FACTORS WHICH ARE PREDICTIVE OF READING SUCCESS OF LOW SOCIO-ECONOMIC CHILDREN IN SELECTED FIRST GRADES

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CHAPTER I

INTRODUCTION

Reading has about as many definitions as there are writers defining the word. Some authorities say that reading is a perceptual process, or a combination of motoric, emotional, and intellectual activities; some state that it is a problem of language, while others purport reading to be solely a visual act. Nevertheless, reading is recognized by most authorities to involve a variety and complexity of factors and all seem to recognize, to a certain extent, varying degrees of success or failure in reading regardless of which factors are identified as contributors to the act of reading.

With the rapidity with which the school population is increasing in the United States at the present time, from the initial school experiences to the termination of school attendance by an individual, emphasis is being developed among those concerned to find better ways to measure the potential school expectations of the individual and the most desirable means by which these expectations may be accomplished.

One of the areas on which special emphasis is now being placed is that of the educational needs of the low socio-economic school population group. Part of this development is due to the increased ratio of students in this economic group who are now attending school. In 1950, one out of every ten children was considered culturally deprived in fourteen of our major cities. This figure increased to one in three by

1960. The prediction is that unless some preventive measures are undertaken by 1970 fifty percent of the school population in the major cities across our country will be culturally deprived (Riessman, 1965).

Another factor contributing to this emphasis is the change in the attitude of the general public from apathy to that of genuine concern for improving the conditions existing presently in the so-called slum schools across our nation. To a certain extent this concern was brought to the attention of the American public because of the great loss of manpower resources of our nation as a result of the illiteracy of so many of our school youth.

This study is not concerned with describing or delineating the process of reading. Neither is it concerned with a sociological discussion of the culturally disadvantaged population. This investigation is, however, concerned with identifying those variables or factors which predict success in reading for the low socio-economic level children at the end of the first grade.

Need for the Study

This study is designed to determine the relationship between certain reading readiness factors and achievement in reading for low socio-economic level children at the end of first grade. This investigation is particularly concerned with identifying specifically those variables which have a high rate of predicting success in reading.

Mastery of the skills of reading to the maximum of an individual's capacity is crucial for successful achievement at every grade level and in every area of the curriculum. For example, in an early study Lee (1933) reported results which indicated that satisfactory achievement

in grades four, five and six required a reading ability of at least the fourth-grade level. Bond (1938) clearly demonstrated that reading achievement was important for success in the secondary school as well as in the elementary school. She reported that general reading comprehension was found to be significantly related to achievement in each of the separate content subjects except mathematics in the ninth grade.

Bond and Tinker (1967) supported the thesis that reading is generally recognized to be the most important subject taught in the elementary school. The importance of proficient reading becomes clearer when its role in various aspects of a person's life is considered. Among many others the following are well worth special notice: (a) daily life activities; (b) progress in school; (c) recreation; (d) personal and social adjustment; and (e) citizenship.

The ability to read is important not only for the individual but for his family, his schools, and for his total society. Realizing the importance of reading, educators have for many years devoted much attention to finding ways to help children learn to read and to overcoming problems which have developed. Durrell (1958) said that success in the initial classroom instruction is more important than providing remedy after failure had already occurred. He maintained that this is particularly true in learning to read since reading is the essential base for later school development.

Research has shown that readiness to learn to read is influenced by the environment from which a child comes (Shane, 1955). Children who come from the low socio-economic levels have been disadvantaged because of a lack of a stimulation in their environment during their pre-school experiences. This environment has molded the

language development of the child (Havinghurst, 1953; McCarthy, 1952) which is inferior to that of a child coming from a more advantaged background (Nelson, 1957). Research further indicates that there is a significant relationship between the oral language facility and success in beginning reading (Williams, 1953; Hildreth, 1948; Robinson, 1955; Monroe, 1932).

The incidence of children from the low socio-economic level coming from broken homes is greater than that of children coming from higher socio-economic level homes. This condition adversely affects the success of children in their academic program (Havinghurst, 1953).

The low social level and the educational and occupational level of the parents are negative factors in the achievement in reading of a child (Sheldon and Carrillo, 1952). In addition, the disadvantaged child is often hungry, frightened, tired, sleepy, and in need of medical attention (Bond and Wagner, 1955). His life is often filled with frustration, failure, uncertainties, and disappointments. He may change schools frequently and be very irregular in attendance in school (Bond and Wagner, 1955). In a study to explore the possible relationships between success in beginning reading and reading experiences before first grade, Almy (1958) found a significant, positive relationship existed between success in beginning reading and the child's responses to opportunities for reading prior to the first grade. These opportunities have been extremely limited for the child in the low socio-economic level.

Recognizing the inadequacy of present methods for measuring the readiness of a child in the first grade, Ilg and Ames (1965) conducted a massive research investigation in an effort to find other possible

measures of determining readiness. Other researchers had previously stated a need existed for more adequate ways to determine readiness for beginning reading (Smith, 1950). If this be true for the general population, how much more true it is for the low socio-economic level for which it is expedient that every factor indicative of success be identified as early as possible in order to be utilized to the fullest extent.

This study attempts to fulfill these needs: (1) the need to identify those factors which are predictive of success in reading in the first grade for children from a low socio-economic level, (2) the need to identify those differences, if any, in the factors which are predictive of success for boys and for girls in the first grade in the low socio-economic group, and (3) the need to determine the relationships between certain readiness factors and achievement in reading for low socio-economic level children at the end of the first grade.

Statement of the Problem

The principal objective of this study was to identify those factors which are significant predictors of success in reading for low socio-economic level children in the first grade.

More specifically, this study will attempt to answer the following questions:

1. What factor or factors will enable us to predict reading achievement of low socio-economic level children in the first grade?
2. What combination of factors will enable us to predict reading achievement of these children in the first grade?

3. What differences exist in the factors which will predict for boys and for girls?
4. What are the relationships between readiness test scores and achievement test scores for the children who were involved in a compensatory pre-primary education program?
5. What differences exist between the readiness test scores of the boys and the girls?
6. What differences exist in the achievement test scores of the boys and the girls?
7. What differences exist in the relationships between the readiness test scores and the achievement test scores for the children in the compensatory program and for a sample population which was not involved in the program?

Delimitations

Scope of the Study

This investigation includes an analysis of test scores of children who were participants in a compensatory pre-primary education program officially entitled COPE in 1965-66, and who attended the first grade in Hillsborough County, Florida, in 1966-67, and were administered the Metropolitan Achievement Test, Primary Battery I, in May, 1967. Readiness test scores which are available for these children were correlated with their reading achievement test scores to determine which factors or combinations of factors are better predictors of success in first grade reading. The total population of this group for whom a

complete matrix of data was available constituted the final sample studied of those who had the pre-school experience. The number of children in this group were:

1. 422 children in the original population of the compensatory pre-primary education program.
2. 230 children on whom the reading achievement test scores were obtained at the end of the first grade. This number constitutes the final sample.

This study is concerned also with the relationships of the readiness test scores with achievement test scores for the COPE population, and a sample of children who were not involved in the compensatory pre-primary experience. There were 1154 children in the non-COPE group for whom the first grade readiness test scores were available and from whom a final sample of 275 was selected.

This study is not concerned with the methods of teaching reading, an evaluation of the teaching of reading, or with the sociological problems of the low socio-economic group.

Limitations of the Study

This study is limited by the population which is representative of one school district and of one stratum, that of the low socio-economic status.

This study is limited in scope by the selection of factors (enumerated in Appendix A) which will be considered as the variables in this problem. Many other conditions not taken into account in this report may be factors contributing to the success in reading.

Underlying Assumptions of the Study

A major assumption underlying this study is that the scores on the instruments used in this investigation represent some valid indices of the cognitive behaviors described by the developers of these instruments and that the scores obtained on these instruments are accurate.

A second underlying assumption in this study is that of the selected population, which is of one stratum, there are some individuals who will tend to achieve high on the achievement test and some individuals who will tend to achieve low with the tendency for the scores on the achievement test to be distributed at the low end of the scale.

A third assumption underlying the need for this study is that early identification of those factors or combination of factors which are significantly related to success in reading in the first grade for the low socio-economic child would call to the attention of educators the need for providing appropriate experiences for children having attained various levels on those factors.

A further assumption is made that the subjects in the control group and the experimental group were alike at the beginning of the pre-school experience of the COPE population as no data are available with which the initial comparability of these two groups may be established.

Organization of the Study

Chapter I has given an introduction to the investigation to be undertaken. It has included the need for the study, the statement of the problem, the delimitations of the study, and the assumptions underlying the study.

Chapter II will present a review of the literature which is related to the problem being investigated.

Chapter III will describe the population studied, the instruments used for the collection of the data, the hypotheses to be tested, and the description of the statistical treatment of the data.

Chapter IV will contain a statistical analysis of the data. It will contain the treatment of the data, the analysis of the results, and will indicate the degree to which the hypotheses are found to be correct.

Chapter V will present a general summary of the investigation and a discussion of the results from which conclusions and recommendations have been made.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

Although fairly recent in appearance, the literature which is significant to this investigation is voluminous in scope. It may be divided into two major types. First, the early investigators were concerned with identifying those factors that influenced or were involved in readiness for reading. Secondly, researchers have attempted to identify those variables or factors which were indicative of reading failure or of reading success. Of this latter type, the recent literature most pertinent to this study is that in which emphasis has been placed on focusing on those factors which were predictively related to success in first grade reading.

Early attempts to ascertain the factors which were operational in success in first grade reading were obscured by the efforts to determine what constitutes reading readiness. The factors which greatly influence reading readiness are many and of a complex nature, and are often so involved and interwoven that it is difficult to determine what single factor or group of factors bears most significance to the condition known as readiness for reading (Harrison, 1936).

The term of reading readiness seems first to have been used in the Report of the National Committee on Reading in 1925 and quickly passed

into common usage. At that time the factors considered regarding readiness for reading were physical, intellectual development, development of powers of visual and auditory discrimination, facility in the association of ideas and in problem solving, social and emotional maturity, linguistic background of the home, and the child's desire to learn to read (Sanderson, 1963).

An early report by Gates, Bond, and Russell (1939) showed the best predictions of reading progress were made by tests of reading attainments. This study revealed data, including an evaluation, of over one hundred tests, examinations, and ratings used to predict reading progress. Another study continued by Gates (1939) was designed to carry forward the analysis of the preceding study and to reveal the battery of tests which would be of most use early in the first grade. Three significant findings were: (1) correlations of the readiness tests with the midyear reading tests are similar to those with the teachers' judgments, (2) mental age provides a comparatively poor prediction of reading progress, (3) the predictive value of a particular test varies with the teaching method, and (4) the better a teacher adjusts her work to a pupil's special abilities, as revealed by the readiness tests, the better the prediction made by the tests.

Betts (1943) added magnitude to the problem of identifying readiness for reading when he described the following twenty factors which influence reading: learner needs, pre-reading school experiences, social adjustment, interests and attitudes, chronological age, mental maturity, perception of relationships, memory span, background of information, home background, language facility, hearing, auditory discrimination, visual efficiency, visual discrimination, color discrimina-

tion, general health status, motor control, neurological status, and sex differences.

Pertinent to the population of this study, Kottmeyer (1947) said that children from economically deprived homes are usually handicapped in three great conditioning areas of readiness: language skills, experiential backgrounds, and physical and sensory health. Bollings (1956) maintains that children from higher level homes will experience more of the factors of reading readiness before and during school than children from the lower level homes.

Readiness Tests as Predictors of Reading Achievement

In two early studies by Gates (1937) and Dean (1939) readiness tests were found to be effective predictors of reading achievement and to be of genuine usefulness. Bollings (1956) supported these findings in a recent study when he found the total scores of reading readiness tests to be significant in themselves for determining whether the child is ready to read.

Stauffer (1965) reported the scores on the Metropolitan Readiness Tests, Form A, and the scores on the Murphy-Durrell Diagnostic Reading Readiness Test, Revised Edition, provided significant predictive evidence for the experimental population studied and were good predictors for the boys of the control population. They were unable to explain why these tests did not show the same predictive value for the girls in the control population.

In an underprivileged socio-economic area, Henig (1949) found that a substantial degree of relationship existed between the reading readiness test results and the degree of ability in reading at the end of the

first year.

Kottmeyer (1947) found a correlation of .461 between reading readiness tests and success in reading. Wilson and Burke (1937) studied three reading readiness tests which gave very little evidence of predictive value of the progress of reading in grade one. More recently Karlin (1957) concluded that the reading readiness tests are not very valid instruments for predicting success in beginning reading because an analysis of his data revealed only a very small relationship between the scores on the reading readiness tests and the reading achievement test. Later in another report Karlin (1960) reiterated that the relationship between scores on a reading readiness test and a reading test was not great enough to permit confidence in the reading readiness test.

Bremer (1959) suggested a different use for the batteries when he said that readiness tests probably cannot be used to predict reading achievement with any degree of accuracy but that they should be used to screen for or diagnose the deficiencies in the reading readiness of individual pupils.

Defense of the use of readiness tests was made by Gates (1939). The main purpose of a reading readiness test is to reveal the pupil's status in each of the important skills involved in the early stage of reading so that achievement may be insured by giving each pupil the kind and the amount of help which he needs. The types of abilities tested in this study were those found in the earlier investigation to be most promising for the purpose as well as for mere prediction. It should be noted that all these abilities, except mental age, may be readily improved by instruction.

Karlin (1957) maintains that it is nevertheless apparent that

there is a need for developing valid instruments which schools can use to evaluate the readiness levels that have been achieved by their pupils. However, Spache (1958) thinks that it is doubtful that we shall ever find a single test that will accurately predict reading capacity. Betts (1943) summed up his observations by stating that because of the highly complex nature of the reading process, no one factor stands out in bold relief. Factors in reading readiness are inextricably interrelated. Furthermore, each factor carries a different weight in predicting readiness for reading with no single factor appearing as significantly predictive of the other interrelated factors.

Factors Which Predict Reading Success or Reading Failure

Various factors and combinations of factors related to readiness for reading have been investigated to determine their utility as predictors of reading success or of reading failure. Among those factors studied have been sex, chronological age, intelligence, physical factors, social and emotional factors, and knowledge of the alphabet.

The Relationship Between Sex and Achievement in Reading

A number of investigations have been made to determine the relationship between sex and achievement in reading. In some of these studies sex has been the only variable taken into account (Samuels, 1943; Olson, 1952; Hughes, 1953; Hansen, 1939; Gates, 1961; Balow, 1963). In other studies (Potter, 1949; Nicholson, 1958; Ilg, 1950), the factor of sex has been included as a part of a larger investigation.

Significant differences in reading achievement were found in favor

of the girls by a number of investigators (Samuels, 1943; Hughes, 1953; Balow, 1963). In a review of research on reading Keyser (1952) cited a number of studies which substantiated the generalization that girls are superior to boys in reading achievement. Smith (1950) pointed out that girls have an advantage over boys. Nicholson (1958) said that girls were superior to boys on all of her tests. In a study of over one thousand Indian children, Hansen (1939) found that girls achieved appreciably higher on achievement in reading than did the boys at the end of the first grade. In a large study of over 13,000 pupils undertaken to determine the sex differences in reading ability, Gates (1961) found that in each of twenty-one comparisons the mean raw score for the girls was higher than the mean raw score for the boys and most of these differences were significant.

Ilg and Ames (1950) conducted a longitudinal study of subjects who were of above-average or of superior intelligence. They developed a "reading gradient" composed of the stages through which a child had to pass in his reading process. They reported girls as a group were advanced over boys as a group at every stage of the reading gradient.

On the other hand, Potter (1949) reported finding no significant sex differences in reading achievement. In addition, McLaren (1950) found no significant differences in scores of boys or girls on reading comprehension and no significant differences in scores of boys and girls on word recognition on an author-constructed picture and word comprehension test. Although Anderson, Hughes, and Dixon (1956) reported that girls tended to learn to read sooner than boys, these writers (1957) found that no significant difference in sex was shown in the rate of reading development.

Olson (1952) said that although at every age girls exceed boys in reading age, this difference is only from two to four months. Prescott (1955) reported that the differences between the sexes is demonstrated as early as the administration of the readiness tests as the readiness test results of girls were significantly higher than the results for boys. Smith (1950) would agree with these findings. Carroll (1948) found significant differences in favor of girls in visual perception, auditory discrimination, articulation, and total reading achievement score and slight but not significant difference in ability to name letters.

In a study in which the mean scores of intelligence of 151 girls and 151 boys in the first grade were equivalent at midyear, Balow (1963) found that the girls were superior to the boys on a reading readiness test. When reading readiness was held constant by an analysis of covariance, there was no significant difference between the sexes on a reading achievement test administered at the end of the first grade. Balow inferred that because word perception and readiness appeared to be amenable to training, his data supported a cultural, nonmaturational theory of sex differences in reading achievement.

Other studies reporting differences in favor of the girls were reported by Steinback (1953) and Wattenberg (1964). Pauley (1951) thinks that these differences are of such importance that children should not enter school on the basis of chronological age alone, particularly the same chronological age since girls are so much more mature than are boys at that age.

Chronological Age as a Predictor of Success in Reading

Most investigators are in agreement that there is either a very low or a negative correlation between chronological age and success in reading.

Petty (1939) concluded that chronological age was not of importance to success in beginning reading. Bevington (1958) found chronological age to be less effective in predicting success in reading than the mental age. Nicholson (1958) contends the chronological age provides a poor basis for predicting any of the factors related to word background knowledge and Kottmeyer (1947) claimed the criterion of chronological age for beginning reading instruction is an unsatisfactory one. In one of the earlier studies, Dean (1939) stated chronological age was too low to have any weight as a predictive factor.

Negative correlations with chronological age and reading achievement were supported by Steinback (1953) and Gavel (1958). Durrell (1958) found a negative correlation between chronological age and reading achievement and stated further that there was little relationship between chronological age and any factors measured at any testing period.

One of the few studies to report a relationship between chronological age and achievement in reading was made with a group of superior children. These findings showed the earlier the age of learning to read, the higher the final average (Anderson, Hughes, and Dixon, 1956).

Intelligence as a Factor in Success in First Grade Reading

Several investigators reported a significant relationship between intelligence and reading achievement.

Anderson, Hughes, and Dixon (1957) found a correlation between high intelligence and early success in reading achievement. Durrell (1958) reported that mental age has a low relationship to reading achievement and to letter and word perception skills. Kottmeyer (1947) found a correlation between intelligence tests and reading achievement of .423. Using first grade children, Klaus and Starke (1964) found Peabody Picture Vocabulary Test raw scores obtained at the beginning of the school year to correlate with Metropolitan Achievement Test word knowledge scores at .39, word discrimination at .35, and reading at .39, taken at the end of the school year. A somewhat closer relationship was reported by Anderson, Hughes, and Dixon (1956) when they found a correlation between intelligence quotients and age of learning to read to be .57 for the girls and .54 for the boys.

Thomas (1946) and Karlin (1960) are in agreement that mental ability is a major factor if not the leading factor influencing reading achievement. Burks and Bruce (1955) said that verbal intelligence is an important factor in reading achievement and the ability to use abstractions is related to success in reading. Barbe and Grilk (1952) reported significant correlations between intelligence and reading comprehension. Witty and Kopel (1936) generalized a positive relationship between intelligence and reading ability but found the correlation to be too low to be significant in predicting success in learning to read. Upon investigating the relationship between intelligence quotient and reading achievement and between mental age and reading achievement, Morphett and Washburne (1931) found the measure of the intelligence tests to be significantly related to reading progress while other factors contributed substantially to reading gains. Mental age

correlated higher with reading progress than did the intelligence quotient but possession of a minimum amount of maturity did not insure success. Concerned with the limitations of this study, Betts (1943) postulated that what would have happened to those pupils with initial mental ages below six and one-half years in a typical regimented school situation would be a topic worth speculation and investigation.

To a certain extent Wheeler (1949) and Kottmeyer (1947) agree on the effect of intelligence on reading achievement. The former pointed out that a close relationship existed between reading ability and intelligence although intelligence and reading are not always highly correlated. According to Kottmeyer, intelligent children tend to learn to read more readily than do unintelligent children but there are many other factors besides intelligence which influence successful reading. Smith (1950) said that intelligence is one of the most significant indices in predicting readiness for beginning reading, while Deputy (1930) concluded that the mental test was the best single instrument for predicting reading success in the first grade. Dean (1939) credited mental age as being an effective instrument for predicting reading achievement.

From one of the First Grade Studies sponsored by the United States Office of Education, Fry (1965) reported the best predictor for reading achievement was the intelligence quotient raw score (mental age). The mental age had a higher correlation with Stanford Paragraph Meaning Scores than the intelligence quotient, or the total, or the subtest scores of either of the reading readiness tests. The results of another First Grade Study showed that of the pretest measures reported, the test of intelligence provided the best prediction of success in reading, spelling, vocabulary, and arithmetic (Stauffer, 1965). Durkin (1961)

reported a correlation of .40 between intelligence as measured by the Revised Stanford-Binet Scale and achievement in reading of early readers. Although Steinback (1953) found a high relationship between mental age and reading achievement, the relationship was lower than that found for auditory discrimination ability, visual discrimination ability, and range of information.

There are others who found factors which had a closer relationship to reading achievement than mental age or intelligence quotient (Wilson and Burke, 1937). Goins (1958) discovered that two major perceptual factors (one related to speed of perception and one best described as strength of closure or the ability to keep in mind a figure against distraction) were better predictors of reading progress than intelligence tests. The knowledge of letter names showed higher correlations with reading achievement than did mental age (Olson, 1958).

Gates (1937) said that mental age is not a guarantee of success in beginning reading and statements concerning the necessary mental age for beginning reading are essentially meaningless. Robinson (1955) would agree when she said that research does not support the necessity of a mental age of 6.5 years for beginning reading and so would Lynn (1963) who said that a mental age of 6.5 is not necessary for beginning reading. Downing (1963) further stated that the necessary mental age for reading readiness is not fixed but is relative to the conditions under which the learner operates. Williams (1953) and Smith (1950) both stated that beginning reading success cannot be guaranteed by a given mental age. This is in agreement with the statement by Nicholson (1958) that a high mental age does not assure a high learning rate in beginning reading.

An early study reported that intelligence tests administered in kindergarten were not good prognostic measures of reading success in the first grade (Woolf, 1934). In a more recent report, according to Spache (1958), intelligence tests do not accurately predict reading achievement.

The Relationship Between Physical Factors and Achievement in Reading

Researchers have been concerned with investigating the relationship between various physical factors and achievement in reading. Much research has been done particularly in the areas of the auditory and visual factors.

Robinson (1955) contended that research has not supported that physical factors contribute to reading success. Karlin (1957) stated that skeletal development, height, and weight cannot be used as predictors of success in reading. On the other hand, Smith (1950) pointed out a number of significant studies which show a relationship between reading achievement and physiological factors.

One of the physical factors most often discussed is auditory ability. Henry (1947) suggested a relationship between acute hearing ability and success in reading. In a study to determine the factors that enter into the process of learning to read in the first grade, the relative importance of these factors for success in reading, and whether or not these factors functioned the same for boys and girls, Steinback (1953) studied chronological age, mental age, auditory discrimination, visual discrimination, range of information and sex differences. Of the four factors that had the highest relationship to reading achievement, auditory discriminative ability ranked first.

Wheeler and Wheeler (1954) found a very low correlation between auditory acuity and discrimination and reading vocabulary and reading comprehension.

Poling (1953) did not find a significant relationship between auditory discrimination or acuity and reading achievement. In an investigation conducted by Reynolds (1953) to study the relationships between auditory characteristics and reading abilities, when mental age and the auditory measures were entered in a multiple regression analysis, the auditory variables did not add significantly to the correlations provided by mental age alone. Chall (1963) maintained that the ability to blend has a substantial relationship to reading achievement, especially to word recognition and analysis.

Monroe (1935) devised a series of aptitude tests which would measure many different abilities related to reading. The tests were visual, auditory, motor, articulation, language, and laterality. A combination of all tests proved to be a better predictor than any one test although all showed positive relationships. Of the types of tests, the predictive value in descending order were the auditory and visual tests, intelligence, articulation, and language and motor tests.

The statement was made by Popp (1964) that significant correlations are usually reported between ability in visual discrimination and later achievement in reading. Schubert (1957) stated a relationship between near-point visual development and successful reading, and Petty (1939) said that the ability to distinguish between visual symbols is necessary to success in beginning reading.

A high relationship between reading achievement and visual discrimination ability was reported by Steinback (1953) and between

reading achievement and visual perception by Goins (1958). Wilson, et. al. (1938) emphasized visual perception as a factor in reading in their statement that successful reading of ideas depends on perceiving accurately the letters that form each word. Tasks requiring perceptual discrimination appeared to be valuable predictors of first grade reading achievement (Potter, 1949). Keogh (1963) found a statistically significant relationship between copying ability and reading achievement. On the other hand, Robinson and Huelsman (1953) did not find a significant relationship between scores on vision tests and achievement in reading.

The Relationship Between the Social, Emotional, and Personality Adjustment and the Experience Background of a Child and Success in Reading Achievement

The effects of the social, emotional, and personality adjustment and the experience background of children have been investigated by several researchers. In an investigation of the influence of social maturity on reading success, Orear (1951) concluded that social maturity is a major asset in reading achievement although it does not guarantee success in first grade achievement. Bennett (1938) and others have concluded that social adjustment is positively related to success with reading activities. Smith (1950) pointed out evidence of a relationship between social adjustment and reading success. In a study to determine the effect of kindergarten training, Fast (1957) reported the development of social skills, the ability to work independently and in groups, and the acquisition of verbal and manual skills were contributory factors in the achievement of significantly higher scores on all

reading tests by those who had the training than by those who did not have this training.

Several writers agree on the importance of emotional adjustment in a child and his success in reading.

Natchez (1959) reported a significant relationship between emotional adjustment and achievement in reading. That personality factors appear to be of utmost importance in the case of success in reading is supported by Witty (1950). A number of studies pointing out the relationship between emotional readiness and learning to read are cited by Smith (1950).

Because a rich background is an important factor in learning to read (Hilliard and Troxell, 1937), a relationship exists between socio-economic levels and effective reading (Bollings, 1956). There is a significant relationship between readiness test scores and the occupation of the father (Sutton, 1955). Socio-economic status affected (McLaren, 1950) or was at least related to (Milner, 1951) reading achievement at the early levels (Wattenberg and Clifford, 1964). A number of studies show the effectiveness of experience on success in reading (Smith, 1950). The home experiences of children are especially important in learning to read. The home sets the patterns for much of the language development of a child upon which success in reading depends heavily (Kottmeyer, 1947). Measures of self-concept taken in kindergarten proved significantly predictive of progress in reading (Wattenberg and Clifford, 1964). An environment which is stimulating can promote maximal use of intelligence. All children need direction and assistance to develop their intellectual potentialities but this assistance is especially needed by children who score at the lower

ranges, by underprivileged children, and by those who come from lower socio-economic levels (Robinson, 1958). Cognizant of this fact, Durkin (1961) reported 27 of the early readers in her longitudinal study had come from the low socio-economic class.

According to Solomon (1953), the use of the Rorschach technique has potential value in studying the personality adjustment of children in relation to their achievement in reading and Ames and Walker (1964) supported the contention that the Rorschach test administered before the start of formal reading instruction can be useful in predicting individual differences in reading skill.

Letter Names as Predictors of Success in First Grade Reading

Several writers are quite pronounced in declaring the predictive value of a knowledge of letter names and/or sounds to success in reading.

Wilson (1942) found substantial correlations between letter abilities and reading achievement. In an earlier report Wilson and Burke (1937) reported certain abilities with letter forms and sounds were strikingly related to reading progress, namely: naming letters, giving phonic combinations, giving letter sounds, and writing words.

Smith (1928) described reading as a perceptual process which consists of the recognition and interpretation of symbols. Stating that a first step in perceptual learning is that of discriminating between sensations, and recognizing that some children possess this ability when they come into the first grade and some do not, she questioned whether the child who could match well at the beginning of the term would attain a greater success in reading than the one who had

difficulty in matching. She found a high correlation (.87) between matching ability and reading ability. In further questioning as to whether or not a test based on word and letter matching might furnish an indication of reading readiness, she concluded that any instrument which would enable us to predict reading readiness would be tremendously useful.

According to Kopel (1942) a child's familiarity with words and his ability to name and sound the letters of the alphabet are the most satisfactory predictors of learning. Nicholson (1958) agreed that letter knowledge is the highest predictor of learning to read. Barrett (1965) made the observation that reading letters and numbers was the best single predictor of first grade reading achievement.

In an attempt to study the effects of teaching letter knowledge, Linehan (1958) found that an experimental group taught letter knowledge showed statistically significant differences on February reading tests from the control group not presented with the systematic letter program.

Olson (1958) reported that September tests which measure knowledge of letter names provided the best predictions of February success in reading. Gavel (1958) found the tests which associated visual forms of letters with their names (writing letters dictated, naming letters, identifying letters named, and learning rate for words) were the higher predictors of June reading achievement. Durrell (1958) incorporated both of these conclusions when he reported that tests of knowledge of letter names at school entrance were the best predictors of both February and June reading achievement. But Betts (1943) warned that although the ability to make accurate visual discrimination of letters has a high relationship with reading achievement, this knowledge does

not insure success with reading activities.

Summary

A review of the literature reveals numerous and massive investigations undertaken to identify those factors which are significantly related to achievement of reading in the first grade. Few of these studies have been limited to the low socio-economic population.

Many of these studies have been involved with the readiness tests and with the factors which are involved in readiness. There seems to be some agreement that there needs to be additional information to add to the readiness test instruments now available in order to increase their effectiveness as predictors of reading achievement.

Most of the investigations which have been concerned with the relationship between sex and achievement in reading have found significant differences in achievement in favor of the girls.

When chronological age was considered as a variable, most investigators were in agreement that there is either a very low or a negative correlation between chronological age and success in reading.

Several writers agree on the importance of emotional, social, and personal adjustment in a child as related to success in reading. Other physiological factors as well as the experiential background of a child have been reported to be associated with achievement in reading.

Investigations concerning intelligence and achievement in reading reveal conflicting evidence. In summary, it might be said that although there is a high relationship between the intelligence of a child and his success in reading, the achievement of an individual cannot be accurately predicted from a measure of his intelligence alone.

A survey of the literature reviewed revealed that although some of the populations studied included subjects coming from the low socio-economic level, none of the studies were involved with this stratum alone. This investigation is designed to determine those factors which are predictive of reading achievement when the low socio-economic level is studied separately.

CHAPTER III

DESIGN AND METHODOLOGY

Introduction

This chapter contains a description of the population of the study, the instruments used for the collection of the data, and the statistical treatment of the data.

Description of Population

The participants in Project COPE for whom the reading readiness test scores are available in the files of COPE at the University of South Florida and who attended the first grade in Hillsborough County, Florida, constitute the population of this study.

The project officially known as COPE (Compensatory Pre-Primary Education) was a federally-funded research project for purposes of assisting those pre-school children who are technically described as culturally disadvantaged. The twenty classrooms, geographically located in twelve public schools of Hillsborough County, Florida, had an enrollment of twenty-five children each.

To be eligible for admission to COPE, the children had to be from the low socio-economic stratum and first grade entrants for the school year 1966-67. No children were admitted who were too young or too old to meet this criterion. They were of both sexes.

Major objectives of this experimental program were specifically designed to bring about increased school readiness by helping each youngster to develop increased self-esteem, language skills, and motivation for school success. The curriculum was developed to improve the speech, develop the vocabulary, and increase the listening skills of the children. Special emphasis was placed on developing the cognitive thinking and reasoning skills of the children (see Appendix C).

Three agencies participated in Project COPE. The University of South Florida, Tampa, Florida, was responsible for the training of the teachers, the design and methodology of the research of the project, the collection of data and the evaluation of the program. The Hillsborough County Public Schools, Tampa, Florida, were responsible for housing the units and performing the school administrative responsibilities. The Tampa Economic Opportunity Commission contracted for essential services to the project and involved other community agencies such as the Health Department.

The twenty teachers employed as classroom teachers for COPE were certified public elementary school teachers in the State of Florida and were recommended by their principals as being excellent primary teachers. Their teaching experience ranged from two to twenty-five years. Each teacher was provided with a classroom aide. The education of the aides ranged from a few hours of college work to course work in excess of a college degree. Every teacher and aide was required to take an extensive training program from the University of South Florida during the summer of 1965 before classes began in the fall. This course work consisted of nine hours of work in early childhood education and sociology of the culturally disadvantaged child.

The final COPE sample consisted of those subjects who were in attendance in COPE during the academic year 1965-66 and on whom the desired test scores were available and on whom the reading achievement test scores were obtained in May, 1967. Of the 422 on whom data were collected in kindergarten there were 230 children who were administered the achievement tests.

The non-COPE population consisted of subjects who were eligible to enroll in COPE but who were not included in the pre-school experience because of insufficient facilities. There were 1154 children in the non-COPE group from which a final sample of 275 was randomly selected.

Instruments Used

This study involved the use of tests to measure the reading readiness factors which were used as predictor variables and a test of reading achievement in the first grade which was used as the criterion variable.

The predictor variables used were scores obtained on the Metropolitan Readiness Test, Form A, the Peabody Picture Vocabulary Test, A, the Goodenough-Harris Draw-A-Man Test, and the Metropolitan Readiness Test, Form R. All of the tests except the Metropolitan Readiness Test, Form R, were administered by COPE personnel during the kindergarten year. The Metropolitan Readiness Test, Form R, was administered at the beginning of the first grade in the Hillsborough County Public Schools.

Scores on the Metropolitan Achievement Test, Primary Battery I, Form A, were used as the dependent variables. This test was administered during the second and third weeks of May, 1967. Personnel from the

University of South Florida, Tampa, Florida, administered and scored the achievement test.

Metropolitan Readiness Tests

This battery consists of six sub-tests and provides a total battery score.

Test 1. Word Meaning, is a 16-item picture vocabulary test. The pupil selects from three pictures the one which best illustrates the word named by the examiner.

Test 2. Listening, is a 16-item test of ability to comprehend phrases and sentences instead of individual words. The pupil selects from three pictures the one which portrays a situation or event described briefly by the examiner.

Test 3. Matching, is a 14-item test of visual perception involving the recognition of similarities. The pupil marks one of three pictures which matches a given picture. Time: 5½ minutes.

Test 4. Alphabet, is a 16-item test of ability to recognize lower-case letters of the alphabet. The pupil chooses a letter named from among four alternatives.

Test 5. Numbers, is a 26-item test of number knowledge. Mathematical areas tested are size relationships, time, quantitites, numeral identification, numeral writing, oral word problems, fractions, money, and ordinal numerals.

Test 6. Copying, is a 14-item test which measures a combination of visual perception and motor control. This test involves copying upper and lower case letters, numerals, and various shapes. Time: 7 minutes.

The Goodenough Draw-A-Man Test

The Draw-A-Man test as developed and standardized by Goodenough is primarily a measure of intelligence. During the twenty-five years the test has been in existence, a number of studies have confirmed that it compares favorably in test-retest reliability with most group tests of intelligence applicable in the same age range. It also compares favorably in validity, as demonstrated on the basis of its correlations with the Stanford-Binet within the age groups for which it was designed, yet possesses the advantage of being non-verbal in character. The Goodenough-Harris Drawing Test is a revision and extension of the Goodenough Draw-A-Man Test. This form of the test provides a scale for the drawing of a woman and the drawing of self.

Raw scores are converted into "mental ages," and the ratio between the subject's mental age and his chronological age is then taken as his Goodenough IQ.

The Peabody Picture Vocabulary Test

This test, which is an individual wide range picture vocabulary test, consists of two forms, A and B. The test is administered by the examinee indicating the picture on the plate in the series which best illustrates the meaning of the stimulus word provided orally by the examiner. Raw scores can be converted to three types of derived scores: mental ages, standard score I.Q.'s, and percentiles.

Metropolitan Achievement Tests, Primary I Battery, Form A

The Metropolitan Achievement Test, Primary I Battery, Form A, was selected as the instrument for measuring the reading achievement at the

end of the first grade. The three scores (word knowledge, word discrimination, and reading) derived from this test constitute the criterion variables.

The Metropolitan norms were carefully developed to describe the achievement of pupils representative of the nation's public school population. The normative samples were selected on the basis of such characteristics as size of the school system, geographical location, type of system (segregated or nonsegregated). A total of 225 public school systems from 49 states contributed data from over 500,000 pupils to the standardization of the series. Scores earned by approximately a 25 percent random sample of this group were used for developing final grade norms.

The raw scores on each of the subtests are converted to normalized standard scores, percentile ranks, and stanines. The latter are specifically recommended by the authors for interpreting scores earned by individual students.

Reliabilities of the subtests were ascertained by replicated split-half correlations. The corrected coefficients tend gradually to fall within acceptable limits (.80-.95) with few exceptions. The reported standard errors of measurement are uniformly small.

Primary I Battery of the Metropolitan series, designed for use in the latter half of grade one, consists of four tests of which three measure important reading skills. The authors (Hildreth, et. al, 1959) of the manual describe these tests as follow:

> Test 1, Word Knowledge.
>
> This is a 35-item test that measure the child's sight vocabulary, or word-recognition ability. This ability is measured by means of picture vocabulary items in which the child demonstrates his recognition and understanding of the

stimulus words by correctly associating each word with a picture. The pictures have been carefully devised to present unambiguous representations of the concepts embodied in the words. The words tested were selected from words occurring with greatest frequency in beginning reading materials. In each item, the incorrect choices are of approximately the same level of familiarity as the stimulus word. The time limit is such that practically all pupils have an opportunity to complete the entire test. Fifteen minutes.

Test 2, Word Discrimination.

This is a 35-item test that measures the child's ability to select an orally presented word from among a group of words of similar configuration. Success on the test, therefore, depends upon both auditory and visual discrimination abilities; the child must be able to associate the sound of the word as read by the examiner with its printed form, and to distinguish the printed word from other words similar to it with respect to beginning, ending, or middle sounds. Each stimulus word is presented by the examiner in a context that is intended to make absolutely clear to the child what the word is. The words, like those in the Word Knowledge Test, were chosen from vocabulary common to beginning reading materials. Since each item is presented orally by the examiner, children proceed through the test at a uniform rate, with every child having ample time to mark every item. Twelve minutes.

Test 3, Reading.

This test consists of two parts. A 13-item section measures the pupil's ability to comprehend sentences. The child demonstrates his ability to read and to understand sentences by choosing from among three sentences the one that correctly describes the picture. Ten minutes.

The second section of the Reading Test is a 33-item measure of ability to comprehend materials of paragraph length. The opening exercises in this section of the test are in the form of so-called "riddle" items, which are ideally suited for measuring ability to comprehend and reason at this level. The later selections in the test are similar in structure to the type of content that the pupil encounters in primers. Each reading selection is followed by several questions designed to measure various aspects of reading comprehension such as obtaining specific information, and making inferences. Twenty-five minutes.

Hypotheses

The statistical hypotheses to be tested in this investigation are as follows:

There are certain factors or combinations of factors that will significantly predict achievement in word knowledge, word discrimination, and reading for low socio-economic level children in the first grade.

More specifically:

1. There are certain factors or combinations of factors that will significantly predict achievement in word knowledge for boys, for girls, and for both boys and girls in the low socio-economic status in the first grade.

2. There are certain factors or combinations of factors that will significantly predict achievement in word discrimination for boys, for girls, and for both boys and girls in the low socio-economic status in the first grade.

3. There are certain factors or combinations of factors that will significantly predict achievement in reading for boys, for girls, and for both boys and girls in the low socio-economic status in the first grade.

4. There will be a significant difference in the means of the readiness scores of the boys and girls in the COPE sample.

5. There will be a significant difference between the scores on word knowledge, word discrimination, and reading for the boys and the girls.

6. There will be a significant difference in the correlations of the first grade readiness test with the first grade achievement test for the COPE sample and a non-COPE sample.

7. There will be a significant difference between the means of the scores on the readiness test administered at the beginning of the first

grade for the COPE sample and the non-COPE sample.

Treatment of the Data

The hypotheses as stated were tested by subjecting the data to a stepwise analysis of multiple regression in order that the predictor variables most highly correlated with the criterion variable and having low intercorrelations could be selected for use in a multiple regression equation.

This analysis was performed on the 7040 IBM Computer at the Oklahoma State University Statistical Laboratory. The computer was programmed for one dependent variable (word knowledge, word discrimination, reading) and the predictor variables (the reading readiness factors).

One variable at a time was entered into the regression equation, the potential variance reduction was considered for all the remaining variables, and that variable which reduced the variance the most was selected. Those variables were eliminated which were no longer significant. As a result, only significant variables were selected to be used in the regression equations which are designed to predict word knowledge for boys, word knowledge for girls, word knowledge for boys and girls, word discrimination for boys, word discrimination for girls, word discrimination for boys and girls, reading for boys, reading for girls, and reading for boys and girls.

The difference between the means of the scores on readiness and on achievement of the boys and the girls were tested by the t test.

Readiness test scores administered at the beginning of the first grade and first grade achievement test scores of children who were colleagues of COPE but who were not enrolled in the compensatory

pre-primary program were correlated with the scores of the COPE population. Data on the non-COPE group were calculated on the Marchant Deci-Magic Calculator. These data were subjected to a t test for the significance of the difference between the means of readiness for the COPE and the non-COPE sample. The data were tested by a Fisher's Z to test for the relationship between the readiness test scores and the achievement test scores of the COPE and the non-COPE group.

Summary

This chapter has described the population studied in the investigation, the instruments used in the collection of data, and the description of the treatment of the data.

The population studied in this investigation consisted of children from a low socio-economic level who were participants in a compensatory pre-primary education program in Hillsborough County, Florida, in 1965-66. Children who were colleagues of the COPE group but who were not enrolled in COPE were tested with a readiness test at the beginning of the first grade and an achievement test at the end of the first grade.

The measuring instruments used were the Metropolitan Readiness Tests, Form A, administered in February and in July, the Peabody Picture Vocabulary Test, and the Goodenough-Harris Draw-A-Man Test, administered in kindergarten, and the Metropolitan Readiness Test, Form R, administered in the first grade. Scores on these tests provided the data for the independent variables. Scores on the Metropolitan Achievement Test, Form A, were used as the dependent variable. A stepwise procedure of the multiple regression analysis was selected

as the statistical method for identifying the predictor variables.

The data were subjected to a *t* test to test for the significance of the difference between the means of the boys and the girls on readiness and on achievement. The significance of the differences in readiness of the COPE and the non-COPE sample was tested by a *t* test. The differences in correlations of readiness scores with achievement scores for the COPE and the non-COPE sample were tested by Fisher's Z.

CHAPTER IV

TREATMENT OF DATA AND ANALYSIS OF RESULTS

Introduction

This chapter contains a detailed account of the statistical treatment of the data and the analysis of the results.

The data on the COPE sample were subjected to a multiple regression analysis on the 7040 International Business Machine Computer at the Statistical Laboratory at Oklahoma State University.

Differences between the COPE and the non-COPE samples, in terms of the degree to which reading readiness scores related to first year achievement scores, were identified by the use of a Pearson Product Moment Correlation method developed for use with a Marchant Deci-Magic Calculator. A multiple correlation and regression analysis was then made to determine the combination of variables most highly related to and predictive of reading achievement. Differences between mean achievement for all groups were tested for statistical significance using the "t" test.

The data will be discussed under the following divisions: (1) the hypotheses as set forth in Chapter III, (2) the differences between the mean scores of the boys and girls in the COPE sample, (3) the differences between the correlations of the readiness tests with reading achievement for the COPE sample and the non-COPE sample, and (4) the differences between the mean scores of the COPE and the

non-COPE sample.

During the kindergarten year, the COPE population was administered the following tests:

The Peabody Picture Vocabulary Test

The Goodenough-Draw-A-Woman Test

Metropolitan Readiness Test, (Form A), given in February

Metropolitan Readiness Test, (Form A), given in July

At the beginning of the first grade year, during the third week, September, 1966, the COPE population and the non-COPE population were administered the Metropolitan Readiness Test, (Form R).

At the end of the first grade in May, 1967, the Metropolitan Achievement Test, Primary I Battery, Form A, was administered to both groups.

The total scores and sub-test scores on the tests administered in kindergarten and the first grade readiness test were used as predictors (independent variables) of success in reading for the COPE population. Success in reading was determined by the scores on word knowledge, word discrimination, and reading on the Metropolitan Achievement Test (dependent variables).

The code numbers for the independent variables will be found in Appendix A. In order to test Hypotheses I, II, and III of this study, a stepwise multiple regression analysis was applied to these data to identify the best combination of independent variables predictive of reading achievement. This procedure is an improved version of the forward-selection procedure. The improvements involve the re-examination at every stage of the regression of the variables incorporated

into the model in previous stages. A variable which may have been the best single variable to enter at an early stage may, at a later stage, be superfluous because of the relationships between it and other variables now in the regression. To check on this, the partial F criterion for each variable in the regression at any stage of calculation is evaluated and compared with a pre-selected percentage point of the appropriate F distribution. This provides a judgment on the contribution made by each variable as though it had been the most recent variable entered, irrespective of its actual point of entry into the model. Any variable which provides a nonsignificant contribution is removed from the model. This process is continued until no more variables will be admitted to the equation and no more are rejected. The complete stepwise solution for the first part of Hypothesis I is shown.

Tests of the Hypotheses

Hypothesis I: There are certain factors or combinations of factors that will significantly relate to achievement in word knowledge for boys, for girls, and for both boys and girls of low socioeconomic status in the first grade.

Table III shows the simple inter-correlations of the variables most highly correlated with the dependent variable (word knowledge), as well as their correlations with the dependent variable. The multiple correlation which relates both the score of copying from the Metropolitan Readiness Test, administered in February, and the total score on the first grade Metropolitan Readiness Test to word knowledge increased the correlation only .01 over the simple correlation between

TABLE I

THE MULTIPLE REGRESSION EQUATIONS FOR PREDICTING WORD KNOWLEDGE, WORD DISCRIMINATION, AND READING FOR BOYS, FOR GIRLS, AND FOR BOTH BOYS AND GIRLS FROM THE COPE SAMPLE TOGETHER WITH MULTIPLE R

	N	Multiple Regression Equation	Multiple Regression	Standard Error of Estimate
Total	186	$Y = -5.15613 + .29262X_7 + .50545X_{15}$	.65	6.0817
Boys	97	$Y = -6.03690 + .30866X_7$	.64	6.0682
Girls	89	$Y = -4.33911 + .28531X_7 + .69449X_{15}$	.65	6.0964
Total	146	$Y = -5.73448 + .27702X_7 + .45005X_{20}$	.72	5.5503
Boys	79	$Y = -.72706 + .24411X_7$	.58	6.8576
Girls	66	$Y = -5.44572 + .25863X_7 + .60557X_{20}$	.70	5.7742
Total	140	$Y = -.43718 + .12367X_7 + .14188X_{23} + .18182X_{25}$	.58	5.7618
Boys	76	$Y = .51723 + .10582X_7 + .09518X_{23} + .22433X_{25}$	.52	5.6970
Girls	64	$Y = -7.03716 + .24173X_7 + .19764X_{16}$	.65	5.7393

TABLE II

STEP #1 FOR ENTERING A VARIABLE INTO REGRESSION EQUATION IN A STEPWISE FASHION

Entering Variable	F	Standard Error of Y	Constant	Variables in Regression Equation	Coefficient of Variable in Regression Equation	Standard Error of Coefficient
MRT, 1st Gr Total Score	127.6996	6.1366	-6.34138	MRT, 1st Gr Total Score	.32376	.02865

TABLE III

CORRELATIONS OF INDEPENDENT VARIABLES WITH WORD KNOWLEDGE FOR 186 BOYS AND GIRLS

	PPVT$_{(5)}$	MRT, TOTAL FIRST GRADE$_{(7)}$	MRT, FEB. COPYING$_{(15)}$	MRT, FEB. TOTAL$_{(16)}$	WORD KNOWLEDGE$_{(Y)}$
PPVT$_{(5)}$	1.00	.65	.32	.44	.42
MRT, TOTAL FIRST GRADE$_{(7)}$		1.00	.47	.59	.64
MRT, FEB. COPYING$_{(15)}$			1.00	.70	.40
MRT, FEB. TOTAL$_{(16)}$				1.00	.43
WORD KNOWLEDGE$_{(Y)}$					1.00
7 + 15 MULTIPLE R					.65*
7, 15, 16 MULTIPLE R					.65
7, 15, 16, 5 MULTIPLE R					.65

*Multiple R significantly different from zero.

the Metropolitan Readiness Test and the dependent variable from .64 to .65. This is not a significant increase.

The stepwise regression analysis referred to earlier was then applied to these data as described below.

Step I. The stepwise procedure starts with the simple correlation matrix and enters into regression the X variables most highly correlated with the dependent variable (word knowledge on the Metropolitan Achievement Test). Table II shows the first variable to enter the equation was the total score on the first grade Metropolitan Readiness Test. This is variable X_7 and the correlation with the variable and word knowledge is .640.

Step II. Using the partial correlation coefficients as before, it now selects, as the next variable to enter regression, that X variable whose partial correlation with the response is highest. In this problem it is X_{15} (the copying score on the February Metropolitan Readiness Test).

Step III. Given the regression equation $Y = f(X_7, X_{15})$ the method now examines the contribution X_7 would have made if X_{15} had been entered first and X_7 entered second. (The forward selection procedure does not do this.) Since the value of the partial F is statistically significant, X_7 is retained. The stepwise method now selects as the next variable to enter, the one most highly partially correlated with the response (variables X_7 and X_{15} are in regression). This is seen to be variable X_{16}.

Step IV. A regression equation for form $Y = f(X_7, X_{15}, X_{16})$ is now determined by least squares. At this point, if X_{16} were entering with a significant sequential F value, partial F-tests for the

variables X_7 and X_{15} would be made to determine whether or not they should remain in the regression equation. If the F value of X_{16} would exceed either X_7 or X_{15}, that variable exceeded would be rejected. However, variable X_{16} enters with an F value of .015 which does not add to the equation so variable X_7 and X_{15} are retained and variable X_{16} is not added to the equation.

Step V. The only remaining variable to be tested is X_{16}. Since this variable is immediately rejected (F level = .011), the stepwise regression procedure terminates and chooses as its best regression equation $Y = -5.15613 + .29262X_7 + .50545X_{15}$.

The two independent variables were X_7 and X_{15}. X_7 is the total score on the Metropolitan Readiness Test administered at the beginning of the first grade. X_{15} is the score on copying on the Metropolitan Readiness Test, Form A, which was administered during the kindergarten year. The standard error of estimate for predicting scores on the dependent variable (word knowledge score on the Metropolitan Achievement Test) using these two independent variables equaled 6.08. Thus, the chances would be approximately two out of three that any given estimate would not miss the child's actual performance of word knowledge on the Metropolitan Achievement Test by more than ±6.08 points. In other words, individual reading achievement scores predicted from the equation will have a margin of error equal to about ±6 points, if one desires to include the actual reading score attained in the predicted interval approximately two-thirds of the time. The predicted interval for each score would therefore have an approximate range of twelve points, illustrating in this specific instance the general limitations in attempting to predict individual scores even

where the correlation coefficient is rather substantial (.65). However, for purposes of identifying groups of youngsters likely to profit maximally from different levels of instruction, the degree of relationships observed here for COPE children can be extremely useful, and represents a distinct improvement over mere chance placement, and over the typically low correlation observed between standardized test scores when used with a disadvantaged population.

As seen in Table I, the multiple regression equation for the best linear combination of variables predicting word knowledge achievement for the total population is $Y = 5.15613 + .29262X_7 + .50545X_{15}$. However, as seen in Table III, the best multiple correlation coefficient of .65 does not represent a significant increase in the simple correlation of .64 attained by using X_7 alone. Therefore, predictions could be made as reliably using X_7 alone as they could be in using the combination of X_7 and X_{15}. Thus, no particular advantage attaches to using the multiple regression equation to make these predictions, instead of the regression equation involving X_7 alone.

Table IV shows the simple inter-correlations of the independent variables most highly correlated with the dependent variable, and their correlations with the dependent variable (word knowledge) for 89 girls. Although, as cited earlier in this report, Keogh (1963) found a statistically significant relationship between copying ability and reading achievement, the simple correlation of .63 between the first grade readiness score and word knowledge for this sample was increased by only .02 with the addition of the copying score in the regression equation (Multiple R = .65). Once again, the multiple correlation does not represent a significant increase in correlation

TABLE IV

CORRELATIONS OF INDEPENDENT VARIABLES WITH WORD KNOWLEDGE FOR 89 GIRLS

	PPVT$_{(5)}$	MRT, TOTAL FIRST GRADE$_{(7)}$	MRT, FEB. COPYING$_{(15)}$	MRT, FEB. TOTAL$_{(16)}$	WORD KNOWLEDGE$_{(Y)}$
PPVT$_{(5)}$	1.00	.66	.32	.45	.41
MRT, TOTAL FIRST GRADE$_{(7)}$		1.00	.51	.65	.63
MRT, FEB. COPYING$_{(15)}$			1.00	.71	.46
MRT, FEB. TOTAL$_{(16)}$				1.00	.52
WORD KNOWLEDGE$_{(Y)}$					1.00
7 + 15 MULTIPLE R					.65*

*Multiple R significantly different from zero.

over the simple correlation.

Accepting the multiple regression for prediction purposes, although recognizing its failure to increase significantly the simple correlation, the standard error of estimate for predicting word knowledge for girls using these two independent variables equaled 6.0964 points as seen in Table I. Thus, the chances would be approximately two out of three that any given estimate would not miss the actual performance of a child on word knowledge on the Metropolitan Achievement Test by more than ±6.0964 points. Table I further shows that when the total sample is divided by sex, the same factors which are predictive for the total sample are also predictive for girls. The multiple regression equation for the prediction of word knowledge for girls in this study is $Y = -4.33911 + .28531X_7 + .69449X_{15}$.

Analysis of the data for the boys as shown in Table V reveals that the total score on the first grade readiness test alone is the best predictor of achievement in word knowledge and that addition of other factors or combinations of factors prior to the beginning of the first grade does not add to the predictive value. The regression equation predicting word knowledge for boys is $Y = -6.03690 + .30866X_7$.

Table I shows the standard error of estimate for predicting word knowledge on the Metropolitan Achievement Test using the simple correlation of the total score on the first grade Metropolitan Readiness Test equaled 6.0682 points. Therefore, the chances would be approximately two out of three that any given estimate would not miss the actual performance of word knowledge on the Metropolitan Achievement Test by more than ±6.0682 points.

TABLE V

CORRELATIONS OF INDEPENDENT VARIABLES WITH WORD KNOWLEDGE FOR 97 BOYS

	PPVT$_{(5)}$	MRT, TOTAL FIRST GRADE$_{(7)}$	MRT, FEB. COPYING$_{(15)}$	MRT, FEB. TOTAL$_{(16)}$	WORD KNOWLEDGE$_{(Y)}$
PPVT$_{(5)}$	1.00	.65	.33	.44	.45
MRT, TOTAL FIRST GRADE$_{(7)}$		1.00	.43	.55	.64
MRT, FEB. COPYING$_{(15)}$			1.00	.70	.34
MRT, FEB. TOTAL$_{(16)}$				1.00	.35
WORD KNOWLEDGE$_{(Y)}$					1.00
MULTIPLE R$_{(7)}$					.64*

*Multiple correlation significantly different from zero.

Hypothesis II: There are certain factors or combinations of factors that will significantly predict achievement in word discrimination for boys, for girls, and for both boys and girls from a low socio-economic status in the first grade.

As shown in Table VI, the simple correlation between the total score on the first grade Metropolitan Readiness Test and word discrimination for 146 boys and girls is .70. The addition of the score on the alphabet section of the Metropolitan Readiness Test administered in July increased the multiple correlation only .02 points (Multiple R = .72). Even though this is not a significant increase, the statistical data for this Multiple R will be described below.

As seen in Table I, the best combination of variables for predicting word discrimination for the total sample is $Y = -5.73448 + .27702X_7 + .45005X_{20}$.

Table I also shows the standard error of estimate for predicting word discrimination for the total sample using the score on the first grade Metropolitan Readiness Test and the alphabet score on the Metropolitan Readiness Test administered in July equaled 5.55 points. Therefore, for any given estimate the chances would be approximately two out of three that the actual performance of a child on word discrimination would not be missed by more than ±5.55 points.

Although a number of researchers, among whom are Nicholson (1958), Gavel (1958), Kopel (1942), and Barrett (1965), have found substantial relationships between reading success and knowledge of the alphabet, predictions of success in word knowledge for the sample in this study can be made almost as reliably using only the total first grade readiness score.

TABLE VI

CORRELATIONS OF INDEPENDENT VARIABLES WITH WORD DISCRIMINATION FOR 146 BOYS AND GIRLS

	PPVT$_{(5)}$	MRT, TOTAL FIRST GRADE$_{(7)}$	MRT, FEB. TOTAL$_{(16)}$	MRT, JULY ALPHABET$_{(20)}$	MRT, JULY NUMBERS$_{(21)}$	WORD DISCRIMINATION$_{(Y)}$
PPVT$_{(5)}$	1.00	.66	.44	.39	.43	.48
MRT, TOTAL FIRST GRADE$_{(7)}$		1.00	.60	.53	.64	.70
MRT, FEB. TOTAL$_{(16)}$			1.00	.57	.64	.47
MRT, JULY ALPHABET$_{(20)}$				1.00	.56	.53
MRT, JULY NUMBERS$_{(21)}$					1.00	.51
WORD DISCRIMINATION$_{(Y)}$						1.00
7, 20 MULTIPLE R						.72*
7, 20, 5 MULTIPLE R						.71
7, 20, 5, 21 MULTIPLE R						.71
7, 20, 5, 21, 16 MULTIPLE R						.72

*Multiple R significantly different from zero.

Table VII shows the simple inter-correlations of the variables most highly correlated with the dependent variable and their correlations with the dependent variable (word discrimination) for 66 girls. The correlation between the total first grade Metropolitan Readiness Test and word discrimination (.63) is increased by .07 with the addition of the alphabet score in the multiple regression (Multiple R = .70).

Therefore, as shown in Table I, the same combinations of variables which are predictive of the group as a whole are also those most predictive of the girls when the group is divided by sex. The multiple regression equation, $Y = -5.44572 + .25863X_7 + .60557X_{20}$, predicted performance of girls on the word discrimination section of the Metropolitan Achievement Test would not be wrong by more than ±5.7742 points in approximately two-thirds of the predictions made using the total score of the readiness test and the alphabet score on the July administration of the readiness test.

Table VIII shows that for the 79 boys the total score of the Metropolitan Readiness Test alone, administered at the beginning of the first grade, is the best predictor of the achievement on the word discrimination section of the Metropolitan Achievement Test. The addition of other factors does not add to the predictive value of this test. Both the simple and multiple correlations equal .58. Predictions using this equation, $Y = -.72706 + .24411X_7$, shown in Table I, would not be wrong by more than ±6.8576 points in approximately two-thirds of the predictions one might make. These data indicate that, at least for this sample, predictions for word discrimination should not be attempted prior to the beginning of the first grade.

TABLE VII

CORRELATIONS OF INDEPENDENT VARIABLES WITH WORD DISCRIMINATION FOR 66 GIRLS

	PPVT(5)	MRT, TOTAL FIRST GRADE(7)	MRT, FEB. TOTAL(16)	MRT, JULY ALPHABET(20)	MRT, JULY NUMBERS(21)	WORD DISCRIMINATION(Y)
PPVT(5)	1.00	.59	.38	.30	.32	.33
MRT, TOTAL FIRST GRADE(7)		1.00	.63	.47	.70	.63
MRT, FEB. TOTAL(16)			1.00	.62	.65	.45
MRT, JULY ALPHABET(20)				1.00	.56	.55
MRT, JULY NUMBERS(21)					1.00	.56
WORD DISCRIMINATION(Y)						1.00
7 + 20 MULTIPLE R						.70*

*Multiple R significantly different from zero.

TABLE VIII

CORRELATIONS OF INDEPENDENT VARIABLES WITH WORD DISCRIMINATION FOR 79 BOYS

	PPVT(5)	MRT, TOTAL FIRST GRADE(7)	MRT, FEB. TOTAL(16)	MRT, JULY ALPHABET(20)	MRT, JULY NUMBERS(21)	WORD DISCRIMINATION(Y)
PPVT(5)	1.00	.76	.57	.51	.59	.49
MRT, TOTAL FIRST GRADE(7)		1.00	.68	.65	.67	.58
MRT, FEB. TOTAL(16)			1.00	.56	.67	.38
MRT, JULY ALPHABET(20)				1.00	.59	.42
MRT, JULY NUMBERS(21)					1.00	.35
WORD DISCRIMINATION(Y)						1.00
7						.58*
7 + 5 MULTIPLE R						.58
7, 5, 21 MULTIPLE R						.59
7, 5, 21, 20 MULTIPLE R						.59
7, 5, 21, 20, 16 MULTIPLE R						.59

*Multiple R significantly different from zero.

Hypothesis III: There are certain factors or combinations of factors that will significantly predict achievement in reading for boys, for girls, and for both boys and girls from a low socio-economic status in the first grade.

Table IX shows the inter-correlations of the variables most highly correlated with the dependent variable and their correlations with the dependent variable (reading) for boys and for girls. The simple correlation (.54) between the total score on the first grade Metropolitan Readiness Test and reading for 140 boys and girls is increased by .04 points with the addition of the score on the July administration of the Metropolitan Readiness Test and the score on the Goodenough Draw-A-Woman Test obtained in kindergarten (Multiple R = .58). This multiple regression equation for the best combination of variables for predicting reading for the total samples is $Y = -.43718 + .12367X_7 + .14188X_{23} + .18182X_{25}$.

Therefore, in order to predict achievement in reading on the Metropolitan Achievement Test with maximum precision it is necessary to have the total score on the Metropolitan Readiness Test administered at the beginning of the first grade, the total score on the Metropolitan Readiness Test administered in July, and the score on the Goodenough Draw-A-Woman Test administered in kindergarten.

As shown in Table I, the standard error of estimate for predicting scores on reading for boys and girls using the independent variables of total score on the first grade Metropolitan Readiness Test, the total score on the July administration of the Metropolitan Readiness Test, and the score on the Draw-A-Woman Test equaled 5.76. Thus, the chances would be approximately two out of three that any given

TABLE IX

CORRELATIONS OF INDEPENDENT VARIABLES WITH READING FOR 140 BOYS AND GIRLS

	PPVT(5)	MRT, TOTAL FIRST GRADE(7)	MRT, FEB. TOTAL(16)	MRT, JULY TOTAL(23)	DRAW-A-WOMAN(25)	READING(Y)
PPVT(5)	1.00	.64	.42	.50	.35	.34
MRT, TOTAL FIRST GRADE(7)		1.00	.58	.77	.45	.54
MRT, FEB TOTAL(16)			1.00	.75	.35	.41
MRT, JULY TOTAL(23)				1.00	.42	.53
DRAW-A-WOMAN(25)					1.00	.35
READING(Y)						1.00
7 + 23 MULTIPLE R						.57
7, 23, 25 MULTIPLE R						.58*

*Multiple R significantly different from zero.

TABLE X

CORRELATIONS OF INDEPENDENT VARIABLES WITH READING FOR 76 BOYS

	PPVT(5)	MRT, TOTAL FIRST GRADE(7)	MRT, FEB. TOTAL(16)	MRT, JULY TOTAL(23)	DRAW-A-WOMAN(25)	READING(Y)
PPVT(5)	1.00	.68	.47	.57	.36	.36
MRT, TOTAL FIRST GRADE(7)		1.00	.60	.78	.40	.49
MRT, FEB. TOTAL(16)			1.00	.73	.24	.30
MRT, JULY TOTAL(23)				1.00	.29	.45
DRAW-A-WOMAN(25)					1.00	.32
READING(Y)						1.00
7 + 25 MULTIPLE R						.52*
7, 25, 23 MULTIPLE R						.51

*Multiple R significantly different from zero.

estimate would not miss the actual performance of the child on reading on the Metropolitan Achievement Test by more than ±5.76 points.

Table X shows the simple inter-correlations of the variables most highly correlated with the dependent variable and their correlations with the dependent variable (reading) for 76 boys. When the sample is divided by sex, the best multiple regression equation for boys contains the same variables as that of the total population. The predictions of reading achievement for boys will not be wrong by more than ±5.6970 points in approximately two-thirds of the predictions one might make. However, predictions can be made almost as reliably using X_7 alone ($R = .49$) as they could be by the use of the combination of X_7, X_{25}, and X_{23}. Thus, the multiple regression equation makes no substantial contribution to the prediction of scores on reading for boys.

Table XI shows the simple inter-correlations of the variables most highly correlated with the dependent variable, and their correlations with the dependent variable (reading) for 64 girls. When girls alone are studied, predictions can be made using only the total first grade readiness score and the total score on the Metropolitan Readiness Test, Form A, administered in February. Predictions made on the basis of these scores will not be wrong by more than ±5.7393 points in approximately two-thirds of all predictions.

To summarize, predictions of reading scores for girls can be made using a combination of scores obtained from the readiness tests administered during kindergarten and scores on a readiness test administered at the beginning of first grade (total score on the Metropolitan Readiness Test administered in February and the total score on the Metropolitan Readiness Test administered at the beginning of the first

TABLE XI

CORRELATIONS OF INDEPENDENT VARIABLES WITH READING FOR 64 GIRLS

	PPVT$_{(5)}$	MRT, TOTAL FIRST GRADE$_{(7)}$	MRT, FEB. TOTAL$_{(16)}$	MRT, JULY TOTAL$_{(23)}$	DRAW-A-WOMAN$_{(25)}$	READING$_{(Y)}$
PPVT$_{(5)}$	1.00	.57	.35	.43	.35	.32
MRT, TOTAL FIRST GRADE$_{(7)}$		1.00	.59	.78	.52	.62
MRT, FEB. TOTAL$_{(16)}$			1.00	.78	.52	.54
MRT, JULY TOTAL$_{(23)}$				1.00	.58	.60
DRAW-A-WOMAN$_{(25)}$					1.00	.38
READING$_{(Y)}$						1.00
7 + 16 MULTIPLE R						.65*

*Multiple R significantly different from zero.

grade). For boys, predictions can be made more accurately using these two readiness test scores together with an intelligence test score as measured, in this instance, by the Goodenough Draw-A-Woman Test administered in kindergarten.

The Differences Between the Mean Scores of the Boys and Girls in the COPE Population

The Difference in the Means of the Readiness Test of the Boys and Girls

To test for the significance of difference between the means of the readiness of these two groups at the beginning of the first grade, the means of the scores obtained on the Metropolitan Readiness Test, Form R, administered the third week of the first grade, were subjected to a "t" test of the significance of the difference.

Table XII shows the mean score on the Metropolitan Readiness Test for 97 boys, the mean score for 89 girls, the mean difference, the standard error of the difference between the means, the "t" value, and the level of significance of these two groups. For this sample of the COPE population, no significant differences were found between the readiness scores for the boys and the girls. Therefore, it is concluded that the two groups were equivalent at the start of the first grade.

The Difference in the Means of the Scores on Word Knowledge, Word Discrimination, and Reading of the Boys and the Girls

In order to test the significance of the difference between the means of the scores on word knowledge, word discrimination, and reading on the Metropolitan Achievement Test, Form A, for boys and for

TABLE XII

THE MEANS ON THE METROPOLITAN READINESS TEST, FIRST GRADE, AND ON THE METROPOLITAN ACHIEVEMENT TEST OF THE BOYS AND GIRLS IN THE COPE SAMPLE

TEST	MEANS				MEAN DIFFERENCE	$S_{D_{\bar{X}}}$	t Test	SIGNIFICANCE
	Boys	N	Girls	N				
METROPOLITAN READINESS TEST	60.34	97	62.70	89	2.36	2.31	1.02	N.S.
WORD KNOWLEDGE	12.5876	97	14.6180	89	2.0304	2.6215	.7745	N.S.
WORD DISCRIMINATION	13.6076	79	14.1970	66	.5894	1.3579	.4340	N.S.
READING	13.0921	76	14.3281	64	1.2360	1.2025	1.0278	N.S.

girls, administered in May, 1967, the means as computed by the 7040 IBM Computer were subjected to a "t" test of the significance of the difference.

The mean scores for boys, the mean scores for girls, the mean difference, the standard error of the difference between the means, the "t" values, and the appropriate levels of significance are presented in Table XII.

Table XII shows the means of the scores on word knowledge for 97 boys and 89 girls. When the data were tested for the significance of the differences between these means for boys and for girls of this sample, the difference on word knowledge was not significant.

Table XII shows the means of the scores on word discrimination for 79 boys and 66 girls. When the difference between these means was tested statistically, no significant difference was found between boys and girls.

Table XII shows the means of the scores on reading for 76 boys and 64 girls. A test of the significance of the difference between the means of the scores on reading for boys and reading for girls also showed no significant difference.

The Differences Between the Correlations of Readiness and Reading Achievement for Boys and Girls in the COPE Sample

Table XIII shows the correlations between the scores on the Metropolitan Readiness Test with word knowledge, word discrimination, and reading for boys, for girls, and for both boys and girls in the COPE sample.

These data show a significant increase in the correlation between

TABLE XIII

CORRELATIONS OF METROPOLITAN READINESS TEST
WITH WORD KNOWLEDGE, WORD DISCRIMINATION
AND READING FOR COPE SAMPLE*

TEST	FEBRUARY			JULY			SEPTEMBER		
	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls
WK	(186) .4297	(97) .3484	(89) .5212	N O T	A V A I L	A B L E	(186) .6401	(97) .6428	(89) .6330
WD	(146) .4706	(79) .3750	(66) .4479	N O T	A V A I L	A B L E	(146) .6949	(79) .5771	(66) .6344
R	(140) .4091	(76) .2947	(64) .5423	(140) .5288	(76) .4447	(64) .6029	(140) .5369	(76) .4858	(64) .6149

*Number in parenthesis = number

the readiness test administered in February and in September for boys and for girls. These data further show that the increase in correlations tended to be higher for boys than for girls. This would suggest that involvement in the learning experiences provided during this time may be somewhat more critical in predicting first grade achievement for boys than for girls.

The Differences Between the Correlations of Readiness with Achievement for the COPE Sample and the Non-COPE Sample

Significance of the Difference Between the Correlations of the Readiness Tests with Reading Achievement for the COPE Sample and a Non-COPE Sample

The correlations between the scores on the Metropolitan Readiness Test, administered at the beginning of first grade, and scores on the Metropolitan Achievement Test, administered at the end of first grade, for the COPE sample were compared with the correlations between readiness-achievement test scores for a group of children who were eligible for COPE but who were not enrolled in COPE. There are no data available on the non-COPE sample with which the initial comparability of these two groups may be established. Only an assumption can be made that they were alike prior to the pre-school experience of the COPE population as the non-COPE children could have been enrolled in the COPE Project had sufficient classroom space been available.

No attempt was made at selectivity in enrolling the children in COPE other than an effort to keep the number of children of each sex equal in each classroom. There were 1154 children in the non-COPE group from which a random sample of 275 was drawn.

TABLE XIV

CORRELATIONS OF FIRST GRADE READINESS TEST AND FIRST GRADE ACHIEVEMENT TEST FOR THE COPE AND THE NON-COPE GROUPS

TEST	NUMBER		CORRELATIONS		Z		z	SIGNIFICANCE
	COPE	NON-COPE	COPE	NON-COPE	COPE	NON-COPE		
WORD KNOWLEDGE	186	275	.6401	.4110	.758	.436	3.3682	.001
WORD DISCRIMINATION	146	275	.6949	.4886	.867	.523	3.3304	.001
READING	140	275	.5369	.3750	.604	.394	2.0045	.05

Table XIV shows the correlations between the First Grade Reading Readiness Test scores and the Metropolitan Achievement Test scores for the COPE and the non-COPE children. The differences between the correlation coefficients were tested by the following formula:

$$S_{D_z} = \sqrt{S_{z_1}^2 + S_{z_2}^2}$$

The difference between the correlations of readiness and word knowledge for the COPE group and readiness and word knowledge for the non-COPE group was significant at the .001 level in favor of the COPE sample. This indicates that in only one sampling out of a thousand would a difference as great as was found happen by chance.

The difference between the correlations of readiness and word discrimination for the COPE sample and readiness and word discrimination for the non-COPE sample, as shown in Table XIV, was significant at the .001 level in favor of the COPE sample. In only one sampling in a thousand would a difference as great as was found occur by chance.

Table XIV shows the difference between the correlations of readiness and reading for the COPE sample and readiness and reading for the non-COPE sample. This difference is significant at the five percent level in favor of the COPE sample which would indicate that in only five samplings out of a hundred would a difference as great as was found happen by chance.

Differences Between the Readiness of the COPE Sample and the Readiness of the Non-COPE Sample

Table XV shows the correlations between the September administration of the Metropolitan Readiness Test and word knowledge, word

TABLE XV

CORRELATIONS OF METROPOLITAN READINESS TESTS AND READING OF COPE SAMPLE AND NON-COPE SAMPLE

TEST	COPE				NON-COPE	
	N	FEBRUARY	JULY	SEPTEMBER	N	SEPTEMBER
WORD KNOWLEDGE	186	.4297	No data	.6401	275	.4110
WORD DISCRIMINATION	146	.4706	No data	.6949	275	.4886
READING	140	.4091	.5288	.5369	275	.3750

discrimination, and reading as measured by the Metropolitan Achievement Test in May, 1967, for the COPE and for the non-COPE samples. It further shows the correlations between the Metropolitan Readiness Test (administered in February and July) and word knowledge, word discrimination, and reading for the COPE sample. The data show that the score on word knowledge for the non-COPE sample could have been predicted about as well in September as the COPE population could have been predicted the preceding February after approximately four months of kindergarten experience. The score on word discrimination could have been predicted in September for the non-COPE group somewhat closer than could the COPE group have been predicted in February although not significantly so. The non-COPE sample could have been predicted less well in September than the COPE group could have been in February for reading scores.

It is unfortunate that data are not available for these two groups prior to the pre-school experiences. However, the first administration of the Metropolitan Readiness Test for the COPE population was not undertaken until such time as the children were considered to be academically and emotionally capable of responding to the test situation.

The increase in correlation observed for the COPE children between February and September could conceivably reflect the fact that the September scores are closer in time to the predicted variable -- reading achievement. The children would normally show less variability, as a given characteristic over a shorter period of time, other things being equal. It is also possible to account for this increment in part as a manifestation of the normal maturation of children as their differing aptitudes assume more definite forms. In this case, the regular development of the children would be the primary factor in the

increase in the correlation between the readiness tests and achievement tests or the later administrations of the readiness tests.

However, comparison of the same correlations for the non-COPE group, based on tests administered at the same time, affords evidence for rejecting both of these explanations, at least as primary and sufficient in accounting for the increased relationship. Both the passage of time and the increasing maturation of the children would be expected to work the same effect on the non-COPE as well as the COPE children. To the extent these factors produced the increased correlation, the non-COPE children should show the same increment. If we assume that the non-COPE children were comparable to COPE children at the start, which seems a reasonable assumption, although measurement data are lacking, this means that the non-COPE children should show approximately the same level of correlation between the same predictor and predicted variable as the COPE children on the September administration of the readiness test. Table XV reveals, however, that the non-COPE children show a significantly lower correlation than COPE children. This suggests the substantial impact of some factor peculiar to COPE children and not available to non-COPE children, i.e., the involvement in the pre-school program. Identification of this program as the crucial factor is strengthened when it is further recognized that the COPE children themselves showed a significantly lower correlation on the February administration of the Readiness test, about the same as the non-COPE children, in fact, before major saturation in the special pre-school program.

These data suggest most reliable predictions are possible only when disadvantaged children have had an opportunity to perform in a

formal learning situation. Therefore, prediction attempts and efforts at placement of disadvantaged children in specified levels should not precede such opportunities for involvement in and exposure to formal learning tasks. Children should not be "pigeon-holed" too early. This is especially true for disadvantaged children.

Actual performance in learning tasks makes predictions much more reasonable and defensible. In trying to predict subsequent achievement, observation of performance should become an important independent variable to supplement any test data.

Significance of the Difference Between the Means of the COPE Sample and the Non-COPE Sample on the Metropolitan Readiness Test Administered at the Beginning of the First Grade

The means of the scores on the Metropolitan Readiness Test for the COPE sample and the non-COPE sample, administered in September, were subjected to a test of significance of difference.

TABLE XVI

MEANS OF THE METROPOLITAN READINESS SCORES OF THE COPE AND THE NON-COPE SAMPLE

MEANS		MEAN DIFFERENCE	S_{D_X}	t TEST	SIGNIFICANCE
186 COPE	275 NON-COPE				
61.47	40.68	20.79	1.3411	15.5149	.001

Table XVI gives the mean score on the first grade readiness test, the difference between the means, the standard error of the difference between the means, the "t" value, and the level of significance between

the two groups.

For this sample, the difference in the mean score on the Metropolitan Readiness Test administered at the beginning of the first grade was significant at the .001 level in the favor of the COPE children.

There are no data available with which to test for the difference between the groups prior to the beginning of the pre-school experience of the COPE population. Therefore, it can only be assumed that the groups were similar initially. However, these data strongly support the importance of a pre-school experience for purposes of determining first grade readiness, as measured by the Metropolitan Readiness Test, at least as far as the child from the low socio-economic level is concerned.

Summary

This chapter has presented a detailed analysis of the statistical treatment of the data. The following hypotheses were accepted:

1. There are certain factors or combinations of factors that will significantly predict achievement in word knowledge for boys, for girls, and for both boys and girls from the low socio-economic level in the first grade. The total score on the readiness test administered at the beginning of the first grade is the best predictor of achievement in word knowledge for boys. The total score on the first grade readiness test in combination with the score on copying on the Metropolitan Readiness Test administered during the kindergarten year are the best predictors of word knowledge for girls. The best combination of variables predicting word knowledge achievement for the total population is the total score on the first grade readiness test with the copying score on

the Metropolitan Readiness Test administered during the kindergarten year.

2. There are certain factors or combinations of factors that will significantly predict achievement in word discrimination for boys, for girls, and for both boys and girls from the low socio-economic level in the first grade. The total score on the first grade readiness test is the best predictor of achievement in word discrimination for boys. The best predictor of achievement in word discrimination for the girls was the total score on the readiness test administered at the beginning of the first grade with the addition of the alphabet score on the July administration of the readiness test. The best prediction for the total group can be made using the total score on the readiness test administered at the beginning of the first grade and the alphabet score on the July administration of the readiness test.

3. There are certain factors or combinations of factors that will significantly predict achievement in reading for boys, for girls, and for both boys and girls from the low socio-economic level in the first grade. Predictions for boys can be made most reliably by using the total score on the first grade Metropolitan Readiness Test, the total score on the July administration of the Metropolitan Readiness Test, and the score on the Draw-A-Woman Test. Predictions can be made for the girls using only the total first grade readiness score and the total score on the Metropolitan Readiness Test administered in February. Prediction of achievement in reading for the total group may be made using the total score on the first grade Metropolitan Readiness Test, the total score on the July administration of the Metropolitan Readiness Test, and the score on the Draw-A-Woman Test.

4. There will be a significant difference in the correlations of the first grade readiness test with the first grade achievement test for the COPE sample and a non-COPE sample. The differences in correlations between word knowledge and word discrimination for the COPE sample and a non-COPE sample were significant at the .001 level. The differences in the correlations of reading were significant at the .05 level.

5. There will be a significant difference between the means of the scores on the readiness test administered at the beginning of the first grade for the COPE sample and the non-COPE sample. The difference between the means on the readiness test of the COPE and the non-COPE sample was significant at the .001 level.

The following hypotheses could not be accepted:

6. There will be a significant difference between the scores on word knowledge, word discrimination, and reading for the boys and the girls.

7. There will be a significant difference in the means of the first grade readiness scores of the boys and girls in the COPE sample.

CHAPTER V

SUMMARY AND CONCLUSIONS

General Summary of the Investigation

This investigation was concerned with determining those factors or combination of factors which are predictive of success in word knowledge, word discrimination, and reading in the first grade for children from the low socio-economic level. Three different problems were investigated: (1) determining those factors or combination of factors which are predictive of success in reading in the first grade for all children from the low socio-economic level, (2) determining those factors or combinations of factors most reliably predictive of success in reading for boys, and for girls, considered separately, noting any important differences between the sexes, and the total group, and (3) determining the differences in readiness between the COPE population and a randomly selected sample of children who were eligible to enroll in COPE but who were not members of the COPE population. The stated hypotheses that significant differences existed were treated statistically.

Children who were enrolled in the Compensatory Pre-Primary Education project (officially known as COPE) during the school term 1965-66, and for whom Metropolitan Achievement Test scores were obtained in May, 1967, at the end of their first grade experience, constitute the experimental sample used in this investigation. Children who were

colleagues of the COPE sample during the first grade and who could have been eligible for the pre-school (COPE) experience but who were never enrolled in COPE, were used in the latter part of the investigation as the control or non-COPE group. Since these children were not enrolled in any school program prior to first grade, data for this control group were limited to the Metropolitan Readiness Test, Form R, administered during the third week of the first grade, September, 1966, (independent variable), and the Metropolitan Achievement Test, Primary I Battery, Form A, administered in May, 1967, (dependent variable).

There were 230 subjects in the original experimental sample of this study. However, each problem investigated has a smaller number of subjects because a complete matrix of data was not available for each step in the correlation and multiple regression analysis. There were 275 children in the non-COPE group.

Conclusions

For prediction of success in reading of first grade children from a low socio-economic level, it is desirable to study the sexes separately. Predictions for the girls can be made from scores obtained on readiness tests. Predictions for the boys can be made more accurately using the scores on the readiness tests in combination with an intelligence test score.

The total readiness score of the readiness test administered at the beginning of the first grade is the best predictor of success in word knowledge and word discrimination for boys.

The total readiness score of the readiness test administered at the beginning of the first grade, together with the copying score on

the February readiness test, constituted the best combination of predictors of word knowledge for the girls.

The total readiness score of the readiness test administered at the beginning of the first grade, together with the alphabet score on the July administration of the readiness test, were the best predictors of word discrimination for the girls.

Success in reading of the boys is best predicted by a combination of the total scores on the readiness test administered in the first grade, the total score on the readiness test administered in July, and an intelligence test score.

Success in reading of the girls can be predicted by the first grade readiness test and the total score on the readiness test administered in February. An intelligence test score does not make a contribution to the prediction of reading success for girls.

Since a significantly higher correlation between predictor variables and reading achievement was found for girls at an earlier time than for boys, somewhat more reliable predictions can, therefore, be made for girls than for boys.

Although the mean scores for the girls on word knowledge, word discrimination, and reading were each somewhat higher than were the mean scores on these three criterion variables for the boys, none of the differences was significant.

Although this study was limited to a sample from the low socio-economic level, the correlations between the reading readiness tests and the achievement test for the experimental group were at least as high as would have been expected from a more normal sample because these simple correlations were almost identical to those reported in

the validity studies in the manual. This would indicate that the preschool experiences to which these children had been exposed had permitted the children to function as individuals and to achieve more nearly at their capacity during which process normal and significant differences between individuals have a chance to emerge. This increased the variability within this disadvantaged group, contributing directly to the increased correlation observed, and to the more reliable predictions possible. Apparently, as suggested earlier, conventional measures of readiness or aptitude will relate to subsequent achievement for disadvantaged children about as well as these measures do for more privileged children if disadvantaged children have real meaningful learning experiences which help to compensate for their common deprivation permitting the manifestation of individual differences as all such children are given a genuine opportunity to display their various abilities. If we assume that the distribution of talent is essentially the same in all social, cultural or ethnic groups within our society, the emergence of these individual differences in measurable form is a consistent necessary eventuality and is at least indirect evidence of the validity of the educational program involved. It also suggests the inappropriateness of attempts to make such predictions for disadvantaged children before exposure to such a relevant educational experience.

In addition, it would seem to indicate that the instruction which these students received in their first grade year was planned to provide for their individual differences. As Gates (1939) stated, and reported earlier in this study, the better the teaching, the higher the correlations between the readiness test and the achievement test scores.

There was a significant difference between the correlation of the

readiness test with the achievement test for the COPE sample, as compared to the non-COPE sample. This again points out the importance of a pre-school experience prior to the attempt to measure the potential of a child, at least for children in the low socio-economic level.

Recommendations

In none of the nine regression equations used in testing the hypotheses of this study concerning prediction of achievement in reading did the Peabody Picture Vocabulary Test appear as a useful predictor. This would be consistent with a statement made recently in personal correspondence from Dr. Dunn, developer of the test, that the Peabody Picture Vocabulary Test could be used more accurately for later predictions than for predictions at the end of the first grade. Therefore, the recommendation is made that this population be studied in the later elementary years to see if the Peabody Picture Vocabulary Test might appear as a predictor for the low socio-economic level when used at a later time. The use of an instrument as quickly and easily administered as this one would be of invaluable assistance to educators if it is found to be predictive.

The multiple correlation, and related regression analysis, accounts for only a small percentage of the total variance in the predicted scores. Additional examination of the data should be made to study factors which were not considered in this study, such as the teacher variables, classroom atmosphere, and teaching techniques. Systematic, objective gathering of data pertaining to these variables together with observational assessment of pupil performance during the pre-school period might make a significant additional contribution to prediction

of reading achievement.

This study was limited to a sample from one stratum, and from one geographical area. Therefore, the findings as related to other strata and other populations must be interpreted with caution. Nevertheless, it is recommended that this population be followed throughout their school experiences in order that the profession might utilize whatever information may be collected on the 440 students originally enrolled in COPE.

In this study predictability was the prime consideration but it is recommended that future analysis of the data should avoid including the total score where subtest scores are available in order to get differential predictability.

A SELECTED BIBLIOGRAPHY

Almy, Millie Corinne. "The Importance of Children's Experiences to Success in Beginning Reading," Research in the Three R's. (New York: Harper and Brothers, 1958).

Ames, Louise B. "Prediction of Later Reading Ability from Kindergarten Rorschach and IQ Scores," Journal of Educational Psychology, LV (December, 1964), 309-13.

Anderson, Irving H., Byron O. Hughes, and W. Robert Dixon. "Age of Learning to Read and Its Relation to Sex, Intelligence, and Reading Achievement in the Sixth Grade," Journal of Educational Research, XLIX (February, 1956), 447-53.

_____. "The Rate of Reading Development and Its Relation to Age of Learning to Read, Sex, and Intelligence," Journal of Educational Research, L (March, 1957), 481-94.

Balow, Irving H. "Sex Differences in First Grade Reading," Elementary English, XL (March, 1963), 303-6, 320.

Barbe, Walter and Werner Grilk. "Correlations Between Reading Factors and Intelligence Quotient," School and Society, LXXV (March, 1952), 134-36.

Barrett, Thomas C. "Visual Discrimination Tasks as Predictors of First Grade Reading Achievement," The Reading Teacher, XVIII (January, 1965), 276-282.

Bennett, Chester C. An Inquiry into the Genesis of Poor Reading. (New York: Bureau of Publications, Teachers College, Columbia University, 1938).

Betts, Emmett A. "Factors in Readiness for Reading," Educational Administration and Supervision, XXIX (April, 1943), 199-230.

Bevington, W. G. "Effect of Age at Time of Entrance into Grade I on Subsequent Achievement," Alberta Journal of Educational Research, (March, 1958).

Bliesmer, Emery P. "Reading Abilities of Bright and Dull Children of Comparable Mental Ages," Journal of Educational Psychology, XLV (October, 1954), 321-31.

Bond, Eva. Reading and Ninth Grade Achievement. Contributions to Education, No. 756. (New York: Bureau of Publications, Teachers College, Columbia University, 1938).

Bond, Guy L. and Theodore Clymer. "Interrelationship of the SRA Primary Mental Abilities, Other Mental Characteristics, and Reading Ability," Journal of Educational Research, XLIX (October, 1955), 131-36.

_____, and Miles A. Tinker. Reading Difficulties: Their Diagnosis and Correction. (New York: Appleton-Century-Crofts, 1967).

_____, and Eva Wagner. Child Growth in Reading. (Chicago: Lyons and Carnahan, 1955).

Bollings, Rexford W. "Techniques for Diagnosing Reading Difficulties," The Reading Teacher, X (December, 1956), 102-106; 128.

Bremer, Neville. "Do Readiness Tests Predict Success in Reading?" Elementary School Journal, LIX (January, 1959), 222-4.

Burks, Harold F. and Paul Bruce. "The Characteristics of Poor and Good Readers as Disclosed by the Wechsler Intelligence Scale for Children," Journal of Educational Psychology, XLVI (December, 1955), 488-93.

Carroll, Marjorie Wight. "Sex Differences in Reading Readiness at the First Grade Level," Elementary English, XXV (October, 1948), 370-75.

Chall, Jeanne, Florence G. Roswell, and Susan Hahn Blumenthal. "Auditory Blending Ability: A Factor in Success in Beginning Reading," The Reading Teacher, XVII (November, 1963), 113-18.

Dean, Charles D. "Predicting First-Grade Reading Achievement," Elementary School Journal, XXXIX (April, 1939), 609-616.

Deputy, Erby Chester. Predicting First Grade Reading Achievement: A Study in Reading Readiness. Contributions to Education, No. 426. (New York: Bureau of Publications, Teachers College, Columbia University, 1930).

Downie, N. M. and R. W. Heath. Basic Statistical Methods. (New York: Harper and Row, 1965).

Downing, J. A. "Is a 'Mental Age of Six' Essential for 'Reading' Readiness?" Educational Research, VI (November, 1963), 16-28.

Dunn, Lloyd M. Peabody Picture Vocabulary Test. (Minneapolis: American Guidance Service, 1965).

Durkin, Dolores. "Children Who Learned to Read at Home," Elementary School Journal, LXII (October, 1961), 15-18.

_____. "An Earlier Start in Reading," Elementary School Journal, LXIII (December, 1962), 147-51.

_____. "A Fifth Year Report on the Achievement of Early Readers," Elementary School Journal, LXV (November, 1964), 76-80.

Durrell, Donald D. "First-Grade Reading Success Study: A Summary," Journal of Education, CXL (February, 1958), 2-6.

Fast, Irene. "Kindergarten Training and Grade I Reading," Journal of Educational Psychology, XLVIII (January, 1957), 52-57.

Fry, Edward Bernard. "First Grade Reading Instruction Using a Diacritical Marking System, The Initial Teaching Alphabet and a Basal Reading System," Cooperative Research Project 2745, Office of Education, United States Department of Health, Education, and Welfare, 1965, 89.

Gates, Arthur I. "The Necessary Mental Age for Beginning Reading," Elementary School Journal, XXXVII (March, 1937), 497-508.

_____. "An Experimental Evaluation of Reading-Readiness Tests," Elementary School Journal, XXXIX (March, 1939), 497-508.

_____. "A Further Evaluation of Reading Readiness Tests," Elementary School Journal, XL (April, 1940), 577-591.

_____. "Sex Differences in Reading Ability," Elementary School Journal, LXI (May, 1961), 431-434.

_____, Guy L. Bond, and David H. Russell. Methods of Determining Reading Readiness. (New York: Bureau of Publications, Teachers College, Columbia University, 1939).

Gavel, Sylvia R. "June Reading Achievements of First-Grade Children," Journal of Education, CXL (February, 1958), 37-43.

Goins, Jean Turner. Visual Perceptual Abilities and Early Reading Progress. Supplementary Educational Monographs, No. 87. (Chicago: University of Chicago Press, 1958).

Goodenough, Florence L. and Dale B. Harris. Goodenough-Harris Drawing Test. (New York: Harcourt, Brace and World, Inc., 1963).

Guilford, J. P. Fundamental Statistics in Psychology and Education. (New York: McGraw-Hill Book Company, 1965).

Hansen, Harvey C. "Relationship Between Sex and School Achievement of One Thousand Indian Children," Journal of School Psychology, X (August, 1939), 399-406.

Harrison, M. Lucile. Reading Readiness. (Boston: Houghton Mifflin Company, 1936).

Havinghurst, Robert J. Human Development and Education. (New York: Longmans, Green and Company, 1953).

Henig, Max S. "Predictive Value of a Reading Readiness Test and of Teachers' Forecasts," Elementary School Journal, L (September, 1949), 41-46.

Henry, Sibyl. "Children's Audiograms in Relation to Reading Attainment," Pedogogical Seminary and Journal of Genetic Psychology, LXX (June, 1947), 211-31.

Hildreth, Gertrude. "Interrelationships Among the Language Arts," Elementary School Journal, XLVIII (June, 1948), 538-49.

_____, and Nellie L. Griffiths. Metropolitan Readiness Tests, Form R. (New York: Harcourt, Brace, and World, Inc., 1949).

_____, Nellie L. Griffiths, and Mary E. McGauvran. Metropolitan Readiness Tests, Form A. (New York: Harcourt, Brace, and World, Inc., 1964).

_____, Harold H. Bixler, Kenneth W. Lund, and J. Wayne Wrightstone. Metropolitan Achievement Tests, Primary I Battery, Form A. (New York: Harcourt, Brace, and World, Inc., 1959).

Hilliard, George A., and Eleanor Troxell. "Informational Background as a Factor in Reading Readiness and Reading Progress," Elementary School Journal, XXXVIII (December, 1937), 263.

Hughes, Mildren C. "Sex Differences in Reading Achievement in the Elementary Grades," Clinical Studies in Reading: II, Supplementary Educational Monographs, No. 77 (Chicago: University of Chicago Press, January, 1953), 102-106.

Ilg, Frances L. and Louise Bates Ames. "Developmental Trends in Reading Behavior," Pedagogical Seminary and Journal of Genetic Psychology, LXXVI (June, 1950), 291-312.

_____. School Readiness: Behavior Tests Used at the Gessell Institute. (New York: Harper and Row, Publishers, Inc., 1965).

Johnson, Palmer O. Statistical Methods in Research. (New York: Prentice-Hall, Inc., 1949).

Karlin, Robert. "The Prediction of Reading Success and Reading-Readiness Tests," Elementary English, XXXIV (May, 1957), 320-22.

_____. "Physical Growth and Success in Undertaking Beginning Reading," Journal of Educational Research, LI (November, 1957), 191-201.

_____. "Research in Reading," Elementary English, XXXVII (March, 1960), 177-183.

Keogh, Barbara K. "Form Copying Tests for Prediction of First Grade Reading," Claremont Reading Conference Yearbook, XXVII (1963), 141-144.

Keyser, Margaret Lee. "Research in Reading in the Elementary School," Review of Educational Research, XXII (April, 1952), 65-75.

Klaus, R. A. and Christiana Starke. Experimental Revision of the Peabody Picture Vocabulary Test As a Predictor of First Grade Reading Ability. Unpublished paper. (Nashville, Tennessee: Peabody College Psychology Department, 1964).

Kopel, David. "Reading Readiness: Its Determination and Use," Teacher's College Journal, XIII (January, 1942), 64-70.

Kottmeyer, William. Handbook for Remedial Reading. (St. Louis: Webster Publishing Company, 1947).

_____. "Readiness for Reading," Elementary English, XXIV (October, 1947), 355-66.

Lee, Dorris May. The Importance of Reading for Achieving in Grades Four, Five, and Six. Contributions to Education, No. 556. (New York: Bureau of Publications, Teachers College, Columbia University, 1933).

Linehan, Eleanor B. "Early Instruction in Letter Names and Sounds as Related to Success in Beginning Reading," Journal of Education, CXL (February, 1958), 44-48.

Lynn, R. "Reading Readiness and the Perceptual Abilities of Young Children," Educational Research, VI (November, 1963), 10-15.

McCarthy, Dorothea. "Factors that Influence Language Growth: Home Influences," Elementary English, XXIX (1952), 421-28; 440.

McLaren, Violet M. "Socio-Economic Status and Reading Ability--A Study in Infant Reading," Studies in Reading, II (London: University of London Press, 1950), 2-62.

Milner, Esther. "A Study of the Relationship Between Reading Readiness in Grade One School Children and Pattern of Parent-Child Interactions," Child Development, XXII (June, 1951), 95-112.

Monroe, Marion. Children Who Cannot Read. (Chicago: University of Chicago Press, 1932).

_____. "Reading Aptitude Tests for the Prediction of Success and Failure in Beginning Reading," Education, LVI (September, 1935), 7-14.

Morphett, M. W. and C. Washburne. "When Should Children Begin to Read?" Elementary School Journal, XXXI (March, 1931), 48.

Natchez, Gladys. Personality Patterns and Oral Reading. (New York: New York University Press, 1959).

National Society for the Study of Education 24th Yearbook, Part I - Report of the National Committee on Reading. (Chicago: University of Chicago Press, 1925).

Nelson, Lois Ney. "Clues from Childhood," Childhood Education, XXXIV (November, 1957), 123-126.

Nicholson, Alice. "Background Abilities Related to Reading Success in First Grade," Journal of Education, CXL (February, 1958), 7-24.

Olson, Arthur V. "Growth in Word Perception Abilities as It Relates to Success in Beginning Reading," Journal of Education, CXL (February, 1958), 25-36.

Olson, Willard C. "Should Boys Enter School Later than Girls?" National Education Association Journal, XLI (January, 1952), 29-31.

Orear, Margaret Louise. "Social Maturity and First Grade Achievement," California Journal of Educational Research, II (March, 1951), 84-88.

Pauley, Frank R. "Sex Differences and Legal School Entrance Age," Journal of Educational Research, XLV (September, 1951), 1-9.

Petty, Mary Clare. "An Experimental Study of Certain Factors Influencing Reading Readiness," Journal of Educational Psychology, XXX (March, 1939), 215-230.

Poling, Dorothy L. "Auditory Deficiencies of Poor Readers," Clinical Studies in Reading: II, Supplementary Educational Monographs, 77 (Chicago: University of Chicago Press, January, 1953).

Popp, Helen M. "Visual Discrimination of Alphabet Letters," Reading Teacher, XVII (January, 1964), 221-6.

Potter, Muriel Catherine. Perception of Symbol Orientation and Early Reading Success. Contributions to Education, No. 939. (New York: Bureau of Publications, Teachers College, Columbia University, 1949.)

Prescott, George A. "Sex Differences in Metropolitan Readiness Test Results," Journal of Educational Research, XLVIII (April, 1955), 605-610.

Reynolds, Maynard Clinton. "A Study of the Relationships Between Auditory Characteristics and Specific Silent Reading Abilities," Journal of Educational Research, XLVI (February, 1953), 439-49.

Riessman, Frank. The Culturally Deprived Child. (New York: Harper and Row Publishers, 1965).

Robinson, Helen M. "Factors Which Affect Success in Reading," Elementary School Journal, LV (January, 1955), 263-69.

_____. "Development of Reading Skills," The Elementary School Journal, LVIII (February, 1958), 269-74.

_____, and Charles B. Huelsman, Jr. "Visual Efficiency and Progress in Learning to Read," Clinical Studies in Reading: II, Supplementary Educational Monographs, No. 77 (Chicago: University of Chicago Press, January, 1953), 31-63.

Samuels, Fra. "Sex Differences in Reading Achievement," Journal of Educational Research, XXXVI (April, 1943), 594-603.

Sanderson, A. E. "The Idea of Reading Readiness -- A Re-Examination," Educational Research, VI (November, 1963), 3-9.

Schubert, Delwyn G. "Visual Immaturity and Reading Difficulty," Elementary English, XXXIV (May, 1957), 323-25.

Shane, Harold G. Research Helps in Teaching the Language Arts. (Washington, D. C.: Association for Supervision and Curriculum Development, 1955).

Sheldon, William D., and Lawrence Carrillo. "Relation of Parents, Home, and Certain Developmental Characteristics to Children's Reading Ability," Elementary School Journal, LII (January, 1952), 262-270.

Smith, Nila B. "Matching Ability as a Factor in First Grade Reading," Journal of Educational Psychology, XIX (November, 1928), 560-71.

_____. "Readiness for Reading," Elementary English XXVII (January and February, 1950), 31-39; 91-106.

Solomon, Ruth H. "Personality Adjustment to Reading Success and Failure," Clinical Studies in Reading: II, Supplementary Educational Monographs, No. 77 (Chicago: University of Chicago Press, January, 1953), 64-82.

Spache, George D. "Estimating Reading Capacity," Evaluation of Reading, Supplementary Educational Monographs, No. 88 (Chicago: University of Chicago Press, December, 1958), 15-20.

Stauffer, Russell G. and W. Dorsey Hammond. "Effectiveness of a Language Arts and Basic Reader Approach to First Grade Reading Instruction," Cooperative Research Project 2679, Office of Education, United States Department of Health, Education, and Welfare, 1965, 140.

Steinback, Mary Nila. "Foundations of a Successful Reading Program," Education, LXXIII (May, 1953), 543, 555.

Sutton, Rachel S. "A Study of Certain Factors Associated With Reading Readiness in the Kindergarten," Journal of Educational Research, XLVIII (March, 1955), 531-38.

Thomas, George Isaiah. "A Study of Reading Achievement in Terms of Mental Ability," Elementary School Journal, XLVII (September, 1946), 28-33.

Wattenberg, William W. and Clare Clifford. "Relation of Self-Concepts to Beginning Achievement in Reading," Child Development, XXXV (June, 1964), 461-7.

Wheeler, Lester R. "The Relation of Reading to Intelligence," School and Society, LXX (October, 1949), 225-7.

_____, and Viola D. Wheeler. "A Study of the Relationship of Auditory Discrimination to Silent Reading Abilities," Journal of Educational Research, XLVIII (October, 1954), 103-13.

Williams, Gertrude H. "What Does Research Tell Us About Readiness for Beginning Reading?" The Reading Teacher, VI (May, 1953), 34-40.

Wilson, Frank T. "Early Achievement in Reading," Elementary School Journal, XLII (April, 1942), 609-615.

_____, and Agnes Burke. "Reading Readiness in a Progressive School," Teachers College Record, XXXVIII (April, 1937), 565-580.

Wilson, Frank T., Cecile Flemming, Agnes Burke, and Charlotte Garrison. "Reading Progress in Kindergarten and Primary Grades," Elementary School Journal, XXXVIII (February, 1938), 442-449.

Witty, Paul. "Reading Success and Emotional Adjustment," Elementary English, XXVII (May, 1950), 281-96.

_____, and David Kopel. "Preventing Reading Disability: The Reading Readiness Factor," Educational Administration and Supervision, XXII (September, 1936), 401-418.

Woolf, Henriette. "The Relation of Intelligence Test Scores of Kindergarten Children to their Reading Test Scores in the First Grade," School and Society, XL (August, 1934), 150-152.

APPENDIX A

CODE FOR INDEPENDENT VARIABLES

APPENDIX A

Code for Independent Variables

1. Age
2. Index of Social Class
3. Months Attended
4. Days Absent
5. Peabody Picture Vocabulary Test - pre-administration
6. Peabody Picture Vocabulary Test - post-administration
7. Metropolitan Readiness Test, Form R, First Grade, Total Score
8. Metropolitan Readiness Test, First Grade, Reading
9. Metropolitan Readiness Test, First Grade, Numbers

Metropolitan Readiness Tests, February Administration

10. Word Meaning
11. Listening
12. Matching
13. Alphabet
14. Numbers
15. Copying
16. Total Score

Metropolitan Readiness Tests, July Administration

17. Word Meaning
18. Listening
19. Matching
20. Alphabet
21. Numbers
22. Copying
23. Total Score

Goodenough-Harris Drawing Test

24. Man
25. Woman
26. Self

APPENDIX B

TEST OF MULTIPLE REGRESSION

TABLE XVII

ANALYSIS-OF-VARIANCE TABLE

Source of Variation	Sum of Squares	D.F.	Mean Square
NOT ASSOCIATED WITH REGRESSION	$(1 - R^2)\ \Sigma y^2$	$N - m - 1$	$\frac{(1 - R^2)\ \Sigma y^2}{N - m - 1}$
ASSOCIATED WITH REGRESSION	$R^2\ \Sigma y^2$	m	$\frac{R^2\ \Sigma y^2}{m}$
TOTAL	Σy^2	$N - 1$	

$$F \text{ (variance ratio)} = \frac{R^2(N - m - 1)}{m(1 - R^2)}$$

TABLE XVIII

F TEST OF SIGNIFICANCE OF MULTIPLE REGRESSION

TEST	MR	N	Variables in Regression	F	Significance
WORD KNOWLEDGE - TOTAL	.65066	186	2	67.177	*
WORD KNOWLEDGE - BOYS	.64281	97	1	66.895	*
WORD KNOWLEDGE - GIRLS	.65399	89	2	32.135	*
WORD DISCRIMINATION - TOTAL	.71891	146	2	76.485	*
WORD DISCRIMINATION - BOYS	.57705	79	1	38.442	*
WORD DISCRIMINATION - GIRLS	.69476	66	2	29.3925	*
READING - TOTAL	.57574	140	3	22.477	*
READING - BOYS	.51723	76	3	8.7645	*
READING - GIRLS	.65389	64	2	22.783	*

*Significantly different from zero.

APPENDIX C

CURRICULUM OBJECTIVES FOR PROJECT COPE

APPENDIX C

Curriculum Objectives for Project COPE

I. Receptive Language: Auditory Skills

- A. To extend vocabulary of recognition
- B. To build skill in listening
  - 1. Word perception
    - a. Recall of word meanings
    - b. Deduction of meanings of unknown words
  - 2. Comprehension of ideas
    - a. Noting details
    - b. Following directions
    - c. Organizing into main and subordinate ideas
    - d. Selecting information pertinent to a specific topic
    - e. Detecting clues that show the speaker's trend of thought
  - 3. Using ideas to build understanding
    - a. Evaluating an expressed point of view or fact in relation to previous learning
    - b. Making justifiable inferences
- C. To perceive similarities and differences in sound
- D. To extend skill in interpreting meaning from intonation, rhythm and pitch of voice

II. Receptive Language: Visual Skills

- A. To recognize relationships between symbolic and concrete concepts and objects
- B. To interpret interpersonal meaning from facial and bodily expressions (Kinesics)
- C. To gain familiarity from traditional cultural symbols: flag, signal light, etc.

III. Expressive Language: Verbal Skills

- A. To develop understandable articulatory habits
- B. To use words in sequence
- C. To adapt speech to different social situations
- D. To expand vocabulary of use
- E. To improve syntax and usage habits
- F. To develop understanding that words have shifting, complex referents

IV. Expressive Language: Motor Skills

A. To develop talents in drawing, painting, sculpturing
B. To provide opportunity for construction work, puzzles, handicrafts
C. To promote activity through rhythm and games
D. To develop skill in body movement

V. Social-Emotional Development

A. To develop group participation and sharing skills
B. To provide socially acceptable means of channeling expression of feeling
C. To develop effective social interaction skills with adults and with peers
D. To develop skills in self-help and independence functions
E. To develop sensitiveness to and means of expressing humor
F. To utilize social-practical tools
G. To develop self-concept
    1. Developing independence from family
    2. Developing realistic awareness of physique
    3. Developing positive identification with academic success
    4. Developing adjustment to success and failure situations
    5. Developing realization of individual uniqueness
    6. Developing feelings of self-worth
    7. Developing self-awareness as a group member
H. To recognize cultural differences
    1. Developing an awareness of differences of cultural patterns:
        a. Eating habits
        b. Food preferences
        c. Dress
        d. Home activities
        e. Personal relationships
        f. Recreation
        g. Values and aspirations
    2. Expanding geographical limits
    3. Expanding psychological limits
    4. Expanding background of first-hand experiences
I. To develop value patterns
    1. Moving from extrinsic to intrinsic motivation
    2. Ability to defer immediate gratification in pursuit of a long-range goal
    3. Perceiving education as a means of upward mobility

VI. Perceptual-Motor Development

A. To develop body image and differentiation of body parts
B. To develop space-world perception
C. To further develop form perception: part-whole, figure-ground
D. To develop sensory discrimination skills

1. Tactile
2. Auditory
3. Visual
4. Kinesthetic

E. To promote better large and small muscle coordination skills
F. To develop flexibility in motor control
G. To develop hand-eye coordination and sense of direction, and laterality

VII Perceptual Skills

A. To develop visual skills
   1. Discriminating likenesses and differences in shapes and sizes
   2. Perceiving color differences and shadings
B. To develop auditory skills
   1. Hearing loudness and softness
   2. Identifying rhyming words
   3. Discriminating differences in initial and final sounds
C. To develop motor skills
   1. Improving hand-eye coordination skills
   2. Increasing small muscle development
   3. Improving manual dexterity
D. To develop listening skills
   1. Attending to stimuli
   2. Increasing attention span
   3. Following directions
E. To develop tactile or kinesthetic skills
   1. Experiencing different textures
   2. Discriminating shapes through touch
   3. Discriminating size through touch

VITA

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