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GRADUATE COLLEGE

CORRELATIONAL ANALYSIS OF FIRST-GRADE READING ACHIEVEMENT, WITH OBJECTIVE AND PROJECTIVE MEASURES

A DISSERTATION

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BY

WALLACE WARREN REXROAD

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CORRELATIONAL ANALYSIS OF FIRST-GRADE READING ACHIEVEMENT, WITH OBJECTIVE AND PROJECTIVE MEASURES

APPROVED BY

DISSERTATION COMMITTEE

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CORRELATIONAL ANALYSIS OF FIRST-GRADE READING ACHIEVEMENT, WITH OBJECTIVE AND PROJECTIVE MEASURES

CHAPTER I

INTRODUCTION

In our schools there is probably no accomplishment of greater importance to the learner than that of learning to read. This is not to say that the task of learning to read is a severely difficult one, but rather to suggest that reading adequacy is fundamental to almost every other branch of school learning to be encountered. Reading stands in a vital relationship to over-all performance within the scholastic realm, yet it is no less important to the child's personal development and his social betterment.

Reading exists as a keystone in the scholastic experiences of our children; indeed, reading is the very basis of the curriculum. Reading proficiency for each child is, therefore, an all-important educational goal. In seeking to attain this goal, it is of prime importance that the whole program of reading development be characterized by a propitious beginning. It is pointed out by Witty that

a child's first experiences with reading may influence his regard for reading throughout his life.[1] During the years of kindergarten-primary instruction, the child is introduced to basic skills, the acquisition of which provides him the tools by which he masters subsequent learning tasks. Accordingly, reading programs stress the building of competence in the crucial first steps that are taken in learning to read. Not only does success in these initial phases better equip the learner to traverse the sequential educational steps, but also success at this point fosters positive, receptive attitudes and motives toward ensuing scholastic experiences. In short, reading has assumed a position of supreme importance in our educational scheme, and, further, the degree of success experienced by the learner during the first year or so of formal schooling determines, in large measure, the kind of cast that is imparted to his general learning pursuits thereafter.

Purpose of the Study

The important status of reading advocates our continuing efforts to develop methods for improving the teaching of reading. Our proficiency in reading instruction depends, in part, upon how accurately we can appraise the beginning reader and can predict his probable success with

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[1]Paul A. Witty, Reading in Modern Education (Boston: D. C. Heath and Company, 1949), p. 55.

the reading instruction we provide him. In practice, classroom teachers rely chiefly upon published test materials for purposes of describing the beginning reader and for estimating his probable success. To predict reading success, teachers ordinarily utilize objective, group-administered instruments yielding quantitative scores pertaining to reading readiness, maturity, mental age, and the like.

Investigations emphasizing such predictions have been rather numerous, yet far less attention has gone into investigating the effectiveness of predictions based upon information derived from less objective measures. Only rarely have projective methods been studied as a basis for formulating reading forecasts. The conventional, objective measures continue to be widely used without strongly persuasive evidence in their support. Yet less objective techniques, though relatively ignored by teachers and scantily explored through research, may be fully as effective as the more objective measures. Therefore, the purpose of this study was to investigate the statistical correlation of certain variables with year-end reading achievement in order to determine if the obtained relationships were different from the correlation between reading readiness test scores and reading achievement.

Significance of the Study and Related Research

In its key position, reading understandably becomes

the focus of manifold concern. Teachers and curriculum makers perceive their responsibilities and structure the school experiences so that attention during the primary grades is focused upon the development of reading skills. Parents, for the most part, are highly concerned to see that their children are provided reading experiences and materials, that they develop the reading skills requisite to scholastic adequacy, and that they demonstrate the ability to at least "keep up with" their peer group. The child perceives that his reading accomplishment is somehow important to the adult world, and this awareness merely aggravates other pressures that are already focused upon his reading endeavors. Heilman points out that even though we customarily regard reading, like any other symbolic process, as highly sensitive to a variety of pressures, "yet in no area of learning in our schools is greater pressure brought to bear on the pupil than in the area of reading."[1]

Within such a context, competition will be keen and comparisons will inevitably be made between the reading performance of one child and that of his peers. What occurs during this first significant encounter with scholastic competition can exert a lasting influence upon a learner's development. The viewpoint has persisted that success at a

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[1]Arthur W. Heilman, Principles and Practices of Teaching Reading (Columbus, Ohio: Charles E. Merrill Books, Inc., 1961), p. 4.

task has the effect of bolstering one's self regard and of keeping one's strivings within the bounds of realistic attainment, making future successes more likely. Unfortunately, all children are not equally successful. Because of differences in maturation, motivation, preparation and other factors, some children will experience reading difficulties in their initial efforts. These early failures or difficulties with reading can undermine a beginner's self-esteem and, as was pointed out earlier, can give rise to a flawed motivational structure that henceforth pervades the learning atmosphere. Faulty performance is not conducive to satisfactory learning at the time, nor does it provide a sound footing for later personal development.

Undoubtedly some poor starts can be avoided if attention is devoted to the factors that commonly give rise to reading failure. Lack of reading success may, in part, be attributed to deficiencies inherent in the learner when he begins school. Such factors as inferior learning potential and possible defects in development and experience commonly cause reading disabilities. The school is charged with the chronic task of compensating for these shortcomings. On the other hand, difficulties in reading may sometimes stem from faulty school procedure and instruction. Within this latter group of factors would be such causes as operating with a class size that precludes the giving of attention to individual children, ignoring the readiness

stage of the learners, and failure to recognize the less obvious sources of learning difficulty. Every effort should be made to minimize the extent to which school experiences themselves aggravate the task of learning.

Regardless of the source of the beginning reader's problems, whether they reflect deficiencies that inhere in him or whether they result from instructional shortcomings, the conclusion seems clear enough. Educators should be ever mindful to see that the school, as the primary agency of formalized instruction, fulfills its task of promoting achievement and eliminating unnecessary failure. These goals become more attainable whenever the educator more clearly understands and clarifies the nature of the learner. An important role shall always be assigned to the techniques by means of which the learner is appraised.

Through the use of screening or survey devices at the beginning of the school year, the teacher can gauge the composition of her class and use the test results as an aid in placing her pupils. When the screening instruments are supplemented by an ongoing diagnostic program, information that is gathered can be helpful in the formulation of a blueprint that guides classroom organization and teaching tactics.

Measures obtained near the end of kindergarten or the beginning of first grade yield information that, though limited, is still essential in helping to provide

guidelines for future action. If it is possible at the outset, through appraisal of certain factors in the reading candidate, to predict reading achievement, the school might be in a better position to help the reader acquire different reading skills, to avert later frustrations, and to achieve proficiency in reading. What evidence can be collected at that time that is indicative of future success? The degree to which reading success is attained is a function of a number of factors, no one of which operates in isolation. It would be well to consider a number of variables thought to be related to success in reading.

Correlates of Reading Success

Reading Readiness Scores. Few notions concerning learning have exerted a more widespread influence upon educational belief and practice than that of readiness. In recent decades, hardly any of our textbooks on educational psychology have been without some coverage of readiness or related topics, but "the concept undoubtedly goes back many hundred years."[1] Readiness is thought of as differing from one learning task to another and being "a state or condition

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[1]Glenn M. Blair and R. Stewart Jones, "Readiness," Encyclopedia of Educational Research, ed. Chester W. Harris (3d ed.; New York: Macmillan Co., 1960), p. 1081.

of the person that makes it possible for him to engage profitably in a given learning activity."[1]

So fundamental is readiness to the learning process that the concept has differentiated into more specific areas of learning, e.g., number readiness, foreign language readiness, and, of course, reading readiness. Gray pointed out that it was four decades ago that educators began giving recognition to the differences that exist among beginning first-graders in terms of their preparedness for undertaking reading instruction. And, further, certain experiences and training were deemed appropriate in promoting the preparation.[2] In earlier days, entry into the first grade apparently qualified a child as being ready for formalized reading instruction. In the years since, there has been an expansion of our concepts of readiness. Quite clearly, our thinking has gone beyond the naive assumption that all children of a given age are essentially comparable in terms of readiness. Concern about reading readiness has been associated predominantly with the stages of beginning reading; but since development is a continuing process, the concept of reading readiness also has reference to a condition requisite to

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[1]Horace B. English and Ava C. English, A Comprehensive Dictionary of Psychological and Psychoanalytical Terms (New York: Longmans, Green and Co., 1958), p. 441.

[2]William S. Gray, "The Teaching of Reading," Encyclopedia of Educational Research, ed. Chester W. Harris (3d ed.; New York: Macmillan Co., 1960), p. 1114.

reading endeavors beyond the primary level. "The readiness concept is not reserved for the period of beginning reading; it applies to all levels of reading development."[1] Betts has affirmed that the concept of readiness carries as much significance for reading activities at the secondary level as it does in the primary grades.[2] Learning will always be facilitated when the learner possesses the level of preparedness appropriate to the demands of the task.

If a child is unready for instruction, he will make little or no progress; yet rather than waiting passively, teachers attempt to provide a program of experiences aimed at promoting conditions more favorable for beginning reading activities. Gates and Bond point out that:

> It appears that readiness for reading is something to develop rather than something merely to wait for. Most teachers interested in a "reading readiness program" will, of course, declare that they do not merely wait; they engage actively in building readiness.[3]

Benefits that can be derived from programs geared to nurture readiness are reflected in a study reported by Bradley. The investigation was designed to draw a comparison between two classes of first graders matched on relevant

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[1]Henry P. Smith and Emerald V. Smith, Psychology in Teaching Reading (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1961), p. 13.

[2]E. A. Betts, Foundations of Reading Instruction (New York: American Book Co., 1957).

[3]Arthur I. Gates and Guy L. Bond, "Reading Readiness: A Study of Factors Determining Success and Failure in Beginning Reading," Teachers College Record, XXXVII (1936), 684.

variables. The experimental subjects took part in a program stressing thorough reading appraisal and activities involving social participation. The control group, comprised of those who, at the beginning of the year, went directly into formal reading instruction, displayed superiority on all reading measures at the end of the year. Yet later results, two years hence, favored the experimentals in vocabulary and reading comprehension. Temporary gains in reading skill accrued when practice dwelled only on those skills, but more permanent and meaningful benefits apparently resulted from giving careful consideration to the components upon which the skills build.[1] Another study pointed out that through a readiness program, first graders were better able to avert impediments connected to reading.[2] The right start is desirable in any enterprise, and such studies suggest that we can enhance the likelihood of a right start in reading by paying close attention to the beginner's readiness status.

If differences in pupil readiness are ignored, a child may be initiated too soon into reading activities and, accordingly, confronted with demands that exceed his

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[1]Beatrice E. Bradley, "An Experimental Study of the Readiness Approach to Reading," Elementary School Journal, LVI (1956), 262-267.

[2]Robert W. Edmiston and Bessie Peyton, "Improving First Grade Achievement by Readiness Instruction," School and Society, LXXI (1950), 230-232.

abilities. When this occurs, the results, while variable, are usually unfortunate.

> The too early introduction to reading may create a situation in which the child actually learns not to read. This is quite different and far more serious than not learning to read.[1]

With a knowledge of the differences in readiness that prevail among her pupils, the primary teacher can provide reading instruction at a time and at a pace commensurate with the children's varying abilities. Knowledge concerning children's readiness and their reading inadequacies can help assure a higher degree of success to the instructional program. To this end, reading readiness tests have been utilized in our schools for the past thirty-five years or so. Reading readiness tests are currently in widespread usage, and their general purpose is seen as that of prediction, the prediction of a pupil's ability to learn to read.[2] The readiness tests are typically administered near the end of kindergarten or the beginning of the first grade. For the most part, the tests, consisting predominantly of objective items, are administered in group settings. The test items are formulated to assess a child's ability to follow directions, his maturity level, his information, his visual and/or auditory discrimination skills, and the like.

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[1]Smith and Dechant, op. cit., p. 104.

[2]O. K. Buros, The Fifth Mental Measurements Yearbook (Highland Park, N. J.,: The Gryphon Press, 1959), pp. 772-780.

Agreement on the value of readiness tests for predicting success in learning to read has not been reached. Efforts to establish the validity of readiness tests as predictors usually involve the correlation of test scores obtained upon school entrance with some measure of reading achievement near the end of the first grade.

An early investigation by Lee, Clark and Lee reported the success of a reading readiness test described as high in reliability and more accurate in forecasting reading success than were the judgments of kindergarten teachers who rated the pupils on certain traits related to reading.[1]

Also in a positive vein were the findings of Henig. When assigned grades were used to signify reading ability, a coefficient of .55 was obtained between the grades and the readiness scores collected at the beginning of the year. Regarding the predictions made for this particular group, it was concluded that "the reading-readiness-test results foretold rather reliably the degree of success they would meet in learning to read."[2]

Less encouraging were the results obtained by Wilson and Burke when the scores on three reading readiness tests

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[1]J. Murray Lee, Willis W. Clark and Doris M. Lee, "Measuring Reading Readiness," Elementary School Journal, XXXIV (1934), 656-666.

[2]Max S. Henig, "Predictive Value of a Reading-Readiness Test and of Teachers' Forecasts," Elementary School Journal, L (1949), 45.

were correlated with various reading measures during the first year. The authors concluded that:

> None of the subtests of the readiness tests produced average correlations of any impressive size. Few of the separate coefficients with the individual readiness measures were even moderately high, and many were so low as to indicate little, if any, relationship between the readiness subtests and the reading tests.[1]

In studying the prognostic value of the Metropolitan Reading Readiness Test, Karlin correlated readiness scores with achievement scores and obtained a correlation coefficient of .36. The relationship was of such size that he felt prompted to issue a cautionary note regarding the use of readiness tests alone to measure degree of readiness.[2] Moreover, he pointed out a possibly useful, but often overlooked, function of readiness tests when he said:

> Additional research may produce readiness tests which are more useful than existing ones for purposes of prediction. This weakness does not preclude the use, however, of these tests for diagnosis of possible difficulties in language and visual perception.[3]

A similar conclusion was reached by Bremer after obtaining a correlation of .40 between the readiness scores (Metropolitan) of more than 2,000 first graders and their reading achievement scores after an interval of one year.

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[1]Frank T. Wilson and Agnes Burke, "Reading Readiness in a Progressive School," Teachers College Record, XXXVIII (1937), 567.

[2]Robert Karlin, "The Prediction of Reading Success and Reading-Readiness Tests," Elementary English, XXXIV (1957), 320-322.

[3]Ibid., p. 322.

He advocated the use of readiness test results for identifying reading inadequacies and underscored this position when he said, "In fact, diagnosis may be the purpose that a readiness test best serves."[1] This conclusion was further substantiated by Townsend.[2]

After correlating results of the Lee-Clark Reading-Readiness Test with those obtained a year later on the California Reading Test, Powell and Parsley found the relationship high enough to be moderately useful in predicting the general reading achievement of a total group. But reservation was expressed concerning the common practice of utilizing a score for purposes of placing an individual child in a reading group, for "there is reason to doubt its adequacy for such precise placement, especially at the lower levels."[3]

The reservation regarding the placement function of readiness tests appears to disagree somewhat with the preceding viewpoints that emphasized the diagnostic merits of reading readiness tests. Discrepant views such as these appear in the literature and, in part, derive from the usage

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[1]Neville Bremer, "Do Readiness Tests Predict Success in Reading?" Elementary School Journal, LIX (1959), 224.

[2]Agatha Townsend, "What Research Says to the Reading Teacher," The Reading Teacher, XV (1962), 267-276.

[3]Marvin Powell and Kenneth M. Parsley Jr., "The Relationship Between First Grade Reading-Readiness and Second Grade Reading Achievement," Journal of Educational Research, LIV (1961), 233.

of different predictive instruments by different investigators. In addition, the usage made of readiness test information can have a bearing upon the merits ascribed to the test. On the one hand, test performance might be used diagnostically to help identify and describe the existing differences among beginning readers, or, on the other hand, results may be used for prognostic purposes. Expecting an instrument to be of comparable utility in both roles might be somewhat unrealistic.

Like most predictive instruments, reading readiness tests do not tend to possess high predictive validity. A survey of the literature has indicated that views range from those that acknowledge the capabilities of the tests to those that indicate a more negative assessment, e.g., "Unfortunately, present day tests are not very valid instruments for predicting probable success in beginning reading."[1] The need for valid estimates of future reading achievement is pressing enough to encourage continuing efforts to develop more effective predictive instruments.

Mental Age. From other research has come the suggestion that a relationship exists between mental age and reading achievement and that, accordingly, the mental age score, as measured by an intelligence test, can serve as a predictor of reading attainment. Yet the question concerning

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[1]Robert Karlin, "Research in Reading," Elementary English, XXXVIII (1959), 177.

what level of mental age is optimum for beginning reading is an unresolved one. In recent decades there have been several investigations addressed to this question. One of the earliest was that of Morphett and Washburne whose findings exerted a persistent influence upon beliefs regarding the level of mental age requisite to success in beginning reading. In their study, 141 first-grade children were given mental tests, and the obtained mental ages served as the basis for dividing the subjects into nine groups. Later in the school year it was determined what percentage of each group made satisfactory reading progress. In the group with a mental age range from six years, six months to six years, eleven months, the percentage of those making general reading progress was impressively high, especially when compared with the insignificant percentage of those registering progress in the groups with a mental age less than six years. These results prompted the authors to designate the mental age of six years, six months as the optimum time to begin reading.[1] In addition to lending support to this prescription, Dean's study also investigated the effectiveness of the mental age score as a predictor of reading success. Correlation of Stanford-Binet mental age scores, obtained upon school entry, with reading achievement measured late in the school

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[1]Mabel V. Morphett and Carleton Washburne, "When Should Children Begin to Read?" Elementary School Journal, XXXI (1931), 496-503.

year with the Metropolitan Achievement Test yielded a coefficient of .62.[1]

Subsequently, Gates conducted a study involving four groups of first-graders taught by methods and materials that were appreciably different. Correlations between mental age and reading achievement yielded coefficients of .62, .55, .44, and .34, the degree of relationship varying in accordance with the provisions that were made in the classroom for individual differences. Where good teaching procedures prevailed, a child accomplished far more than he would within a less enriching context, emphasizing that reading success is a function of effective teaching procedure as well as maturity level.[2]

Some investigators have argued that despite the help they afford the teacher in selecting activities appropriate to the learner, "mental test results should not be used to predict achievement."[3] Mental test results, however, enjoy a usage in at least some phase of most reading programs. Undoubtedly, similar elements are being measured with both mental ability tests and reading readiness tests. When

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[1]C. D. Dean, "Predicting First-Grade Reading Achievement," Elementary School Journal, XXXIX (1939), 609-616.

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

[3]David Kopel, "Reading Readiness: Its Determination and Use," Teachers College Journal, XIII (1942), 67.

numerous measures of kindergarten children were compared with their reading readiness test scores, the highest degree of relationship existed between mental maturity and readiness scores.[1] Smith and Dechant in summarizing the research on the correlation between mental age scores and reading readiness scores found the correlation coefficients to range between .35 and .80.[2]

The evidence indicates that mental test scores, like reading readiness scores, have been shown to be correlated with reading outcomes. It is unclear, however, just how well either factor aids the teacher in forecasting later reading performance. And no evidence was found that would indicate which measure operates as a better predictor of success.

Alphabet Knowledge. The search for factors which can serve as predictors of initial reading success has disclosed that certain elements associated with visual discrimination skills possess prognostic value. In a study that involved the measurement of numerous characteristics of beginning first graders, Gates and Bond administered tests designed to sample the ability to name the letters in the alphabet, to read letters, to match words, and the like.

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[1]James B. Sutton, "A Study of Certain Factors Associated with Reading Readiness in the Kindergarten," Journal of Educational Research, XLVIII (1955), 531-538.

[2]Smith and Dechant, op. cit., p. 89.

Their investigation revealed that these measures of familiarity with printed letters "tended in general to give fair correlations with ability to learn to read."[1]

Wilson and Burke reported an intensive search into the concomitants of reading readiness. Their efforts indicated, as noted earlier, that scores on three conventional reading readiness tests were of little value in predicting reading success. Nevertheless, significant relationships did emerge from their study. On the basis of data secured, the authors concluded that:

> 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. These relationships were much closer than any other measured abilities, including mental age and intelligence quotient.[2]

More recently, a large-scale, cooperative study of some of the factors related to reading success was conducted by a team of investigators, each dwelling on a particular feature of the project. More than 2,000 first grade children in four communities in Greater Boston participated in the study which spanned a school year and involved the gathering of data in September, November, February, and June. In one phase of the investigation, tests were given in September that concentrated on measuring letter-knowledge skills such as matching, identifying, naming, and sounding letters. The

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[1]Gates and Bond, op. cit., p. 680.

[2]Wilson and Burke, op. cit., p. 573.

conclusion was reached that "a knowledge of the names of letters provides the greatest assurance of learning to read."[1] It should be noted, however, that there was no direct measure of reading as such, rather the inference was made that the rate of learning ten words on a reading readiness test, administered along with the letter knowledge tests, was indicative of the ability to learn to read.

Another feature of the total study dwelt more directly with reading performance and its prediction. The different measures, seventeen in all, that were collected in September were correlated with February reading achievement as measured by an oral reading test. The highest correlation, .55, was between the ability to name capital letters and reading achievement, while a relationship of similar magnitude, .53, was obtained for naming lower-case letters. There were other measures involving knowledge of letter forms that showed correlations higher than .50. The correlation of mental age with reading success was .41, and of its relation to other measures, Olson stated: "The only test of letter-sound relationship which correlates with reading achievement

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[1]Alice Nickolson, "Background Abilities Related to Reading Success in First Grade," Journal of Education, CXL (1958), 24.

lower than does mental age is the September test of giving sounds of lower-case letters."[1]

In June of the same year, the reading status of 1,506 of the children was measured in terms of word classification and paragraph meaning. Correlations were computed between these measures of achievement and the September measures of letter-knowledge skills in an effort to establish the predictive prowess of the latter. The correlation coefficients obtained for naming capital letters and naming lower-case letters were .58 and .54, respectively. And when a comparison was drawn between the strength of these relationships and those obtained in February, it was concluded that "all tests which associated visual forms of letters with their names are higher predictors of June reading achievement."[2]

Finally, the investigation conducted by Linehan, while not concerned with the prediction of performance, emphasized, nevertheless, the relevance of letter knowledge to reading success. Her study, experimental in design, investigated the effect of deliberate training in letter knowledge upon reading achievement. The program for the experimental group involved early training with letters and

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[1]Arthur V. Olson, "Growth in Word Perception Abilities as it Relates to Success in Beginning Reading," Journal of Education, CXL (1958), 33.

[2]Sylvia R. Gavel,"June Reading Achievement of First-Grade Children," Journal of Education, CXL (1958), 38.

phonics with only incidental training devoted to the recognition of whole words. With the control group, the emphasis in training was in the reverse order. At year's end, results favored the experimental group, suggesting that, to some extent, direct training to build a child's skill with letters can contribute to his reading growth.[1]

The studies devoted to the relation of alphabet skills to reading performance have exhibited a consistently positive connection between the two. It should be noted that, as with other instances of correlation, the mere existence or strength of a relationship does not necessarily argue for a causal connection between the factors involved. It could be, in this case, that underlying both is the general factor of perceptual development which is reflected earlier in proficiency with the letters of the alphabet and manifested later in the degree of reading success attained. But whatever the basis of the relationship, research has provided data which suggest that the measurement of children's alphabet knowledge can help foretell their later accomplishments in reading.

Teacher Judgment. Evidence relating to the effectiveness of teachers' judgments in predicting probable success in reading has been more sparse and less uniform. Lee and others

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

regarded teachers' judgments of less value than reading readiness scores for predictive purposes.[1] Another investigator, finding a correlation of .59 between teachers' forecasts and assigned grades, concluded that the judgments made by experienced teachers were equivalent in predictive value to the scores obtained on a conventional reading readiness test.[2] Corroboration for this view was essentially voiced by another investigator who in addition urged that judgments be supplemented with objective test data.[3] But the strongest support for teachers' estimates was expressed in a study in which the authors concluded that:

> The teacher's November prediction correlated .86 with her May ranking of the pupil's ability to read, and also gave a higher average correlation with reading ability as later measured by tests than did any other measures used in the study.[4]

The high positive correlation just cited may have been a function of obtaining a correlation between two sets of subjective ratings by the same judge. When an objective criterion variable was employed, the relationship was less impressive. Teacher judgments apparently possess enough prognostic utility to warrant further investigation.

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[1]Lee, Clark, and Lee, op. cit.

[2]Henig, op. cit., pp. 41-46.

[3]William Kottmeyer, "Readiness for Reading," Elementary English, XXIV (1947), 355-366.

[4]Wilson and Burke, op. cit., p. 573.

Projective Techniques. Further use of the subjective approach in predicting reading status has taken the form of utilizing data obtained with certain projective methods. Such methods are customarily employed for purposes of collecting some of the data which are used in formulating a clinical diagnosis. Apart from the role that projective procedures play collectively in personality evaluation, a particular procedure may sometimes be studied individually so as to identify the personality variables to which it may have special relevance. It is in this sense that certain projective devices have been explored in relation to reading ability. Of the numerous projective techniques, this study shall confine itself to investigating the use of projective figure drawings in the prediction of reading ability.

Koppitz, et al, studied the prediction of first grade reading ability with projective drawings of the human figure and with the Bender-Gestalt Test. The drawings, scored according to a unique system, and the Bender-Gestalt were both administered at the beginning of the school year. Several months later, performance on a reading achievement test was correlated with performance on each test alone and then with both tests in a multiple correlation. The results on both projective techniques were thought to be predictive of later reading success, but still better predictive power

was attained when the forecast was based on the combined measures.[1]

The significance of children's drawings was also explored by Hofmann who hypothesized that the nature of drawings made by kindergarten children is indicative of their general level of readiness for first grade work. Children produced drawings in the art program under maximized freedom of choice of color and subject. Different attributes of the drawings such as picture composition and color usage were evaluated and assigned rating scores. The obtained scores were then correlated with maturity rankings by the teachers and with reading readiness test scores. A correspondence was demonstrated between how children perform on figure drawing tasks and how they perform on reading readiness tests, and the results, accordingly, were held to support the hypothesis. It is to be noted, however, that no attempt was made to evaluate how effectively the measures foretold reading ability itself.[2]

A closer relationship between projective techniques

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[1]Elizabeth M. Koppitz, et al, "Prediction of First Grade School Achievement with the Bender Gestalt Test and Human Figure Drawings," Journal of Clinical Psychology, XV (1959), 164-168.

[2]Helmut Hofmann, "Children's Drawings as an Indicator of Readiness for First Grade," Merrill-Palmer Quarterly, IV (1958), 165-179.

and reading ability was investigated by Bailey.[1] Projective figure drawings were collected from children in three elementary grade levels; second, fourth, and sixth. Within a given grade, the drawings used were those of the five most proficient readers and the five least proficient readers. The study demonstrated that the drawing productions of the children in the two categories were different enough that elementary teachers, upon viewing groups of unsigned drawings, could rather accurately distinguish the good readers from the retarded readers.

Summary of Related Studies

The foregoing studies have indicated that various predictor tests have been investigated as to their relevance to reading success in the first grade. Those measures which have been reviewed are reading readiness scores, mental age scores, measures of alphabet knowledge, teacher evaluations, and projective figure drawings. All of the measures considered have been shown to possess a relationship to reading success. Some predictive measures have been seen to display promise in one instance while in other instances significant results were not forthcoming. Each measure undoubtedly has its proponents, yet most research authorities agree that

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[1]Robert B. Bailey, "A Study of Predicting Academic Success in Elementary School Reading from Projective Tests," (unpublished Ed. D. dissertation, University of Oklahoma, 1956).

there is perhaps no single instrument which can be considered highly dependable in predicting reading success.

In the numerous studies that have sought to investigate various correlates of reading success, the focus of attention has been, for the most part, upon one factor, or predictor test, at a time. As a consequence, it has been difficult to establish the relative strengths of the different predictors because of the variability of the research designs, the data-gathering methods, and the conditions under which the studies were conducted. If several of the measures were studied concurrently, permitting comparison among them, there is the possibility of deriving information that could be generally helpful in early reading instruction.

Statement of the Problem

Most reading readiness tests can, and perhaps most properly should, be used for purposes of diagnosis of perceptual and conceptual weaknesses; yet, in those instances when the concern is primarily for a screening survey of first graders in order to predict their later reading achievement, there is a question whether the conventional reading readiness test is any better than other predictor tests. The literature has lent support to the notion that measures such as alphabet knowledge, teacher judgment, and figure drawings may possess significant prognostic merit. Moreover, such methods, if put to use, may have the advantage of

practicality. A figure drawing test, for example, could be informally administered to a group of pupils in a matter of minutes near the end of kindergarten or the beginning of the first grade. In addition, if the classroom teacher can readily formulate predictions from the children's drawings without any specialized training in psychometrics, she may have a worthwhile predictive technique at her disposal. In a similar fashion, the other informal measures under analysis in this present study make minimal demands in terms of cost and time allotment. If significantly supportive evidence can be assembled, the techniques would seem to warrant serious consideration.

This study was concerned with the problem of estimating the year-end reading achievement of first-grade pupils. The tests customarily used for this purpose have not been totally satisfactory. Through a comparison of different predictors, information might be obtained that could contribute toward the development of more effective instruments.

The intent of this investigation was to analyze the correlation of certain measures with reading achievement in the first grade. More specifically, the purpose was to determine if the variables differed significantly from the reading readiness scores on the basis of correlation with the criterion, reading achievement. The investigation also sought to determine the relationship of two or more of the variables, taken as a team, to year-end reading achievement.

The null hypothesis advanced in this investigation was as follows: there are no significant differences among the correlations between reading achievement and reading readiness test scores, mental age scores, alphabet knowledge scores, H-T-P drawings, and teacher judgments, respectively. A secondary aspect of the problem is the determination of b coefficients for the variables, reading readiness test scores, mental age scores, alphabet knowledge scores, H-T-P drawings, and teacher judgments and the determination of the multiple correlation for various composites of predictor variables.

CHAPTER II

PROCEDURE OF THE STUDY

The Subjects

The subjects included in this study were first-grade children enrolled in the public schools in Midwest City, Oklahoma. Midwest City is a community of approximately 40,000 people and has thirteen elementary schools. The three schools participating in the study were selected because they were located in neighborhoods that appeared to be representative of the larger community. Twelve first-grade classrooms were included, with four classrooms from each of the schools. A total of 227 children was involved in both the predictive testing at the beginning of school and the criterion test (reading achievement) at the end of May the following year.

The twelve participating classrooms were all involved in essentially the same reading program, a skill-level program. As part of the program, children were administered a reading readiness test (Metropolitan) near the end of their kindergarten year. Test results were reported to the first-grade teachers and were used for establishing classrooms that

were relatively homogeneous in terms of readiness. All teachers who participated in this investigation were experienced teachers.

Instruments of Measure

The predictor tests used in this study have all been shown to be associated to some degree with first-grade reading success. Further, each of the informal predictor tests being compared with the more formal reading readiness test displayed such qualities as ease of administration and minimal expense. The readiness test itself, the Row-Peterson Readiness Test-I[1] was a group test consisting of seventy items. It was the readiness test being uniformly used at the beginning of the year in all first-grade classrooms in Midwest City. The remaining predictor tests were all individually administered.

A subject's knowledge of the alphabet was measured with materials prepared by the investigator. Commercially-produced, black letters on a transparent background were mounted on two white, prism-shaped pieces of solid wood. Capital letters were mounted on one prism, while lower-case letters were on the other. The prisms, therefore, had three flat surfaces on which the letters were widely and evenly spaced and arranged in random order. The letters used were of roman type, and the size was 22.5 points.

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[1]Willis W. Clark, First Year Readiness Test-I (Evanston, Illinois: Harper and Row, n. d.).

The H-T-P Technique[1] was used as the basis for the remaining predictors. The H-T-P is a projective procedure using the freehand drawings of House, Tree, and Person. Clinically the drawings are used as a source of information related to numerous personality variables. The drawing of the Person was used as the basis for deriving a mental age score for each child according to a scoring system proposed by Goodenough.[2] The mental ages so obtained served as one of the predictor tests.

Another predictor test was based upon a more direct usage of the H-T-P. Even though the H-T-P, as pointed out earlier, is a projective instrument commonly used in a clinical fashion, no clinical application was intended in this study. Indeed, the teachers had little if any awareness of this possible function of the drawings; and, further, no specific orientation in this regard was provided them. The concern here was whether the teachers merely by the inspection and the ranking of the anonymous drawings produced by their pupils could foretell pupil reading success with any significant accuracy. Thus each teacher participated in a ranking of the projective drawings of her pupils, a blind

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[1]John N. Buck, "The H-T-P Technique, A Qualitative and Quantitative Scoring Manual," Journal of Clinical Psychology Monograph Supplement, No. 5, (1948).

[2]Florence L. Goodenough, Measurement of Intelligence by Drawings (Yonkers-on-Hudson, New York: World Book Company, 1926).

ranking on the basis of the presumed reading ability of the persons producing the drawings.

The final set of predictions from the H-T-P was obtained by again submitting the drawings to the individual teachers. But on this administration, conditions were altered in that each set of drawings was clearly identified in terms of the child who had made the drawings. It was assumed that the teacher was judging her pupils and subjectively forecasting their success much as she might under more ordinary circumstances.

Reading achievement as measured by the Gates Primary Reading Test, Form 2,[1] was the criterion variable in this study. In two of the three participating schools, the test was routinely administered as part of their regular testing program. School officials in the third school willingly agreed to substitute the Gates Test, provided by the investigator, for the reading achievement test ordinarily used by them. As a result, all participating classrooms were uniform in the use of the criterion test.

Collection of Data

The Row-Peterson Readiness Test-I was routinely administered and scored by the twelve participating teachers during the second week of school. During the third week,

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[1]Arthur I. Gates, Gates Primary Reading Test (New York: Bureau of Publications, Teachers College, Columbia University, 1958).

additional predictor test data were collected. All of the children in the twelve first-grade classrooms were tested individually in a separate room provided by the school. The H-T-P was first administered and yielded three figure drawings which, upon completion, were stapled together with the House drawing on top. The Person drawing, on bottom, was identified by the child's name in the lower right corner.

Data collection continued with the measurement of the child's knowledge of the alphabet. As the letters were pointed out, one at a time, the subject identified those that he could by calling them out. A cumulative score was kept with a hand counter. The score recorded for each child was the total of correctly identified capital letters and lower-case letters combined.

During the following week, the teachers themselves actively participated in tasks that yielded the remaining predictor data about their pupils. Each teacher was seen individually in a workroom, lounge, or other room free from distractions. At that time she was given her pupils' H-T-P drawings and directed to use them to rank her pupils in terms of their probable reading achievement by the end of the school year. The identifying name on each set of drawings had been folded under and stapled. Consequently, the teacher was engaged in a blind ranking of the drawings. No orientation was provided concerning the criteria to be used in

making her rankings, and care was taken to assure each teacher that neither her predictive ability nor the performance of her class would be compared to that of other teachers and their classrooms. The teacher was instructed that after a brief inspection of the entire group of drawings she was to put those judged in the upper third in one pile and those in the lowest third in another pile, leaving the middle third in the remaining group. Then working with each third separately, she ranked the individual members of that sub-group. As a consequence, the entire group of drawings was placed in rank order, but the reduction to smaller portions presumably simplified the task. The drawings were collected, the identification of each set was made visible by folding forward the child's name, and the rank score of each child was recorded.

After the drawings were randomly arranged, they were once again presented to the teacher who was asked to carry out another ranking, following the same procedure. Since the drawings were identified on this administration, her judgment was influenced by this knowledge. These rank scores, reflecting teacher judgment, were recorded for each child.

The remaining score used for predicting reading success was computed at a later date. Goodenough's scale of fifty-one points was used to score the human figure drawings collected with the H-T-P, and the raw scores so obtained

were transformed into mental age scores according to a table of norms.[1]

Two weeks before the end of the school year, the Gates Primary Reading Test was administered to all the children in the participating classrooms. The scores, served as the criterion variable in the investigation.

Treatment of the Data

A substantial portion of the data in this study obtained from the judgments (rankings) issued by the twelve classroom teachers. The use of ratings advanced by several judges introduced the element of subjectivity and the concomitant question of interjudge reliability. Confidence in the results obtained from the teachers' rankings would be enhanced if the teachers could be shown to be in reasonable accord in judging the same objects or events. To this end, Kendall's coefficient of concordance, W, was applied to judgments made by the twelve teachers.[2] From all of the first-grade children tested, a set of drawings was selected at random. This group of drawings, produced by twelve children, was submitted to all the teachers prior to the collection of the data pertaining to the predictors themselves. Thus each teacher was involved in ranking twelve

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[1]Goodenough, op. cit., p. 39.

[2]Sidney Siegel, Nonparametric Statistics (New York: McGraw-Hill Book Company, Inc., 1956), pp. 229-238.

entities, and the coefficient of concordance W was a measure of the extent of interjudge reliability.

In order to study the prediction of reading success, this investigation sought to evaluate the relationships between predictor tests and a criterion test. Two of the predictors, however, involved rankings. These were the predictions using the H-T-P and the teacher judgments.

The variable or trait represented by these ranks is the reading ability of the children, and this is the underlying variable being represented by the other predictors used in this study. It seems reasonable to assume that the underlying variable is normally distributed; therefore, all ranks were converted to T-scores according to a method suggested by Walker and Lev.[1] Transformation of the rankings in the two predictors resulted in all collected data being of such a nature to permit the usage of the Pearson product-moment coefficient of correlation.

Since this investigation was not concerned with comparisons from room to room or among the teachers involved, all measures for a given variable were grouped together. As a result, 227 measures for each of the five predictors and the criterion were obtained.

Evaluating the relationship between a particular

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[1]Helen M. Walker and Joseph Lev, Elementary Statistical Methods (2d ed.; New York: Holt, Rinehart and Winston, 1958), pp. 199-200.

predictor and the criterion involved the computation of a correlation coefficient between the two. Thus five correlation coefficients were obtained, indicating the relationship between the criterion and each predictor.

This study investigated the correlation of reading readiness test scores and four other variables with scores on a reading achievement test. Therefore, the correlation coefficient for the readiness test was compared to the correlation coefficient for each of the four other predictors. According to the null hypothesis advanced in this study, true differences in correlation were zero. To test the significance of the differences, a *t* test developed by Hotelling and described by Guilford[1] as applicable in such instances, was applied.

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[1]J. P. Guilford, Fundamental Statistics in Psychology and Education (4th ed.; New York: McGraw-Hill Book Company, 1965), pp. 190-91.

CHAPTER III

THE RESULTS

In this chapter, the following will be presented: the results obtained when the interjudge reliability was checked, the coefficients obtained when the criterion was correlated with each of the predictors, and the tests of significance indicating how the reading readiness test compared to the other predictors on the basis of predictive validity.

Other results will be presented, however, which go beyond those obtained through the study of correlations between reading achievement and the individual predictors. Analysis of the findings was extended in an effort to more fully explore the basic data already gathered, with the hope that pertinent relationships and practical information might be obtained. More specifically, results obtained through an analysis involving multiple correlation will be presented. Lastly, results will be furnished which indicate the most reliable composite of predictors and the regression equation.

Interjudge Reliability

Situations often arise in which an individual serves

as a judge or rater describing certain traits or experiences to which quantitative techniques can not apply. In those instances, the appraisal he makes is a subjective enterprise open to unknown influences. Concern about reliability, therefore, perhaps accompanies the use of data from even one rater or judge; but when there are ratings provided by several judges, there is reason for even greater concern regarding the matter of reliability among the judges. Accordingly, results will take on greater relevance if there is confidence that they reflect prevailing differences in the entities being judged rather than the inconsistencies of the judges.

Because the teachers in this study, acting as judges, were the source of much of the data, a check was made to determine the degree to which they applied essentially the same standard in ranking the drawings of children. Before the teachers were called upon to judge the drawings of their own pupils, they were all given the common task of independently ranking the same group of randomly selected H-T-P drawings. The concern, at this point, was with the uniformity of their rankings and not with their predictive efficiency. The data with regard to the ranks assigned to the twelve sets of drawings by the twelve first-grade teachers are presented in Table 1.

While it is clear that unanimity among the teachers was not obtained, there was a marked tendency toward agreement among the assigned ranks. A comparison of the numbers

TABLE 1

RANKS ASSIGNED TO 12 H-T-P DRAWINGS BY 12 TEACHERS

Teacher	H-T-P Drawings											
	1	2	3	4	5	6	7	8	9	10	11	12
A	1	2	3	4	5	6	7	8	9	10	11	12
B	1	7	3	5	2	11	4	6	8	9	12	10
C	1	2	4	3	6	9	5	7	8	10	11	12
D	3	2	4	5	1	6	7	8	9	10	11	12
E	2	1	4	7	3	6	5	8	9	10	11	12
F	1	2	4	7	3	5	6	8	11	9	10	12
G	1	2	4	3	5	7	6	8	11	10	9	12
H	1	2	3	5	4	6	7	8	9	10	11	12
I	1	6	2	4	3	8	5	10	7	9	11	12
J	2	5	3	4	1	6	7	12	8	11	9	10
K	3	1	6	5	2	9	4	8	7	10	12	11
L	1	8	3	2	4	7	5	9	11	6	10	12

in a particular column reflects how the teachers judged a set of drawings. For the data of Table 1, Kendall's coefficient of concordance, W, was computed, and a coefficient of .839 was obtained. Testing the hypothesis that there is no actual agreement among judges, the chi-square value of 110.7

was obtained. This value, with 11 degrees of freedom, was significant at or beyond the .001 level. On the strength of these data, it is tenable to assert consistency among the judges' ratings. The high W obtained, however, does not mean that the orderings or rankings are correct, it merely speaks for their congruence. The agreement among the several judges was sufficient to support the belief that the teachers would judge their own pupils' drawings in a reliable manner.

Predictor-Criterion Correlations

The five predictor tests administered during the first weeks of the school year were correlated with year-end reading success as measured by the Gates Primary Reading Test, Form 2. Correlating the dependent variable with each of the five predictors yielded the Pearson product-moment coefficients presented in Table 2.

TABLE 2

CORRELATIONS BETWEEN FIVE PREDICTORS OF READING SUCCESS AND THEIR CRITERION (N=227)

Reading Readiness	Mental Age	Alphabet Knowledge	H-T-P Drawings	Teacher Judgment
.565*	.362*	.512*	.207*	.407*

*Significant at .01 level.

While all coefficients were positive in nature and of such magnitude to be considered significant, inspection

reveals that some of the predictors bore a higher relationship to the dependent variable than did others.

Comparison of Predictors

For the data just presented, tests of significance were applied in order to statistically compare the correlation coefficients of the various predictors. A comparison between two predictors, therefore, involved a testing of the difference between their respective coefficients.

Since five predictors were employed, five correlation coefficients were obtained reflecting how each predictor was correlated with the criterion. The coefficient obtained between the readiness test scores and reading achievement was used as a basis for comparison, and the coefficient for each of the other four predictors was compared with it. In order to determine whether the differences were insignificant as hypothesized, a testing of the four relationships was involved. Application of a t test of the difference between two correlation coefficients from correlated samples yielded the results summarized in Table 3.

The data in Table 3 indicate that when the correlation coefficient of the readiness test was compared to that of each of the other predictors, the differences for three of the comparisons were large enough to be considered significant. The three predictors whose predictive validities were significantly different, in a negative direction, from

the predictive validity of the readiness test were the mental age scores, H-T-P drawings, and teacher judgments. The null hypothesis as it related to the predictive validities of the aforementioned predictors was accordingly rejected, and it was concluded that each of them differed significantly from the readiness test with regard to predictive validity.

TABLE 3

VALUES OBTAINED WHEN TESTING THE SIGNIFICANCE BETWEEN THE CORRELATION COEFFICIENT FOR READING READINESS AND THE CORRELATION COEFFICIENT FOR EACH OF FOUR PREDICTORS

	Predictor			
	Mental Age	Alphabet Knowledge	H-T-P Drawings	Teacher Judgment
t Value	3.376*	.942	5.126*	2.533*

*Significant at the .05 level.

It is further indicated that the only predictor whose validity did not differ significantly from that for the readiness test was the alphabet knowledge variable. In testing the significance of the difference between their respective correlation coefficients, no significant difference was found. On the strength of such a finding, it seems reasonable to regard as tenable the null hypothesis being tested: that the true difference in correlation was zero. It was

concluded that the two variables, the reading readiness test and alphabet knowledge, were not significantly different with regard to their correlation with reading achievement.

It was concluded, above, that, on the basis of tested significance, the predictive validity of the reading readiness test was significantly higher than that for the mental age scores, the H-T-P drawings, and the teacher judgments. While a demonstrable superiority was indicated for the readiness test, the other predictors probably should not be viewed as lacking in predictive merit. It will be noted that their coefficients were at levels indicating definite relationships to the criterion. The suggested relationships seemed sufficient to warrant further exploration of the data in an effort to reveal less obvious, but potentially useful, information. Further analysis of the data involved the use of multiple correlational techniques to examine the complex relationships among the several variables.

A multiple linear regression program for the IBM 360 computer was used to obtain this statistical analysis. The program yielded the means and standard deviations for all the measures used, the intercorrelations among the six variables, and the values needed to construct multiple-regression equations. The statistical results were analyzed and are presented below.

Multiple Correlation and Regression Equation

Table 4 presents the zero-order correlations of the various tests employed in this study. Inspection of the table indicates that all the tests are positively correlated with one another to a significant degree. The mental age variable appears to be most highly interrelated with the other predictors, yet its relationship to the dependent variable was next to the lowest. It is noted that a coefficient of .624, the highest magnitude of all the correlations computed, was obtained between the mental age test and the H-T-P drawings. This high correlation might be explained by the fact that the mental ages were derived from the figure drawings. The use of the common element in both variables would tend to increase the correlation between the two.

The Gates Primary Reading Test was the criterion used in this study. It can be seen from the table that while three variables, reading readiness, alphabet knowledge, and teacher judgment, were moderately correlated with the criterion, their correlations with one another were relatively lower. These relationships suggest that each of them may in some way be uniquely related to the criterion and, further, they lend credence to the notion that the three predictors, when considered as a composite, may possibly have greater predictive merit than any predictor singly.

Consideration might be given to the results obtained when the criterion variable was statistically related to all

TABLE 4

MEANS, STANDARD DEVIATIONS, AND INTERCORRELATIONS AMONG THE PREDICTOR TESTS AND THE CRITERION TEST (N = 227)

Test	1. RR	2. MA	3. AK	4. H-T-P	5. TJ	6. RA
1. RR		.383	.388	.185	.295	.565
2. MA			.327	.624	.465	.362
3. AK				.168*	.385	.512
4. H-T-P					.524	.207
5. TJ						.407
6. RA						
Mean	57.110	78.881	17.185	50.004	49.855	85.784
SD	8.748	14.898	14.240	9.729	9.755	28.241

*Significant at .05 level of significance. All others significant at .01 level of significance.

Note: The abbreviations in the table are as follows:

RR -- Reading Readiness
MA -- Mental Age
AK -- Alphabet Knowledge
H-T-P -- House-Tree-Person
TJ -- Teacher Judgment
RA -- Reading Achievement

the predictors combined. In the present multivariate problem, the obtained multiple correlation was .669. Squaring this coefficient gives the coefficient of multiple determination, $\underline{R}^2$, indicative of the proportion of variance in the criterion that is associated with or determined by variance in all the predictors combined. The $\underline{R}^2$ of .447 means that 45% of the variance in the reading achievement test is predictable from knowledge of all five predictors combined.

Concern might be expressed about the practicality of using five variables to predict a particular performance. In view of certain statistical relationships described earlier, it seems likely that some of the predictors were not adding appreciably to forecasting ability. Efforts were therefore made to identify which combination of predictors might be most worthwhile.

It has already been shown that, of all the predictors, reading readiness held the highest relationship with the criterion. Presumably any best combination of predictors would therefore include the readiness test. It was further established that the readiness test and the alphabet knowledge variable did not differ significantly in their relationship to the criterion. Similarly, it seems reasonable to entertain the supposition, at the moment, that each of these two predictors would make a significant contribution to any combination of predictors selected. The potential merit of

including other predictors, if any at all, is less obvious and therefore suggests a statistical analysis that would indicate whether additional variables contribute significantly to R.

The quest for the best combination of predictors was directed toward identifying those predictors which could be deleted from the combination of predictors without significantly reducing the relationship to the criterion. To identify this relationship, statistical testing was performed involving the comparison of squared multiple correlations when one predictor or a combination of predictors was deleted from a large composite. The concern was whether the deletion significantly reduced the magnitude of R^2.

It was reasoned that since two predictors, the anonymous H-T-P rankings and the derived mental ages, were based upon the usage of figure drawings, they might both be deleted concurrently from the total grouping of predictors. From a practical standpoint also, it can be argued that the individualized administration of the H-T-P would be time-consuming for the classroom teacher, and her derivation of mental age scores from the drawings would involve the learning and application of a scoring procedure.

A test was therefore conducted involving a comparison between the full model containing all five predictors and a restricted model containing predictors 1, 3, and 5. Stated otherwise, the comparison involved a deletion of predictors

2 and 4, i.e., mental age and H-T-P drawings. The statistical test yielded an F value of .269 which was not significant. Thus it can be concluded that the two predictors can be excluded from the total combination without significantly reducing the forecasting ability of those remaining.

A similar procedure was next followed, this time deleting the teacher judgment variable from the remaining predictors. The R for the full model (variables 1, 3, and 5) was .668, while the R for the restricted model (variables 1 and 3) was .648. This time the F test yielded a value of 10.647, significant at $<.01$ level. Consequently, it was concluded that the deletion of the teacher-judgment variable from the three-variable composite significantly diminished the relationship to the criterion. From a practical standpoint, there is also support for retaining the variable, for the demands involved in expressing one's subjective judgments are minimal.

Even though alphabet knowledge was shown, as indicated earlier, to be comparable to reading readiness regarding their association with the criterion, it was felt desirable to check the relevance of alphabet knowledge as a member of a combination of predictors. Accordingly, the effect of its deletion from the three-variable combination was tested, and the obtained F value was 25.51, significant at $<.01$ level. Thus the alphabet knowledge test was shown to add significantly to the multiple correlation.

To exhaust the possibilities, reading readiness was also deleted from the combination of three predictors. Even though its correlation with the criterion appeared to be the highest of any of the predictors when considered individually, there was the remote possibility that its contribution to a multiple correlation was not substantial. In the deletion of the readiness test, a full model R of .668 and a restricted model R of .560 were subjected to a testing of their differences. The obtained F of 53.684, significant at $<.01$ level, indicated that the readiness test exercised a significant effect upon the multiple correlation, hence it should be retained in the combination of predictors.

The final phase of the data analysis involved the development of a multiple-regression equation. If it is desirable to predict reading achievement scores for individual pupils, the multiple-regression equation can be of help. It should be pointed out that the regression equation developed would have use only with respect to the tests in the particular combination of predictor tests and the criterion test. The IBM program yielded the values to be used in a multiple-regression equation for a particular combination of predictor variables. These values were the b coefficients and a constant. According to results presented earlier, it was indicated that the best combination of predictors was the readiness test, alphabet knowledge, and teacher judgment. Employing the appropriate values relative to these particular

variables, the computed multiple-regression equation was as follows:

$$PS = -23.608 + 1.294\ (X_1) + .570\ (X_3) + .515\ (X_5)$$

The predicted score (PS) on the reading achievement test would be based upon the constant plus the sum obtained after multiplying each of the predictor scores, readiness, alphabet knowledge, and teacher judgment, X_1, X_3, and X_5, respectively, by the associated b coefficient. The computed standard error of estimate was 21.157. Because of the nature in which the data were analyzed by the computer, it could be possible that the existing b coefficient for X_1 was of the magnitude of 1.294. The inclusion of the alphabet knowledge variable and the teacher judgment variable appreciably improved the multiple correlation without placing undue testing demands upon the practictioner who might use the predictors.

CHAPTER IV

DISCUSSION OF RESULTS

This study was basically exploratory in nature, aimed at the examination of different predictors of reading success in the first grade. Certain measures, collected at the beginning of the school year, were all correlated with year-end reading achievement.

Using five predictor tests, data were gathered from 227 children in twelve first-grade classrooms in Midwest City. The predictors used were the Row-Peterson Readiness Test-I, mental age scores, alphabet knowledge, H-T-P drawings, and teacher judgments. The criterion variable was the Gates Primary Reading Test, Form 2.

Data treatment involved the computation of a Pearson product-moment coefficient of correlation between the measures on each predictor variable and the criterion. It was hypothesized that the strength of association between reading achievement and reading readiness scores would be no different from the strength of association between reading achievement and each of the other four predictor variables. The correlation of the readiness test with the criterion was

compared to correlations involving the other predictors and the criterion. Statistical testing utilized t tests to determine if there were significant differences between the readiness test correlation coefficient and each of the other coefficients.

Going beyond the examination of how single variables were related to the criterion, the data were further analyzed by means of an IBM program. An analysis involving multiple correlation was performed, yielding complex intercorrelations among the variables as well as multiple correlation coefficients and values to be used in deriving a multiple-regression equation.

Turning now to a consideration of the results themselves, inspection of Table 2 indicates all of the predictors to be positively associated to the criterion to a significant degree. While the largest coefficient was obtained for the readiness test, its coefficient, when compared to that of some of the other predictors, did not appear to be sufficiently greater to support a supposition that the readiness test was more definitely associated with reading achievement.

Regarding the results obtained for the mental age variable, the coefficient ranked as the fourth highest. The finding of a relatively low relationship seemed somewhat discrepant in view of reports in the literature which moderately supported the mental age as a predictor. The mental ages commonly used in the reported studies were derived from the

well-established Stanford-Binet, while the mental ages used in this study were based upon figure drawings. Because of the questionable correspondence between the mental ages on these different instruments, there is reason to assume that the lower validity found in this study might result, in part, from the different means of deriving the scores.

The H-T-P's correspondence to the criterion was apparently the weakest of all the predictors. The literature regarding the use of figure drawings for predictive purposes disclosed a few tentative but positive findings, lending credence to the idea that figure drawing might help foretell reading success. Yet, the results obtained in this study did not strengthen that belief.

One factor, however, bears consideration because of the possible influence it might have exercised upon some of the data of this study. All of the schools involved in the study followed the procedure of administering a reading readiness test near the end of kindergarten and using the results for placement of the children in relatively homogeneous classrooms in the first grade. The assumption was made that, as compared to random placement, this manner of placement resulted in greater homogeneity in terms of maturity and intellective factors. Conceivably, then, the greater similarity of the children was manifested in H-T-P productions characterized by less group variability. As a result, a teacher was confronted with the task of making

discriminations among relatively similar entities. This would be expected to influence the accuracy of her discriminations and, hence, the accuracy of her predictions. Presuming this influence was operative, it leaves unanswered the question of how effectively the teacher could use the drawings for predictive purposes with an unselected group of pupils.

The coefficient obtained between teacher judgment and the criterion was .407. A coefficient of this low-moderate size suggests that a teacher's judgments can be of practical, albeit limited, value for predicting reading outcomes.

Null hypotheses advanced in this study stated that the reading readiness test did not differ significantly from the other four predictors regarding association with reading achievement. From null hypothesis testing, the results reported in Table 3 were obtained. The hypothesis of no difference regarding three of the variables was rejected. For three of the predictors, it was found that their relationship to the criterion was significantly less than that of the reading readiness test. These three predictors were: mental age, H-T-P drawings, and teacher judgment. The null hypothesis regarding the alphabet knowledge test was the only one sustained. It was shown that statistically there was no difference between the two predictors with regard to the criterion. The results are compatible with the tenor of

the findings reported in Chapter I that reflected the predictive virtue of early alphabet skills.

For prognostic usage, the alphabet knowledge test would apparently function at a level comparable to the reading readiness test that was employed in this study. Performance on the reading achievement test was as highly associated with one as with the other. In view of the simplicity of the alphabet knowledge test, its ease of administration and its economy, there is reason to advocate that its worth be further explored and its usage encouraged.

At this point attention can be directed toward certain factors in this study which have indirect bearing upon the results obtained and the conclusions reached. Considering first the particular instruments employed in the study, certain test features, which often remain unclear, operate as possible sources of error. Interpretations must take cognizance of the fact that a particular reading readiness test was the basis for comparison; hence, the significance or lack of significance of the other predictors is relative to this test. Had a different readiness test been employed, the findings might have been otherwise. Any findings of this study should be interpreted within this underlying limitation.

In addition, the findings that describe the relationships found here between the reading readiness test and the particular reading achievement test can not speak for

the correlation between readiness tests and reading achievement. In a similar vein, it must be emphasized that if a measure demonstrates a higher degree of relationship to the criterion than does another, there is no implication that a general superiority necessarily exists. One predictor might serve as a valid indicator of success yet be relatively ineffective in some other important respect. This is by way of saying, again, that interpretations are relative and should, therefore, be advanced with caution.

The criterion itself can obviously exert an influence in the overall picture because of the key position it plays in the evaluation of predictions made. The criterion reliability is a factor whose effect can lower the predictive validity of the instruments under study. If the criterion were inconsistent in its measurement, it could lower the validity coefficients of otherwise accurate predictors.

There is another factor that possibly influences predictor-criterion relationships and about which there can be only speculation. The influence results from the actual use of the readiness test information for instructional and planning purposes. On the basis of readiness scores, the teacher advances predictions regarding future reading status of her pupils. But it is to be assumed that on the basis of the same scores she also inaugerates efforts toward corrective teaching. By gearing her provisions to the pupil differences identified with the scores, possibly modifying the

differences, she may thereby influence the validity of the predictor. If such an influence occurs, it does not, of course, argue that the predictor is basically invalid. Rather, it merely highlights what may well be the primary function of the readiness test--the assessment of abilities indicative of a child's preparedness to profitably engage in reading activities.

The possibility just described is, therefore, just part of the general difficulty in establishing creditable validity for predictors of readiness to read. But it also serves to point out that a selected criterion may not be as representative as we would like. In an effort to establish predictive validity, scores on a predictor test are correlated with some measured outcome. The outcome performance is, however, only a sample inferred to represent the more important, but immeasurable, intervening behavior. Even though we establish validity by conducting correlations between the predictor and the criterion, we are primarily more interested in the intervening, non-test behavior. In the usage of reading readiness tests, the concern of the practitioner may be more a matter of determining individual states of preparedness than predicting year-end achievement scores as such. Basically, performance on the reading achievement test may not be the prime characteristic the teacher desires to predict. In the light of this, it seems feasible to suppose that the teacher could be using a

readiness test to good advantage even though the test might display unimpressive predictive validity.

A final qualification seems appropriate at this point. Even though both the reading readiness test and the alphabet knowledge test differed significantly from the other predictors, their association with reading achievement was not overly impressive. This realization lends support to what others have previously avowed; namely, that perhaps no single basis has yet been found for accurately gauging the child's readiness for reading instruction. A child's readiness to read and his progress during ensuing instruction are the function of an almost incredible number of factors. The individual child, viewed for the moment only in the role of a learner, is characterized by an aggregate of motives, attitudes, needs, abilities, interests, disabilities, defenses, and various other factors, all in ever-changing relationships.

These factors give rise to individual differences which at once make for the uniqueness of personality that pleases us and the variation in performance that baffles us. The interplay of these facets is virtually kaleiodoscopic and so complex that it seems to preclude finding a single, highly valid index of reading success. And it reminds the researcher anew that whenever a worthy predictor is ultimately devised, it will, most likely, tap multiple factors.

In view of this realization, the additional analysis

of the data using multiple correlation permitted the investigation to go beyond the consideration of how the criterion was related to single variables to an examination of the effects of multiple variables. The multiple correlation coefficient representing the relationship of all five variables combined was not significantly reduced by the deletion of both the mental age scores and the H-T-P. Each variable in the remaining combination of three predictors was shown to contribute significantly to the multiple correlation. The composite of predictors, consisting of the readiness test, alphabet knowledge, and teacher judgment, yielded the highest prediction, a multiple correlation of .668.

If the combination is considered in contrast to the reading readiness test alone, it can be seen that the measured relationship to the criterion is higher in the former. On the strength of this greater relationship found when using the combination, the classroom teacher might give thought to combining these measures with the readiness test results. Getting the additional scores in alphabet knowledge and teacher judgment would entail no expense and relatively little additional time.

In view of the findings considered in this chapter and tempered by the notes of caution that have been presented, certain conclusions are offered. In order to improve the challenging and complex task of forecasting the reading success of beginning readers, careful consideration

should be given to a variety of approaches. The evidence collected in this study has suggested that for screening purposes, measures other than reading readiness scores may be championed. The teacher has at hand certain means that could augment her task of devising instructional plans for her pupils.

Usage of a three-variable composite, i.e., readiness scores, alphabet knowledge, and teacher judgment, may enhance the forecasting of reading success. If the forecasting is based upon the usage of a single predictor, similar results should be obtained with alphabet knowledge and reading readiness scores.

Recommendations

Efforts will continue toward identifying accurate predictors of reading success. Toward that end, the following recommendations are offered:

1. In the future, continued attention should be directed toward exploring a multiple-factor approach. This recommendation seems justifiable when considering the countless factors at play in the processes of learning to read. The prospect of finding a single index capable of accurately gauging this complexity is rather remote.

2. In order to more firmly establish the role of the different measures and the interrelations among them, the present study should be replicated.

3. Teachers can be encouraged to collect informal measures such as their own subjective appraisals and indicators of their pupils' alphabet skills and to relate these measures to later reading status.

4. Efforts should be directed toward more extensively probing the predictive merits of the child's alphabet knowledge and associated skills.

CHAPTER V

SUMMARY

Educators have long recognized that upon entry into the first grade, children differ widely in the degree to which they are ready to undertake the task of learning to read. These differences in readiness can exercise both immediate and lasting influences upon the child's attainments; and, accordingly, efforts are made to assess readiness and to utilize the results within a framework of educational planning and provision. Concern about the matter of readiness has prompted exploration into factors that are indicative of readiness and that are likewise associated with reading success. The general purpose of this study has been to investigate various instruments thought to be associated with reading success in the first grade. This study attempted to provide a comparison of five predictors which, applied at the beginning of the school year, supplied the scores that were correlated with subsequent reading attainment.

The five variables whose relationship to a criterion was being studied were: reading readiness scores, mental age scores, alphabet knowledge, H-T-P drawings, and teacher

judgment. Past evidence regarding the validity of these predictors, while uneven, has been of such a nature that it hints at possible predictive merit.

The shortage of highly valid predictors prompts a concern to investigate various measures as possible predictors. Quite possibly, certain techniques, rather uncommonly used, may be found to be vested with capabilities that have not been acknowledged. Within this category, the predictors in this present study were thought to hold promise. And providing they could be shown to at least compare favorably to the readiness test, there would be reason for advocating their use by dint of greater economy and administrative ease.

In order to force a more definitive answer to the speculation, the five predictor variables were subjected to analysis that would permit comparison under conditions common to all the predictors. Regarding the predictor-criterion relationships, the null hypothesis contended that the reading readiness test did not differ significantly from the four other measures in the strength of correspondence with reading achievement.

Twelve classrooms of children and their teachers were the sources of data collected in this study. The children were enrolled in the first grade in three of the Midwest City Public Schools.

During the early weeks of the school year, scores

were gathered on the five predictors. The reading readiness test, the Row-Peterson, was group administered, while the remaining four predictors were based upon information gathered in sessions with individual children and teachers.

Each child was seen briefly in a separate testing room, at which time he was administered a test that measured the number of alphabet letters, capital and lower-case, that he could identify. This measurement served as one of the predictors. The child was also administered the H-T-P. The human figure drawings produced were scored to yield mental age scores, the basis of another predictor.

The H-T-P drawings of a particular classroom were then submitted to that room's teacher, and she was directed to rank the anonymous drawings produced by her pupils, ranking them to indicate the probable reading success of the pupils. After scores on that predictor were obtained, she was again submitted the drawings, this time correctly identified, and asked to rank them once again. This teacher judgment test constituted the fifth and final predictor.

Near the end of the school year, the Gates Primary Reading Test was administered to all the children in the twelve classrooms. The scores obtained served as the criterion in the study.

The statistical treatment involved in this study was in four phases. First, a test was performed to determine the degree of interrater reliability. Checking on the

extent of agreement among the teachers, acting as judges, was deemed desirable because two of the predictors being studied involved subjective ratings. The twelve teachers participated in ranking a trial set of H-T-P drawings. Application of Kendall's coefficient of concordance, W, disclosed a significantly high degree of interjudge agreement.

The second aspect of data treatment involved correlating each predictor with the criterion, yielding Pearson product-moment correlation coefficients. All predictors were found to be positively correlated with the criterion at levels indicative of significance.

In the next phase of the statistical analysis, the null hypothesis was tested. The hypothesis contended that, regarding the degree of correlation with reading achievement, there was no significant difference between the reading readiness test and each of the other predictors. The correlation coefficients of three of them, however, were found to be significantly smaller than that for the readiness test. The three predictors were the mental age, H-T-P, and teacher judgment. The null hypothesis for the remaining predictor, alphabet knowledge, was sustained. Since no difference was found, the alphabet knowledge variable was considered to be equivalent to the readiness test with regard to degree of correlation with year-end reading achievement.

In the final phase, a multiple linear regression program for the IBM 360 computer was used to extend the

statistical analysis. Intercorrelations were obtained among all of the predictors and the criterion, and the coefficient of multiple correlation was computed based upon a combination of all five variables used as predictors. Non-significant predictors were deleted from this composite, leaving the least number that remained without lowering the multiple correlation significantly. Using values relative to the three remaining predictors, a multiple-regression equation was formulated.

The combination of predictors that correlated most highly with reading achievement included the reading readiness test, alphabet knowledge, and teacher judgment. A multiple correlation of .668 was obtained using these three tests in combination. This composite was seen as holding promise when used for predicting reading success.

Support would go toward the general view that at those times when the first-grade teacher is interested primarily in estimating the reading outcomes of her pupils, she could probably predict as well using an indication of her pupils' alphabet knowledge as she could by using their Row-Peterson Readiness Test scores. The forecasting of reading status would probably be improved if use were made of the scores obtained from the three-variable combination and the computed regression equation associated with those variables.

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