they thought their child would experience in school. The parents further rated their child using an abbreviated version of the Burks Behavior Rating Scale: Preschool and Kindergarten Edition (BBRS) (Burks, 1977). The items
selected for rating were those that comprised the Poor Intellectuality, Poor Attention, and Poor Impulse Control subscales of the total instrument. These scales were included because of their relevance to school functioning. The use of the entire scale was prohibitive due to its length.

Along with the direct student testing and parental rating, the teachers involved rated each child with the abbreviated BBRS on two occasions. The first rating occurred in the Spring of 1984, during kindergarten screening clinics, and the second rating was collected in February of 1985 after the students had spent close to six months in kindergarten. The second rating also included a global assessment by the teacher of how the child currently ranked compared to his/her classmates. Four kindergarten teachers and two preschool teachers participated in the first rating and six kindergarten teachers completed the second rating. The original four kindergarten teachers participated in both ratings while the two preschool teachers were replaced by the students' kindergarten ratings for the second data point. In total, eight different teachers participated in the study.

Procedure

At the parent meeting prior to the screening clinic, each parent was given a copy of the informed consent letter and a questionnaire packet. Eighty-nine percent (118) of the parents returned the questionnaire packet. Ninety-five percent (112) of the parents responding were the mothers of the subjects. Each child for whom permission was received was administered the WEST, the K-ABC, and was rated with the BBRS by the teacher. The WEST and
K-ABC were administered in a counter balanced order such that the mean of the second test administered would not be altered due to a practice effect. All testing was conducted in a private area within the school by either a certified school psychologist or certified speech clinician. The initial teacher rating was completed by either the child's preschool teacher or future kindergarten teacher. For the 21 children whose testing was done at the preschool, the rating scale was completed by their preschool teacher who was acquainted with the child for at least eight months. The students who were screened at the regular school were rated by teachers who were acquainted with the students for varying periods of time. With the exception of the 21 students mentioned above, all the children were rated at the culmination of the kindergarten clinic, these clinics varied in length from one half-day to four half-days. Seventy of the children attended four half-day sessions while the remainder attended a single half-day. In February of the following school year (1985), each child was rated by his/her present kindergarten teacher. The subjects originally rated by their preschool teachers were necessarily rated by different teachers in kindergarten. The remaining students were rated by the same teacher at each data point. Of the original 133 students, 116 (87%) were located for follow-up.

Data Analysis

A correlation matrix was computed to determine the extent of relationship among variables and the degree of relationship between the predictor variables and subsequent kindergarten ranking. In view of the
size of the sample and the number of correlations involved, a minimal significance level of $p < .01$ was established.
RESULTS

The purpose of this study was to establish the predictive validity of a comprehensive kindergarten screening battery. To accomplish this purpose, data were gathered on three types of variables. The first variable type was demographic and consisted of 19 items. The second variable type was predictive and consisted of Parent Report (Parent Prediction [1 item]; Parent BBRS [3 items] and IIPACC [6 factor scores]); Teacher Report 1 (TR1) (includes the 3 BBRS ratings made by teachers during kindergarten roundups); and the WEST (11 subtests and total score). The third variable type was achievement and consisted of children's scores on the K-ABC Achievement Test (5 subtests - each reported in raw and standard scores) and Teacher Report 2 (TR2) (includes the 3 BBRS ratings and global rating made by teachers in the middle of the children's kindergarten year).

Three hypotheses, written in the null form, were formulated for testing and are the organizational structure around which the results will be presented. The first hypothesis addresses demographic and predictor variables as they relate to children's achievement. The second hypothesis explores the relationship among demographic and predictive variables. The third hypothesis addresses the internal reliability of the instruments used. It must be noted that the obtained correlation coefficients do not indicate a cause-effect relationship between variables. The intention of the study was to establish an association between the variables identified as predictors and the variables identified as indicative of school success. Although the predictor variables alone cannot predict school success,
educators can use the information in educational planning.

**Null Hypothesis #1**

The Null Hypothesis predicting no relationship between the Comprehensive Screening Battery (CSB), (Teacher Report 1, Parental Report, and the WEST) and the criterion measures of school success (K-ABC and Teacher Report 2) was rejected. The rationale for rejecting this null hypothesis is based on the significant correlations found between the subunits of the CSB and school success measures. Each of the subunits will be addressed in the following sections.

**Demographic Variables**

Table I reports the relationships between demographic variables and school success. A significant relationship between the child's gender and their achievement was noted for one K-ABC subtest. Boys scored higher on the Riddles Raw and Standard scores \((r = -0.30, p < 0.001; r = -0.27, p < 0.01;\) respectively). According to the coding procedure, a positive correlation denotes a higher performance by females on the dependent variable while negative correlations indicate higher male scores. The exception to this is on the BBRS Poor Intellectuality, Poor Attention, and Poor Impulse Control ratings where the reverse holds (i.e., a negative correlation denotes a higher rating of females) because higher ratings on the BBRS scales reflect poorer performance.

Three significant relationships were found between age and the K-ABC (Table II). A correlation of .24 \((p < 0.01)\) was found between age and both
the Arithmetic Raw Score and the Riddles Raw Score. Interestingly, a significant negative relationship existed between age and the Reading/Decoding Standard Score ($r = -0.35, p < 0.001$). In addition, a significant positive relationship resulted between the children's age and the WEST Total Score ($r = 0.24, p < 0.01$, see Table VI).

No significant relationships were found between preschool attendance and school success for this sample of children. Since the mothers were living for all children for whom demographic information was available, no correlation coefficients were computed for this variable. One significant negative relationship emerged for the variable Father Living. That is, children with deceased fathers scored significantly lower on the Arithmetic Standard Score ($r = -0.26, p < 0.01$).

Parent's education served as a significant predictor for numerous measures of achievement. In fact, all correlations between Father's Education and children's performance on the K-ABC reached at least the $p < 0.01$ level of significance. The strongest K-ABC subscore relationships with Father's Education existed for Arithmetic Standard Score ($r = 0.39, p < 0.001$) followed by Faces and Places Standard Score ($r = 0.36, p < 0.001$) and Arithmetic Standard Score ($r = 0.34, p < 0.001$). Riddles Standard Score and Reading/Decoding Raw and Standard Scores all resulted in correlations of 0.32 ($p < 0.01$). A correlation of 0.30 ($p < 0.01$) was found between the Faces and Places Raw Score and Father's Education. The remaining K-ABC subtest scores, i.e., Vocabulary Raw and Standard Scores and Riddles Raw Score resulted in correlations of 0.28, 0.28, and 0.27; respectively (all $p < 0.01$). In addition, a correlation of 0.34 ($p < 0.01$) was found between Father's
Education and the Teacher's Global Rating of children's academic ranking in comparison to their kindergarten classmates.

Similar relationships were observed between Mother's Education and academic achievement. Again, all correlations between educational level of mothers and their children's performance on the K-ABC were significant. The following correlations reached the p < .001 level of significance: Faces and Places Standard (r = .44), Vocabulary Standard (r = .40), Vocabulary Raw (r = .39), Faces and Places Raw (r = .37), and Arithmetic Standard (r = .33). Correlations between Mother's Education and children's K-ABC subtest performance reaching the p < .01 significance level were Riddles Standard (r = .31), Reading/Decoding Raw and Standard (r = .30), Arithmetic Raw (r = .27) and Riddles Raw (r = .27). A correlation of .31 (p < .01) was noted between maternal educational level and the Teacher's Global Rating of children's academic ranking.

The marital status of the children's parents significantly related to four K-ABC subtests. Children from single-parent homes fared less well on the Vocabulary Raw Score (r = -.26, p < .01), Faces and Places Raw Score (r = -.26, p < .01), Faces and Places Standard Score (r = -.25, p < .01), and Arithmetic Raw Score (r = -.25, p < .01). Further, a correlation of -.33 (p < .01) resulted between children from single-parent homes and the kindergarten teacher's academic ranking of these students.

Parental age proved to be a poor predictor of school achievement. The only significant relationship revealed was between Mother's Age and the children's K-ABC Riddles Raw Score (r = .26, p < .01). No relationships were noted between the children's ordinal position and measures of academic
Parent Report Variables

One purpose of this study was to assess the value of parental input into the screening process. Many important variables which may impact upon subsequent achievement can only be reported by parents. For this reason, three assessment instruments were employed to determine parent report. The instruments included: Kindergarten Developmental Screening (KDS), Burks Behavior Rating Scales (BBRS), and the Iowa Inventory for Parent Assessment of Children's Competencies (IIPACC) (see Appendix C). Correlations of parent report variables with achievement variables are shown in Table III.

The health history items used on the KDS portion of the screening battery were not predictive of future kindergarten success and thus were not reported on the Tables. Other KDS items such as the frequency in which parents read to their children and parental prediction of their child's kindergarten success proved to be significant predictors of school success. A correlation of .39 (p < .001) was revealed between frequency of Parental Reading and Children's Performance on the K-ABC Arithmetic Standard Score. Additionally, Parental Reading correlated .35 (p < .001) with children's Faces and Places Standard Score; .34 (p < .001) with children's Vocabulary Standard Score; and .33 (p < .001) with children's Vocabulary Raw, Faces and Places Raw, and Arithmetic Raw Scores. Parental Reading also significantly correlated (r = .32, p < .001) with children's Reading/Decoding Standard Score; with Riddles Standard Score (r = .30, p < .01); and with Reading/Decoding Raw Score (r = .26, p < .01). A correlation of .32 (p < .01)
resulted between Parental Reading and the kindergarten teachers' Global Rating of children's academic ranking.

Parental prediction of their children's kindergarten performance correlated significantly with children's: K-ABC Arithmetic Raw Score (r= .32, p < .001); Reading/Decoding Raw Score (r= .32, p < .001); Arithmetic Standard Score (r= .31, p < .01); Faces and Places Raw Score (r= .28, p < .01); Faces and Places Standard Score (r= .28, p < .01); and Reading/Decoding Standard Score (r= .28, p < .01). Parental prediction correlated significantly (r= .40, p < .001) with teachers' Global Rating of children's academic ranking.

Several significant relationships occurred between the parents' BBRS ratings and their children's achievement. Since, on the BBRS, a high score given by the parent constitutes a poor rating of the child, negative correlations indicate agreement between good ratings of their children by parents and good performance on the achievement measures. Negative correlations did result between poor intellectuality and the K-ABC Arithmetic Standard Score (r= -.35, p < .001); the Arithmetic Raw Score (r= -.31, p < .001); and the Reading/Decoding Standard Score (r= -.25, p < .01). Poor attention significantly correlated with the Arithmetic Standard Score (r= -.30, p < .01); the Reading/Decoding Standard (r= -.27, p < .01) and Raw (r= -.25, p < .01) Scores; and the Arithmetic Raw Score (r= -.27, p < .01). Poor attention also correlated significantly with the Teachers' Global Rating (r= -.32, p < .01). No significant relationships emerged between parental ratings on the BBRS subscale of Poor Impulse Control and children's achievement.
Of the six IIPACC Scales, the parents rating of their children on the Mental Alertness Scale was the best predictor of the academic achievement scores. Mental Alertness correlated at or beyond the p <.001 level of significance on nine of the fourteen achievement scores. These correlations ranged from .48 (p <.001) for the Faces and Places Standard Score to .34 (p <.001) for the Vocabulary Raw and Standard Scores (see Table III). Artistic Ability resulted in seven significant correlations, with teachers' Global Rating (r = .45, p <.001) demonstrating the highest magnitude. Similarly, Musical Ability demonstrated seven significant correlations. Again, the highest correlation (r = .40, p <.001) occurred with the teachers' Global Rating. No significant relationships were observed between achievement measures and Motoric Skill, Responsibility Taking, and Pleasantness.

Teacher Report Variables

Teachers provided ratings on two occasions. During kindergarten roundup activities (TR1) the teachers rated each student on the three BBRS subscales. The second rating (TR2) occurred during the middle of the subsequent kindergarten year at which time the teachers again rated the children on the BBRS and also provided an overall rating of the children's academic ranking (1=poor, 5=excellent) in comparison to his/her classmates. TR1 served as a predictor of success while TR2 served as a criterion measure of school success. Table IV depicts relationships between the TR1 scores and concurrent achievement as measured by the K-ABC, which was also administered during kindergarten roundup, and subsequent achievement as
measured by TR2. The TR1 Poor Attention Scale of the BBRS demonstrated the strongest relationship with achievement. Thirteen of fourteen Poor Attention correlations reached significance with the highest correlations existing for the Arithmetic Raw Score ($r = -0.51$, $p < 0.001$) and TR2 Poor Attention rating ($r = 0.52$, $p < 0.001$). Ten of fourteen correlations were significant for TR1 Poor Intellectuality while only four of fourteen significant relationships emerged for TR1 Poor Impulse Control. In all, 7 of 12 correlations were significant between TR1 and TR2 and 20 of 30 correlations were significant between TR1 and the K-ABC. (Again, because of the scoring system, negative correlations indicated agreement between TR1 and achievement while positive correlations indicated agreement between TR1 and TR2 ratings.)

**Worthing Early Screening Test**

Correlations of achievement variables with the WEST are presented in Table V. The children's performance on the WEST Total Score resulted in highly significant correlations with the K-ABC (e.g., Arithmetic Raw Score ($r = 0.71$, $p < 0.001$) and TR2 Global Rating ($r = 0.68$, $p < 0.001$). Significant correlations were noted between the WEST and most of the K-ABC subtests (105 of 120 possible) and 26 of 48 significant relationships resulted between the WEST and TR2 scores. The TR2 Poor Impulse Control Scale demonstrated the weakest overall relationship to the WEST as no significant relationships were noted.

To further analyze the utility of the WEST in predicting academic performance, a ratio of "hits" and "misses" was computed. (See Figures 2a
For example, when a child's score fell into the same category (poor or good) on both the WEST and the teachers' Global Rating, a "hit" was recorded. Likewise, a poor score on one assessment measure and a good score on another resulted in a "miss". The criterion of a poor score on the WEST and K-ABC was one standard deviation below the mean (32 and 85, respectively) while a poor score on the teacher's Global Rating was a two or below (on a scale of 1 to 5 with a mean of 3.40 and a standard deviation of 1.07). In order for a subject to receive a good score on the K-ABC all five subtests had to exceed 85. If one subtest fell at or below 85, the test was scored as poor. This method of scoring was chosen over using an overall K-ABC score as it was felt important to identify weaknesses in any academic area.

| Global Rating |
| | Poor | Good |
| WEST | | |
| Poor | 10 | 9 |
| (9%) | (8%) |
| Good | 7 | 86 |
| (6%) | (77%) |
| | | Hits = 96 86% |
| | | Misses = 16 14% |
| | | N = 112 |

Figure 2a. Concordance between WEST and teachers' Global Rating

| Global Rating |
| | Poor | Good |
| K-ABC | | |
| Poor | 19 | 6 |
| (14%) | (5%) |
| Good | 25 | 81 |
| (19%) | (62%) |
| | | Hits = 100 76% |
| | | Misses = 31 24% |
| | | N = 131 |

Figure 2b. Concordance between WEST and K-ABC
Using the Teachers' Global Rating as a criterion for school success, the WEST correctly predicted 86% of the students' performance. Only seven students (6%) who "passed" the WEST were rated as below average by their teachers. Thus, the WEST "missed" these students. Due to the more conservative scoring procedures for determining concordance between the WEST and the K-ABC, the hit rate was somewhat lower (76%). Since the student could conceivably do well on four of the five K-ABC subtests and still "fail" the K-ABC, a larger percentage of students were misidentified by the WEST (24%). However, in spite of the difficulty in predicting a diversity of skills, the WEST correctly categorized over three-fourths of the sample.

In summary, the Null Hypothesis predicting no relationship between the Comprehensive Screening Battery and school success was rejected. Several demographic characteristics, especially parental education, were significantly related to school achievement. In addition, parent report items such as Parental Reading and Mental Alertness (IIPACC) resulted in significant correlations with the achievement measures. Teacher reports also significantly correlated with school success and the WEST proved to be highly predictive of K-ABC performance and teachers' Global Ratings. All these findings contributed to the rejection of the stated Null Hypothesis.

**Null Hypothesis #2**

The second null hypothesis predicting no relationship between the various demographic and predictor variables was rejected. The purpose of this hypothesis was to determine the strength of relationships among the variables included in the Comprehensive Screening Battery. The rationale
for rejecting this null hypothesis is based on the significant relationships found and which will be addressed in the following sections.

Demographic and Predictor Variables

Table VI presents the correlations among demographic variables and the predictor variables of the Comprehensive Screening Battery. Only one significant relationship was noted regarding child's gender. Girls were rated higher by parents on the Musical Ability factor of the IIPACC \( (r = .34, p < .001) \). Although the age range of the subjects at the beginning of this study was rather narrow (56 months to 71 months) two age-related correlations were noted. Older children performed significantly better on the WEST Word Memory 1 subtest \( (r = .27, p < .01) \) and Total Score \( (r = .23, p < .01) \). No significant relationship resulted for Preschool Attendance or Father Living (mothers of all subjects were living so no correlation coefficient was computed for that variable). However, Fathers' Education was related to several variables. Fathers' Education significantly correlated with Parents' Prediction of how their child would do in school \( (r = .35, p < .001) \), the parent rating on the Poor Intellectuality scale of the BBRS \( (r = -.32, p < .001) \) and the Mental Alertness Factor of the IIPACC \( (r = .42, p < .001) \). In addition, significant relationships were found between Fathers' Education and the WEST scores on Rhyming \( (r = .29, p < .01) \), Digit Recall \( (r = .31, p < .01) \), Rote Counting \( (r = .27, p < .01) \), and the Total Score \( (r = .34, p < .01) \). Fathers' Age was significantly correlated only to the parents' rating on the Poor Impulse Control scale of the BBRS \( (r = -.26, p < .01) \) and the WEST Total Score \( (r = .26, p < .01) \).
Mothers' Age resulted in significant correlations with the WEST subtests of Word Memory 1 (r = .31, p < .01), Syllable Blending (r = .25, p < .01), Phoneme Blending (r = .26, p < .01), Rhyming (r = .28, p < .01), and the Total Score (r = .39, p < .01). The variable of Mothers' Education produced a significant correlation with the IIPACC Mental Alertness factor (r = .37, p < .001) and the WEST scores on Word Memory 1 (r = .27, p < .01), Rhyming (r = .33, p < .001), Digit Recall (r = .28, p < .01), Rote Counting (r = .27, p < .01), and the Total Score (r = .38, p < .001). Although only three significant relationships were observed between Marital Status and the components of the Comprehensive Screening Battery, the advantages found were in favor of two-parent households. Correlations of .26 and .27 (both p < .01) were noted between Marital Status and parents ratings on the BBRS scales of Poor Attention and Poor Impulse Control, respectively. (A higher score on the code sheet indicated a single-parent household and a higher score on the BBRS indicates poorer performance.) Children of single parent homes also scored less well on the WEST Phoneme Blending task (r = -.25, p < .01). No relationships resulted between Ordinal Position and the components of the Comprehensive Screening Battery.

Table VII presents the relationships between parent report variables and the WEST and TRI. As stated earlier, no significant relationships emerged between the parent report of the child's early health history and the other Comprehensive Screening Battery variables. However, parent report of the frequency in which they read to their children did significantly correlate with the TRI Poor Attention rating (r = -.30, p < .01) and the WEST scores including DAP (r = .25, p < .01), Rhyming (r = .26,
p < .01), Rote Counting (r = .29, p < .01), 1-to-1 Counting (r = .28, p < .01), and the Total Score (r = .31, p < .001) (Table VII). Parental Prediction of their child's subsequent school performance achieved significance with four WEST scores: Syllable Blending (r = .40, p < .001); Digit Recall (r = .37, p < .001); Rote Counting (r = .28, p < .01); and WEST Total Score (r = .35, p < .001).

Little communality existed between the parents' and teachers' (TR1) BBRS rating for Poor Intellectuality. A significant correlation did emerge between the parents' and teachers' rating on Poor Attention (r = .26, p < .01). Further, parents' rating for Poor Impulse Control was predictive of teachers' rating on Poor Attention (r = .35, p < .001) and Poor Impulse Control (r = .36, p < .001). Two significant correlations were noted between parents' rating on Poor Intellectuality and the WEST: Digit Recall (r = -.24, p < .01) and Rote Counting (r = -.28, p < .01). The parents' rating on Poor Attention revealed a correlation of -.28 (p < .01), -.33 (p < .001), -.30 (p < .01) and -.33 (p < .001) with WEST Syllable Blending, Phoneme Blending, Digit Recall, and the Total Score, respectively. No significant correlations were found between the parents' Poor Impulse Control ratings and the WEST.

Three factors on the IIPACC demonstrated significant relationships with TR1 BBRS ratings and the WEST. The IIPACC Mental Alertness factor exhibited the highest number of significant relationships (6 out of 15 possible) ranging from correlations of .42 (p < .001) with Digit Recall to .25 (p < .01) with Vocabulary on the WEST and a correlation of -.26 (p < .01) with teachers' BBRS Poor Attention rating. Significant correlations were
found between Artistic Ability and four WEST scores and one such relationship was found between Musical Ability and the WEST: Digit Recall ($r = .33$, $p < .001$).

Table VIII presents the correlations between TR1 and the WEST. The TR1 teachers' ratings on the BBRs Poor Attention scale resulted in significant correlations with the following WEST scores: Rote Counting ($r = -.43$, $p < .001$), Total ($r = -.42$, $p < .001$), Syllable Blending ($r = -.41$, $p < .001$), Vocabulary ($r = -.32$, $p < .001$), DAP ($r = -.27$, $p < .01$), Digit Recall ($r = -.25$, $p < .01$), and Rhyming ($r = -.25$, $p < .01$). Poor Intellectuality correlated to a significant degree with Syllable Blending ($r = -.39$, $p < .001$), Total ($r = -.34$, $p < .001$), Rote Counting ($r = -.30$, $p < .001$), Word Memory 1 ($r = -.29$, $p < .01$) and Vocabulary ($r = -.27$, $p < .01$). Only three significant correlations were observed for Poor Impulse Control and the WEST with the highest being $-.29$ ($p < .001$) for Rote Counting.

Null Hypothesis #3

The third null hypothesis proposed for this study addressed the internal reliability of the instruments used. Since various traits were measured via different reporters and methods, it is important to determine if, in fact, different abilities were being measured. If a single reporter or test does not discriminate among different subject attributes, a "halo effect" could be inferred which would contraindicate the use of a multifaceted approach. A convergent-discriminant approach as suggested by Campbell and Fiske (1959) was utilized informally to discriminate among within subject abilities. For example, higher correlations would be
expected between two scales proposing to measure mental ability than between a scale assessing mental ability and one evaluating motor skill. If no such difference was noted an overall global rating would serve the same purpose as a multidimensional rating.

For the purpose of this study, a correlation coefficient reaching the p < .001 level of significance was selected to indicate dependence between two variables. For the present sample size (133), a correlation of .29 results in a p < .001 significance level. Although a correlation of .29 depicts a highly significant relationship between two variables, the coefficient of determination (r²) of this value accounts for only 8% of the variance existing between the variables. However, the selection of this value provides a conservative test of the third null hypothesis. Furthermore, since correlations greater than .5 are relatively rare in the social sciences (McCall, 1970), a relatively low correlation was designated to suggest relative dependence between two variables.

Intercorrelations Among Parent Report Variables

Table IX presents the intercorrelations among parent report variables. Only variables reflecting parental assessment of the child's present functioning were included. The Health History and Parent Read variables were excluded as they relied on parents' memory, their own behavior, and not their current assessment of their child's functioning. Parents overall prediction of their children's future success was significantly related to the IIPACC Mental Alertness factor (r = .70, p < .001). While all IIPACC factors were significantly related to Parent Prediction, none approached
the magnitude of Mental Alertness. No significant relationships emerged between Parental Prediction and parental rating of their children on the three BBRS scales.

The parents' BBRS Poor Intellectuality rating significantly correlated with their ratings on both Poor Attention (r = .55, p < .001) and Poor Impulse Control (r = .54, p < .001). Additionally, Poor Intellectuality demonstrated a significant negative relationship with the IIPACC factor of Mental Alertness (r = -.43, p < .001). Significant correlations were also noted between Poor Intellectuality and Musical Ability (r = -.30, p < .01) and Pleasantness (r = -.25, p < .01), but not with Motor Ability, Responsibility Taking, and Artistic Ability. The communality among the parents' rating on the BBRS scales was also demonstrated by the .71 correlation (p < .001) between Poor Attention and Poor Impulse Control.

Poor Attention significantly correlated with five of six IIPACC factors: Responsibility Taking (r = -.38, p < .001); Artistic Ability (r = -.38, p < .001); Musical Ability (r = -.35, p < .001); Mental Alertness (r = -.34, p < .001); and Pleasantness (r = -.25, p < .01). Parents' rating of their children on Poor Impulse Control achieved a significant correlation with only Responsibility Taking (r = -.28, p < .01) on the IIPACC.

The correlation matrix computed for the IIPACC variables reveals that Mental Alertness is significantly correlated to every other factor at the p < .001 level of significance. In addition to the significant relationship with Mental Alertness, Motor Ability achieved a significant correlation with Musical Ability (r = .39, p < .001). Significant correlations existed between Responsibility Taking and Pleasantness (r = .43, p < .001) and Musical
Ability (r = .36, p < .001). As was noted, Pleasantness correlated significantly with Mental Alertness and Responsibility Taking. In addition, a significant relationship was evidenced with Musical Ability (r = .45, p < .001). Musical Ability also appeared to be a somewhat general factor in that significant correlations existed between this factor and all other IIPACC factors at the p < .001 level of significance.

Intercorrelations Among Teacher Report Variables

The internal consistency of the BBRS was exhibited through both teacher ratings (see Table X). On TR1, Poor Intellectuality correlated to a significant degree with both Poor Attention (r = .76, p < .001) and Poor Impulse Control (r = .57, p < .001). Further, a significant relationship resulted between Poor Attention and Poor Impulse Control (r = .79, p < .001).

Table X also presents the correlations between TR1 and TR2 BBRS ratings. TR1 occurred during kindergarten roundups in the spring prior to kindergarten entrance and rating two occurred in February of the kindergarten year. Of the six teachers who completed the second rating, four had also completed the first rating. The other two teachers involved in the first rating were preschool teachers and as such were not the children's teachers at the time of the second rating. The children's kindergarten teachers completed the second rating. Therefore, there was a 66% overlap between the two groups. The obtained correlations reflected the existence of different raters and the ensuing time span. TR1 rating of their students on Poor Attention resulted in a .52 correlation (p < .001) with the TR2 rating on the same scale. A significant correlation was also
obtained between TR1 and TR2 on Poor Impulse Control ($r = .42, p < .001$). However, significance was not reached between the two rating points for Poor Intellectuality ($r = .24, p > .01$). In fact, TR1 Poor Intellectuality correlated to a significant degree only with the Global Rating ($r = -.37, p < .001$) on the TR2 ratings. TR1 Poor Impulse Control achieved significant correlations with TR2 Poor Attention ($r = .39, p < .001$) and TR2 Poor Impulse Control ($r = .42, p < .001$). TR1 Poor Attention was significantly related to all four TR2 BBRS scales at a $p < .001$ level of significance.

Internal reliability for the TR2 BBRS scales also is presented in Table X. All intercorrelations achieved the $p < .001$ level of significance with the relationship showing the greatest magnitude existing between Poor Intellectuality and the Global Rating ($r = -.76$) and followed closely by Poor Attention x Poor Impulse Control ($r = .75$).

**Intercorrelations Among WEST Variables**

Table XI depicts the correlation matrix of the 12 WEST scores. The DAP subtest correlated at the $p < .001$ level of significance with six other subscales, including a correlation of .63 with the Total Score, and at a $p < .01$ significance level with two subscales. Four correlations reached the $p < .001$ significance level with the Word Memory subtest ($r = .48$ with Total Score) and two correlations reached the $p < .01$ level. Syllable Blending demonstrated nine intercorrelations at the $p < .001$ degree of significance including a .68 correlation with the Total Score. Of the seven significant correlations for Phoneme Blending, five reached $p < .001$. A .64 correlation resulted between Phoneme Blending and Total Score.
Rhyming exhibited nine significant relationships, of which seven reached p < .001. The correlation between Rhyming and the Total Score was .71. Vocabulary revealed four intercorrelations at the p < .001 significance level and two to the p < .01 level. Vocabulary and Total Score demonstrated a relationship of r = .46 (p < .001).

The WEST subscale of Digit Recall demonstrated significant relationships with nine other scales; seven at p < .001 including a .60 correlation with the Total Score. Rote Counting was found to be significantly related (p < .001) to ten other subtests with a .68 correlation with the Total Score. Significant correlations resulted between eight WEST variables and 1-to-1 Counting; five at the p < .001 level. The relationships sharing the greatest communality with 1-to-1 counting were Rote Counting (r = .48, p < .001) and the Total Score (r = .48, p < .001). Three correlations at the p < .001 level of significance and four at the p < .01 level were found for Conservation which also had a correlation of .55 with the Total Score. Two significant correlations were found for the Word Memory 2 subtest: Total Score (.36, p > .001) and Vocabulary (.25, p < .01).

As another measure of intra-test reliability a coefficient alpha was computed for the eleven subtests with the Total Score of the WEST. The resulting coefficient was .74.

An analysis of the correlations among the WEST subscales reveals numerous significant relationships. It is recognized that these relationships are biased, i.e., more significant because of the part-whole relationship existing between the individual scales and the Total Score.
However, with the general exception of the correlations with the Total Score, the magnitude of the relationships among the WEST subscales would suggest that the subscales are, in fact, relatively independent of each other. That is, the individual subscales are tapping separate abilities. By contrast, the correlation matrix presented in Table XII presents the communality among K-ABC subtests. Without exception, intercorrelations among all subtests reached a p<.001 level of significance which would suggest that all five subtests are significantly related to a general achievement factor.

The null hypothesis predicting no significant relationships among the subscales of the predictor instruments (i.e., Parent Report, Teacher Report, and WEST) was, in general, not rejected. Although significant relationships did exist among certain subscales of the three predictors, the lack of significant correlations among many of the subscales suggested that different child characteristics were identified and differentiated from one another. For example, out of 45 intercorrelations existing among Parent Report variables only 22 met the criterion of a p < .001 level of significance. (Since the sample size was somewhat smaller for Parent Report, a correlation of .33 was necessary to reach the p < .001 level of significance.) As expected, scales designed to measure similar characteristics demonstrated a higher degree of shared variance (e.g., IIPACC Mental Alertness and Parent Prediction of success in school, $r^2 = .49$) than did dissimilar scales (e.g., IIPACC Motor Skill and BBRS Poor Impulse Control, $r^2 = .00$).
A higher degree of communality was revealed among the teacher ratings on the BBRS. Intratest correlations at the same data points were highly significant and supported the utility of a single global rating by the teacher rather than four separate scales (i.e., Poor Intellectuality, Poor Attention, Poor Impulse Control, and Global Rating). Conversely, only 25 of 55 intratest correlations on the WEST achieved a p < .001 level of significance, thus indicating relative independence among the majority of the subscales. Again, similar subscales demonstrated a higher level of shared variance (e.g., Rote Counting and One-to-One Counting, $r^2 = .23$) than did dissimilar scales (e.g., DAP and Word Memory, $r^2 = .01$).
TABLE 1
CORRELATIONS OF CHILD'S ACHIEVEMENT VARIABLES WITH DEMOGRAPHIC VARIABLES

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**.001 Significance Level.
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* .01 Significance Level.

** .001 Significance Level.
### TABLE 10
INTERCORRELATIONS OF WEST SUBSCALES

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<th>WEST SUBSCALE</th>
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<td>3. Syllable Blending</td>
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<td>7. Digit Recall</td>
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* .01 Significance Level.
** .001 Significance Level.
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<td>3. Arithmetic</td>
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<td>4. Riddles</td>
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<tr>
<td>5. Reading/Decoding</td>
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</table>

* .01 Significance Level.

** .001 Significance Level.
DISCUSSION

Parental Report

Out of all the demographic variables reported by the parents in this study parental educational level proved to be most highly related to school performance. This finding supports Bee et al.'s (1982) review of several research studies that found maternal education level to be significantly correlated with intelligence and school achievement. Bee et al. (1982) go beyond a strictly heredity explanation for this conclusion and suggest that parents with lower education levels are less able to adapt to the changing demands of a child and to create or use support systems for themselves.

Parental report of early health factors did not serve to predict school success in this sample. Two possible explanations may account for this finding. First, this sample was representative of the population at large, and was thus quite healthy. While a history of pregnancy and birth complications has been found in identified learning-disabled students (Colletti, 1979) only minor correlations emerge between perinatal status and subsequent intelligence within a non-identified, healthy sample (Bee et al., 1982). Secondly, retrospective parental reporting can result in inaccuracies not observed in concurrent reporting and thus could reduce predictive validity (Meltzer et al., 1983).

Meltzer et al. (1983) and Ireton et al. (1981) have demonstrated the concordance between parental reports and professionals' assessment of children's behavior and academic skills. The IIPACC and BBRS ratings provided the same type of information. Significant correlations were found
between parental rating of intellectual skills and academic performance. Parents' rating of intellectual ability appears to be their most useful input into the evaluation process; although parental rating of their children's ability to attend to academic tasks also provides essential information. Other child characteristics rated by parents, though informative, did not prove to be as predictive of school achievement in this study.

The somewhat low magnitude of the correlations among parent report and achievement variables was expected and, perhaps, desired. Families have different needs than classrooms and success in the former is not necessarily contingent upon the latter. In fact, the child's true measure of success in life may not be evident until after graduation from high school. Parents look at different things than schools. The child has an entire repertoire of behaviors; some of which lead to school success and some which may not be called upon in school. For example, the Pleasantness scale on the IIPACC assesses characteristics which the parents certainly value and will serve the child throughout his/her life. Although these characteristics will assist the child in school, pleasantness itself will not boost achievement scores.

The frequency of parental reading to their children and their prediction of academic success appear to tap the parents' general attitude toward school; an attitude which can affect the child's performance in school. The questions employed did demonstrate that, in general, parents prefer to report positively about their children. The parents indicated that they read very frequently to their child and that they felt the child
would do very well in school.

On the other hand a "halo-effect" was not observed. Parents accurately discriminated among the different scales contained within the battery. While some scales, such as parental prediction of success in school and Mental Alertness, resulted in significant correlations (r = .70) other less-related skills, such as Poor Impulse Control and Motor Ability, demonstrated no relationship (r = -.03). Thus, parents did not tend to rate their children good on every area and, as such, their ratings can be interpreted as reliable and valuable.

As expected, the IIPACC Mental Alertness factor significantly correlated with several K-ABC, WEST, and teacher rating scores. However, somewhat unexpectedly, the Artistic factor was virtually equivalent to the Mental factor in predicting the WEST Total score and the teachers' Global Rating. Apparently, these two factors do share a common ability that contributes to academic performance. In addition, the Musical Ability factor significantly predicted kindergarten teachers' ratings. Motor Skill, Responsibility, and Pleasantness showed no relationship to academic performance.

Teacher Ratings

The validity of teacher ratings for predicting subsequent school performance has been well documented (Becker & Snider, 1979; Glazzard, 1979; Partenio & Taylor, 1985; Perry et al., 1979; Stevenson et al., 1976; Tollefson et al., 1985). However, existing studies have assessed teachers' rating after interacting with the students for at least three months. The
present study demonstrates that teachers can accurately predict subsequent performance after exposure to the student for less than one week. The finding, however, was somewhat confounded by the fact that 21 of the children were rated by their preschool teachers who were well-acquainted with the students. Moreover, the communities in which the schools were located were small and the teachers' acquaintance with the students outside of school was not controlled.

In general, the teachers' BBRS rating during the kindergarten round-up period did contribute to the prediction of the children's concurrent and subsequent academic performance. This is especially true when evaluating students' attentiveness and intellectual skills. The ability of the student to control his or her impulses (BBRS Poor Impulse Control) was either not accurately identified within that short period of time or not highly predictive of future school performance as a low correlation resulted between this scale and kindergarten performance.

In addition, teachers' rating during kindergarten round-up evinced substantial internal reliability. High correlations were observed between Poor Intellectuality and Poor Attention ($r = .76$) and between Poor Attention and Poor Impulse Control ($r = .79$). A somewhat lower relationship was found between Poor Intellectuality and Poor Impulse Control ($r = .57$).

With a correlation of $0.52$, the BBRS Poor Attention scale showed the most consistency between the two teacher rating points (i.e., at kindergarten round-up and during the kindergarten year). Apparently, student behaviors which contribute to this rating are persistent over
several months time. Moreover, the Teacher 1 Poor Attention rating displayed the highest correlation \(r = -0.46\) with the kindergarten teachers' Global Rating among all BBRS scales. Hence, the ability to attend to the teacher within a group setting appears to be a significant predictor of kindergarten success.

At the second rating point, the teachers' rating of Poor Intellectuality was more significantly related to overall achievement than was Poor Attention, although each scale was related at a \(p < 0.001\) significance level. Apparently, the kindergarten teacher places higher priority on cognitive performance than attending behavior when assessing academic competence. Again, the ability to control impulses was less related to achievement than either Poor Intellectuality or Poor Attention.

The importance of cognitive abilities in school functioning identified here reinforces a similar finding by Stevenson et al. (1976). Further, Stevenson et al.'s contention that brief rating scales are as effective as extensive scales, at least for the early grades was supported. The abbreviated version of the BBRS used in this study is comprised of 17 items, five of which comprise the Poor Impulse Control scale which was found to be an ineffective predictor variable. Therefore, 12 items appeared to significantly predict future school success. Additionally, a single global rating provided by the kindergarten teacher midway through the kindergarten year resulted in the highest correlations with academic predictor variables (WEST and K-ABC). Although the global rating was used as a dependent variable in this instance, the rating's close relationship with a readiness test and a standardized achievement test revealed the
shared variance among these measures.

That parents and teachers perceive the child in a similar frame of reference is demonstrated by the significant correlations between the ratings for the two groups. Significant correlations resulted between parents and teachers when rating children's attention and impulse control. Apparently, there is commonality for these behaviors between the home and school settings. However, no relationship surfaced between parents and teacher ratings of children on the BBRS Poor Intellectuality scale. Thus, the criteria a teacher looks for in judging intellectual competence appears to differ from that of the parent. This finding is not totally unexpected as the demands placed on a child differ significantly between the home and school.

Virtually no relationship existed between the IIPACC and the Teacher 1 BBRS rating, probably because the IIPACC attempts to measure overall child competence, not just school performance (Clark, Crase, & Pease, 1985). This is an important point as, although school success has been operationally defined by performance on the K-ABC and teacher ratings, success in the larger sense (i.e., social adaption) may be more accurately reported by parents.

WEST

The WEST proved to be a significant predictor of subsequent school achievement. Consistent with previous investigations, tasks involving sound segmentation and blending contributed to the WEST's ability to predict reading achievement (Beech & Harding, 1984; Calfee, Lindamood, &
Lindamood, 1973; Fox & Routh, 1975, 1976, 1980; Helfgott, 1976; Knochnower, Richardson, & DiBenedetto, 1983; Mann & Liberman, 1984; Wallach et al., 1977; Zifcak, 1981). However, these segmentation/blending skills also correlated with academic skills not confined to word recognition. For example, the segmentation task involved in rhyming was significantly related ($p < .01$) to all five subtests on the K-ABC. The Syllable and Phoneme blending subtests were similarly related to the K-ABC. As such, support was provided to Backman's (1983) contention that there are perhaps few real prerequisites to reading acquisition, but that a number of facilitators to reading development exist. What, in fact, the segmentation and rhyming tasks may be measuring is the general ability to recognize and utilize the invariant features of the sound stream as suggested by Gibson (Gibson, 1969; Gibson & Levin, 1975). Since virtually every intellectual task requires a variety of skills and knowledge other than those the task was designed to measure (Flavell, 1977), the results of the present study could also suggest that phonological awareness is related to overall intelligence which underlies school achievement in general.

Although word knowledge is an excellent predictor of general intelligence (Sternberg, 1984) the vocabulary section of the WEST resulted in only a mild correlation with kindergarten performance. This is due, perhaps, to the small range of words contained within the vocabulary test. Out of a possible seven words the average score was 6.18 correct with a standard deviation of .56, which indicates that most children correctly defined virtually all of the words. This ceiling effect reduced the potential for a strong correlation. Despite the results, it appears that a
longer and/or more difficult vocabulary section might serve as an important part of a screening battery. In fact, given the average score on the vocabulary section, a child who was unable to define the words included on the WEST would raise concerns regarding his or her language development.

That the number recall memory task was a significant predictor of kindergarten teachers' ratings of achievement was consistent with previous findings (Das et al., 1984; Kagen, 1983; Torgesen & Greenstein, 1982). As such, short-term memory appears to play an important role in performance on academic tasks as suggested by Das et al. (1984) and Torgesen and Greenstein (1982). However, another short-term memory task, Word Memory 1, did not predict academic performance as well which suggests that short-term memory is not a unitary ability, but is comprised of different types of processing skills (Torgesen & Greenstein, 1984).

Interestingly, Word Memory 2, which required the students to retain a list of five words for about ten minutes, did not significantly correlate with subsequent kindergarten performance. This task allowed for the use of more extensive mnemonic strategies than the simple digit recall test. Subjects could have employed elaboration strategies such as creating verbal relationships between the words to enhance recall. An example of an elaboration strategy would be to form a sentence containing all the words to be recalled such as, "In the house in the forest at night the cat sat on the table." The child could also have formed a mental image of the scene which could also serve to enhance recall. The fact that proficient students demonstrated no advantage over poorer students on this task would suggest that no spontaneous mnemonic strategies were employed. This
conclusion is in agreement with Pressley's (1982) review which indicated that, although five- and six-year-old children can benefit from simple imagery-generation instruction, young elementary children do not spontaneously employ such strategies. Results from other studies have shown that such spontaneous use of memory strategies differentiates "mature" from "immature" learners (Cavanaugh & Perlmutter 1982). The present study corroborates the assertion that kindergarten students as a whole are still "immature" in their memory skills. Consequently, no strong relationship emerged between Word Memory 2 and later academic performance.

Simple rote counting proved to be a potentially useful predictor of kindergarten teachers' Global Ratings. In fact, the score on Rote Counting was second only to the Total WEST score in predicting teachers' ratings. Rote counting is a skill that a child is exposed to early in life and reinforced by the environment (i.e., parents, relatives, television, preschool). Therefore, by the age of five this task has taken on major relevance for the child. Children who are proficient rote counters prior to entering kindergarten show promise for future school success while deficiency in the skill may portend academic difficulties. The strong correlation was based on a two-point scoring system for rote counting. The student received a score of one if he or she was able to count to ten without error and a score of two for counting to 20. Thus, those students who were able to count to 20 prior to entering kindergarten demonstrated great promise for kindergarten success.

One-to-one correspondence counting was not as sensitive a predictor as the prerequisite rote counting. As the pre-kindergarten age many students
are as yet unable to make the correspondence between the number and an object.

The resulting correlations among the conservation task, K-ABC scores, and kindergarten teachers' ratings were mild in degree, although statistically highly significant. Contrary to previous findings utilizing Piagetian tasks (Dudek et al., 1969; Kaufman & Kaufman, 1972; Silliphant, 1983) the Piagetian measure used in this study was not equal to other sources in predictive value. However, the conservation task on the WEST was only a brief assessment of reasoning ability while the studies cited above included more extensive assessments of various Piaget concepts. A more elaborate evaluation of the subjects' preoperational and concrete operational development may have resulted in more significant correlations with academic achievement.

The Draw-A-Person was selected to be the first item on the WEST as it is quick, an enjoyable task for most children, and the scoring system is not affected by the child's drawing ability (Koppitz, 1968). Further, despite questionable reliability (Rubin, Schachter, & Ragins, 1983) the Draw-A-Person maintains significant correlations with standardized measures of academic achievement (Dunleavy, Hansen, Szasz, & Baade, 1981; Szasz, Baade, & Paskewicz, 1980).

The resulting correlation of .52 found for this sample justified the inclusion of the DAP in a kindergarten screening test. The DAP especially becomes useful in identifying students who have no concept as to approaching the drawing task. Such students may be unfamiliar with the use of a writing utensil or unable to conceptualize and execute a
representation of a person. In either case, the child's academic readiness would indeed be questioned.

The correlations within the WEST indicate that the 11 subtests are relatively independent of one another. The highest correlation between any two individual subtests was .47, which accounts for 22% shared variance. However, the majority of the tests demonstrated correlations of lower magnitude. Consistent with weak relationships with the K-ABC and teacher Global Rating, the Word Memory 2 subtest showed the weakest relationship of all the WEST subtests to the WEST Total Score. Furthermore, Word Memory 2 demonstrated only one significant relationship, albeit weak, with the other WEST subtests. Based on these findings, the elimination of Word Memory 2 would not significantly affect the predictive value of the WEST.

Considering both intratest correlations and correlations with the teachers' Global Ratings the most valuable WEST subtests would include Rote Counting, DAP, Syllable Blending, Number Recall, and Rhyming.

The intratest correlations within the K-ABC reveal a strong relationship between vocabulary development (Expressive Vocabulary) and general knowledge (Faces and Places). Expressive Vocabulary and Faces and Places also correlated strongly with the Riddles subtest, which requires the subject to name the concept given three clues to its identity. A general ability seems to underlie arithmetic and word recognition judging from the significant correlation between Arithmetic and Reading/Decoding. Further, Arithmetic and Faces and Places share 31% common variance. Interestingly, Riddles and Reading/Decoding exhibited a weaker relationship than any other pair of subtests. Apparently, the ability to synthesize
information to arrive at a concept is somewhat independent of emerging decoding skills.

Summary

The purpose of this study was to develop a comprehensive screening instrument to assess the competencies of young children as they enter kindergarten. A broad range of intellectual, social-emotional, and physical characteristics were assessed through parental reporting, teacher rating, and direct testing of the children. Each of the three data sources proved to be valuable assets to the screening process by significantly predicting the success of their children in kindergarten and by rating their children on various competency areas. In addition, such demographic variables as parents' education significantly predicted the students' school success.

The results of the present study also confirmed previous research demonstrating the effectiveness of teachers' ratings in predicting school success (e.g., Becker & Snider, 1979). In a very short period of time (one to four days) a teacher is able to assess a child's academic competency and apparent readiness for the school experience. Further, the teachers' rating of a student's academic performance is perhaps the truest criterion of school success as it is such evaluations that constitute the students' grades and recommendation for promotion or retention. Although standardized testing is an important component of student evaluation, test scores cannot compare with the influence of the teacher in communicating the degree of academic success to a student and his or her parents (e.g.,
Foster et al., 1984).

Direct testing using the Worthing Early Screening Test complemented the other data sources in predicting kindergarten performance. As hypothesized, the ability to recognize and segment the component sounds of words was an important indicator of early academic achievement. Other skills such as counting, short-term memory, and drawing a person were also significant predictors of standardized achievement measures and the teachers' global ratings.

Limitations of the Study

The participants in this study were all white children from rural Iowa. Therefore, the results obtained may not necessarily generalize to children from different cultural or socioeconomic backgrounds. Linguistic differences of the children tested could have a definite impact on test performance, especially on the language-related items. Further, as Partenio and Taylor (1985) demonstrated, teachers may rate children from different ethnic backgrounds in a different way.

The Comprehensive Screening Battery developed in this study demonstrated significant predictive validity for the children from the spring before they entered kindergarten to the February of their kindergarten year. While the importance of the first year of school cannot be underestimated, not all children develop cognitively, physically, and emotionally at the same rate. Hence, a student who performs poorly on the WEST, for example, may not in reality be educationally handicapped, but rather simply not ready for certain types of academic tasks. Therefore, it
becomes essential to weigh the results of screening batteries, such as the one used in this study, along with actual classroom performance and other evaluations to develop the most appropriate educational program for the child. In sum, a student should not be labeled solely on the results of his or her performance on a screening battery. Furthermore, it must be noted that the first teacher rating in this study was a relative weakness. The teachers involved had varying degrees of familiarity with the students, which may have affected the ratings to an unknown degree.

Recommendations for Future Research

The present study was considered to be the first phase in the development of the Comprehensive Screening Battery. The next phase would involve the collection of additional data to increase the sample size such that a factor analysis would be possible. A factor analysis would possibly reduce the length of the instrument through the elimination of items that did not load on any of the derived scales. Subsequent to the factor analysis, a test-retest reliability study would be completed on another sample. For further validation it is recommended that performance on the scales be compared between different types of students, e.g., normal versus mentally handicapped, to ensure that the test does discriminate accurately. Finally, to assess the long-range predictive ability of this battery, it is suggested that a longitudinal study be completed which would follow the subjects for several years.
REFERENCES


ACKNOWLEDGEMENTS

I would like to express my sincere appreciation to several colleagues who assisted me in the collection of data for this study. Thanks go to Gary Nunn, Susan Nunn, Jack Montgomery, Jay Newburg, Henry Pothast, and Joe Hudson for their time and efforts on my behalf. I would also like to thank Bonnie Kastelein, Velva Butler, Joy Kix, Pat Amundson, Gloria Peterson, Ethel Martin, and Dennise Smith, who were the kindergarten teachers so essential to this study.

My major professor and advisor, Sam Clark, has been very supportive and helpful and I extend my gratitude to him. In addition, I would like to thank the members of my doctoral committee, Damaris Pease, Joan Herwig, Gary Phye, and Robert Strahan for their assistance and suggestions.

Finally, my deep appreciation is extended to Julie Phelps and May Clarizio who typed the numerous drafts of this paper. Their hard work greatly facilitated the completion of the final product.
### APPENDIX A: PARENT LETTERS

<table>
<thead>
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<th>Description of Study</th>
<th>102</th>
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<tr>
<td>Informed Consent</td>
<td>103</td>
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</table>
As a school psychologist for Area Education Agency 6 I have been involved with kindergarten roundups for several years. Because I have been dissatisfied with the available kindergarten screening tests I have developed one of my own. In order to ascertain the usefulness of my test, I am conducting a project which will determine how well this test will predict future school success.

This project will utilize three sources of information for predicting school success: direct testing of the child, parent report, and teacher report. During kindergarten roundup each child will be administered my screening test, which is composed of reading and arithmetic readiness items (e.g. vocabulary, word rhyming, and counting) and memory tasks, and a standardized achievement test designed for children of this age. Altogether the tests will take 25 minutes to administer. In addition, the parents will be asked to complete questionnaires regarding their child's strengths and weaknesses and overall temperament. The child's kindergarten (or in some cases preschool) teacher will also rate the child's school-related abilities and work habits. Early next school year the children will again be rated by their kindergarten teachers to determine which of the sources of information were most predictive of school performance.

The dissemination of the results of kindergarten screening is handled differently in different school districts. However, you can be assured that you will be contacted by the school if any educational concerns arise over your child's performance. Also, if you have any questions regarding my project or your child's test results, please feel free to contact me.

Sincerely,

Ralph J. Worthing
School Psychologist

All children have special needs, some more significant than others.
Dear Parent,

Ralph Worthing, a school psychologist for Area Education Agency 6, is developing a kindergarten screening instrument. Included in this instrument is a parent report of the child's strengths and weaknesses, a screening test administered directly to the child, and a teacher report of how the child adjusted to kindergarten roundup. In order to validate this new instrument, Mr. Worthing needs to test a large number of children. If you are willing to allow your child to be included in this project, please sign and return this form to school. You will be contacted by Mr. Worthing and arrangements will be made to collect the desired information.

__________________________  ____________________________
Child's Name                  (Circle one) Birthdate
__________________________  ____________________________
Parent's Signature            Phone Number
INFORMATION ON THE USE OF HUMAN SUBJECTS IN RESEARCH
IOWA STATE UNIVERSITY

(Please follow the accompanying instructions for completing this form.)

1. **Title of project (please type):** Parent report, teacher report, and individual testing: A concurrent analysis of the variables predicting children's academic readin

2. I agree to provide the proper surveillance of this project to insure that the rights and welfare of the human subjects are properly protected. Additions to or changes in procedures affecting the subjects after the project has been approved will be submitted to the committee for review.

   Ralph J. Worthing
   Typed Named of Principal Investigator 4-3-84
   Campus Telephone
   Campus Address

3. **Signature of others (if any) Date Relationship to Principal Investigator**

4. ATTACH an additional page(s) (A) describing your proposed research and (B) the subjects to be used, (C) Indicating any risks or discomforts to the subjects, and (D) covering any topics checked below. CHECK all boxes applicable.

   - Medical clearance necessary before subjects can participate
   - Samples (blood, tissue, etc.) from subjects
   - Administration of substances (foods, drugs, etc.) to subjects
   - Physical exercise or conditioning for subjects
   - Deception of subjects
   - Subjects under 14 years of age and(or)
   - Subjects 14-17 years of age
   - Subjects In Institutions
   - Research must be approved by another Institution or agency

5. ATTACH an example of the material to be used to obtain informed consent and CHECK which type will be used.

   - Signed informed consent will be obtained.
   - Modified informed consent will be obtained.

6. **Anticipated date on which subjects will be first contacted:** Month Day Year
   **Anticipated date for last contact with subjects:** Month Day Year

7. If Applicable: Anticipated date on which audio or visual tapes will be erased and(or) Identifiers will be removed from completed survey Instruments:

8. **Signature of Head or Chairperson Date Department or Administrative Unit**

9. Decision of the University Committee on the Use of Human Subjects in Research:

   - Project Approved
   - Project not approved
   - No action required

   Name of Committee Chairperson 5/13/84 Signature of Committee Chairperson

Revised 6/78
## APPENDIX C: INSTRUMENTS

<table>
<thead>
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<th>Instrument</th>
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<td>Burk's Behavior Rating Scales</td>
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<td>Burk's Behavior Rating Scales - Teacher's Global Rating</td>
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<td>Kindergarten Developmental Screening</td>
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<td>Worthing Early Screening Test</td>
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These consist of pages:

P. 107-109 The Iowa Inventory for Parent Assessment of Children's Competencies

P. 110-111 Burks' Behavior Rating Scales
Kindergarten Developmental Screening

Date________________________

Name of child: ____________________ Birthdate: ____________________

School: ___________________________ Sex: M _ F _ C.A. __________

Name of Person interviewed: ____________ Relationship: ____________

Telephone #: ______________________ Nursery school: Yes___ No___

Name and address: ____________________

Number of years attended: ______ Length & no. of sessions per week: ______

FAMILY HISTORY

Father: _____________________________ Age range: 20-30 _ 30-40 _ over 40 __

Occupation: _________________________ Highest level of education attained: __________

Mother: _____________________________ Age range: 20-30 _ 30-40 _ over 40 __

Occupation: _________________________ Highest level of education attained: __________

Marital status: Married ___ Separated ___ Widowed ___ Divorced ___ Other ___

Guardian (if other than both parents): ________________________________

Who is responsible for child if parent(s) work outside of home? ________________

Other adults living at home: ______________ Relationship: ______________

Language(s) spoken at home: ________________________________

Brothers and/or sisters of child:

<table>
<thead>
<tr>
<th>Full Name</th>
<th>Age</th>
<th>Any Speech, Hearing, Reading or other Educational Difficulties</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>
Rate the amount of difficulty your child has experienced in the following areas. A rating of 1 indicates no trouble and a rating of 5 indicates extreme trouble.

<table>
<thead>
<tr>
<th>Area</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prenatal difficulties</td>
<td></td>
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<td></td>
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<tr>
<td>Birth complications</td>
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<tr>
<td>Frequency/severity of illness</td>
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<td></td>
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<tr>
<td>Frequency/severity of injuries</td>
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</tbody>
</table>

Using the same rating scale indicate how often you read to your child.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>never</th>
<th>sometimes</th>
<th>everyday</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Rate how well you think your child will do in school.

<table>
<thead>
<tr>
<th>Performance</th>
<th>very poorly</th>
<th>average</th>
<th>very well</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
I want you to draw me a picture of a boy/girl. Make it any kind of boy/girl you want but be sure you make all of him/her.

Head (2)  Eyes (2)  Nose (2)  Mouth (2)  Body (2)  Legs (2)  Arms (2)
Hair (1)  Feet (1)

Score: _____ (16)
Word Memory

I am going to say 5 words. After I finish saying them, I want you to tell me as many words as you can remember. (Present at a rate of 1 word/second).

- house
- forest
- cat
- night
- table

(Have S recall as many of the words as possible. Go on to next trial if S is unable to recall another word after a pause of 5 seconds since the last word given). (say) "You remembered _____ words out of the 5. I am going to say the same 5 words again and I want you to tell me as many words as you can remember. (Do this for each trial until either the S reaches the criterion of a perfect trial or five trials).

<table>
<thead>
<tr>
<th>Trial</th>
<th>Score</th>
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<td>1</td>
<td>5</td>
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<tr>
<td>2</td>
<td>4</td>
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<tr>
<td>3</td>
<td>3</td>
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<tr>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

Score 2: ____ (5)

Secret Word

We are going to play a game called The Secret Word and to play we have to use these blocks (show the child the blocks). I am going to say a word, but I am not going to say it all at once. I am going to say it in two parts and then you are going to tell me what you think the Secret Word is. Let's try one for practice.

(Place one block in each hand and say) The first part is bâ (put block down simultaneously) and the next part is bê (put second block down simultaneously). If you put bâ - bê together (place blocks together) you get the word baby. See? (take block apart holding one in each hand) ba (put one down) and be (put the other block down then put them together) is baby.
Let's try another one. (Use the same procedure with the blocks.)
The first part is kan. The next part is dé. If you put kan - dé together you get? (Pause) What? (Repeat if necessary. If the child does not respond correctly say) If you put kan - dé together you get candy. (Use blocks to demonstrate.)

Continue with the following words using condensed instructions and placing equal emphasis on each syllable. For example: ta - b l is what word? (Point to each block as you say each syllable)

1. tā - bāl = table
2. lād - ē = lady
3. kāl - ēr = color

4. dāk - ter = doctor
5. gār - bij = garbage
6. māth - er = mother

Score one point for each correct response. Score 3:_______ (6)

Now we are going to use three blocks. b - ē - k (place one block down with each sound then squeeze the three blocks together) is bike. (Repeat sample) What word is this s - ē - t?
(If the child does not respond correctly repeat the procedure and provide the correct word.)

Continue with the following words:

1. bā - t = bat
2. tā - p = top
3. kā - t = cat

4. kī - d = kid
5. fā - t = fat
6. dā - g = dog

Score one point for each correct response. Score 4:_______ (6)
Now I am going to tell you the Secret Word and I want you to tell me a word or pretend word that sounds just like, or rhymes with, the Secret Word. Tell me a word or pretend word that sounds like wet. (If the child doesn't respond correctly say) One word that sounds like wet is pet. Wet - pet, see they sound the same. Another word that sounds like wet is net. Wet - net, see they sound the same. Tell me a word, or pretend word, that sounds like kite (If the child doesn't respond correctly say) One word that sounds like kite is bite. Kite - bite, see they sound the same. Another word that sounds like kite is night. Kite - night, see they sound the same. Tell me a word, or pretend word that sounds like: (Proceed with items 1-6. Give no further help.)

1. pop  4. at
2. hook  5. bad
3. nose  6. can

Score one point for each word or pretend word with the same vowel-consonant ending as the example.

Score 5: ______ (6)

This is the last part of this Secret Word game. I am going to say a word and I want you to tell me what it means. (Present each word by saying What is a/an ______? If the child hesitates in answering urge him/her to try by saying: "Just tell me in your own words" or "tell me anything about it" or a similar phrase)

1. hat
2. clock
3. orange
4. scissors
5. zoo
6. ball
7. stove

Score one point for each correct response. Score 6: ______ (7)
Number Recall

I am going to say some numbers. Try to say them just as I do.

Two - Four. Say these numbers just as I do. (Administer the second trial only if the first trial is failed.)

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<tbody>
<tr>
<td>4</td>
<td>6</td>
<td>2</td>
<td></td>
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<tr>
<td>3</td>
<td>9</td>
<td>1</td>
<td></td>
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<tr>
<td>6</td>
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<td>5</td>
<td>4</td>
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<td>10</td>
<td>1</td>
<td>3</td>
<td>8</td>
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<tr>
<td>5</td>
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<td>2</td>
</tr>
<tr>
<td>4</td>
<td>10</td>
<td>8</td>
<td>1</td>
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</tbody>
</table>

Score one point for each correct series. Score 7: (3)

Counting/Conservation

"Let's see how high you can count. Start with one and see how far you can go." (When/if the child reaches 20 tell him/her to stop.)

Child's response:

Score one point for correctly counting to 10; two points for correctly counting to 20. Score 8: (2)

Place ten blocks (one-half inch apart) in a row and say "Count these blocks with your finger."

Child's response:

Score one point for correctly counting to 5; two points for correctly counting to 10. Score 9: (2)

Place three red blocks adjacent to two green blocks so that the two rows are of equal length. Say to the child "Are there more red blocks; more green blocks; or is there the same number of red blocks as green blocks?" Repeat using six green and five red.
Next, make a row of six red and say "Now you make a row of green with just the same number as the red row." Make sure the child has the correct number then say "OK, now there are the same number in each row. Now watch." Spread the red row out so that it extends two inches out from each end of the green row. Repeat above question. Make sure the child understands that all the blocks are to be included.

Score two points for each correct response.

R-G
2-3
5-6
6-6

Score 10: (6)

"Do you remember those 5 words I asked you to say before? Tell me as many as you can remember." If the child does not respond, say "One word was house, tell me the rest."

house forest cat night table

Score one point for each word remembered. Score 11: (5)

I. Draw-A-Person (16)
II. Memory (13)
III. Secret Word (25)
IV. Counting (4)
V. Conservation (6)
VI. Total (64)