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ABSTRACT

Three concurrent validity studies were conducted to determine the relationship between performances on formative measures of reading and standardized achievement measures of reading. Correlational analyses for five formative measures and three standardized measures provided evidence for the validity of Words in Isolation, Words in Context, and Oral Reading as indices of reading achievement. Comparisons of performance of regular and resource program students in grades 1 through 6 revealed marked differences between the two groups and across grades. The usefulness of the formative measures for continuous evaluation of student growth in reading is discussed. (Author/CL)

University of Minnesota

Research Report No. 20

RELATIONSHIPS AMONG SIMPLE MEASURES OF READING AND PERFORMANCE ON STANDARDIZED ACHIEVEMENT TESTS

Stanley L. Deno, Phyllis K. Mirkin, Berttram Chiang, and Lisa Lowry

Institute for Research on Learning Disabilities

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II. Computer Simulation Research on the Assessment/Decision-making/Intervention Process

III. Comparative Research on Children Labeled LD and Children Failing Academically but not Labeled LD

IV. Surveys on In-the-Field Assessment, Decision Making, and Intervention

V. Ethological Research on Placement Team Decision Making

VI. Bias Following Assessment

VII. Reliability and Validity of Formative Evaluation Procedures

VIII. Data-Utilization Systems in Instructional Programming

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Abstract

Three concurrent validity studies were conducted to determine the relationship between performances on formative measures of reading and standardized achievement measures of reading. Correlational analyses for five formative measures and three standardized measures provided evidence for the validity of Words in Isolation, Words in Context, and Oral Reading as indices of reading achievement. Comparisons of performance of regular and resource program students in grades one through six revealed marked differences between the two groups, and across grades. The usefulness of the formative measures for continuous evaluation of student growth in reading is discussed.

Introduction

The research reported here was conducted as part of a project that has as its purpose developing formative evaluation systems for teachers to use in improving learning disabilities service programs in reading. The primary assumptions upon which that research project is based are:

(1) that the success of learning disabilities services is defined primarily by the extent to which those services improve the academic and social behavior goals of individual students served,

(2) that teachers can increase the success of learning disabilities services by systematically measuring student progress toward achievement of program goals and then adjusting student programs to improve that progress, and

(3) that the technology presently available for teachers to use in measuring student progress and adjusting programs based on measured progress is either not sufficient or has not been sufficiently tested.

The particular part of the research project described here was conducted to answer a first and critical question that is raised when developing a formative evaluation system in reading: what student performance data can be routinely and easily obtained that validly index achievement in reading? The question arises because, for several good reasons, commercially prepared standardized tests of reading

ordinarily used to assess achievement cannot be used routinely in a formative evaluation system to monitor performance. First, commercially produced standardized tests take too much time to administer. Second, an insufficient number of equivalent forms is available for any test to be used in the repeated measurement of performance required for formative evaluation. Third, the cost of using achievement tests repeatedly is prohibitive.

The development of measurement procedures that can be incorporated relatively easily into the daily routine of most teachers working in learning disabilities programs is deemed desirable if intensive monitoring of program effects on student performance is to occur. The importance of intensively monitoring program effects is that such monitoring enables us to more precisely determine the appropriateness of services provided to individual students. Given the requirement in P. L. 94-142 (Federal Register, 1977) that each handicapped student be provided an "appropriate educational program" and our current inability to diagnose and prescribe effective programs (Arter & Jenkins, 1978), continuous evaluation of a student's program is the only way to achieve substantive compliance with the law (Deno & Mirkin, 1980).

Beyond compliance with the law, research on the use of intensive repeated measurement in formative evaluation of instruction has already yielded evidence bearing on its potential benefits (Bohannon, 1975; Crutcher & Hofmeister, 1975; Frumess, 1973; Lovitt, Schaff, & Sayre, 1970; Mirkin & Deno, 1979). The research findings are isolated, however. The research and development program of which the present studies are a part was designed to systematically construct formative

evaluation procedures for learning disabilities programs that specify:

(1) What behaviors to measure when improved reading proficiency is an IEP goal.

(2) How to repeatedly measure those behaviors reliably.

(3) Who should administer the measurement procedures.

(4) How often measurement should occur.

(5) How to obtain data most efficiently.

(6) How to use repeated measurements of student performance to increase intervention effectiveness.

The strategy employed in the present research was first to review available literature on reading, to identify those common reading behaviors that might validly index achievement in this academic domain; second, to develop measurement procedures for taking data on those behaviors; and third, to determine the reliability and validity of the measures by correlating the scores obtained on them with scores from standardized measures of reading that are highly respected, and technically adequate with respect to their psychometric properties.

To be considered for inclusion in a formative evaluation system the developed measures had to fulfill the following criteria:

(1) They must be valid with respect to widely used measures of achievement in reading.

(2) They must be immediately sensitive to the effects of relatively small adjustments made in (a) instructional methods and materials, (b) motivational techniques, and (c) administrative arrangements (e.g., adjustments in grouping, setting for instruction, teacher/tutor, time

of instruction, etc.).

(3) They must be easy to administer by teachers, parents, and students.

(4) They must include many parallel forms that are frequently administrable (daily, if necessary) to the same student.

(5) They must be time efficient.

(6) They must be inexpensive to produce.

(7) They must be unobtrusive with respect to routine instruction.

(8) They must be simple to teach to teachers, parents, and children.

Our hope is that regardless of personal philosophical, theoretical, historical, and current situational constraints those responsible for ensuring the quality of learning disabilities services will continuously evaluate the impact of those services on the academic and social behaviors of their individual students. The measurement procedures that are described here are an important first step in the development of such an evaluation system.

Review of the Literature

Since the primary purpose of the research reported here was to determine the concurrent validity of simple procedures for monitoring changes in reading proficiency, the research literature reviewed consisted of studies that examined both the relationships among different reading skills, and the association between those skills and performance on standardized tests of reading achievement. The review was not intended to be exhaustive. Instead, relevant studies were reviewed with an eye toward identifying reading behaviors that show enough promise for use in formative evaluation that a measure of those behaviors might be included in a concurrent validity study.

In the early studies reviewed, factor analysis techniques were applied to determine the relationships among some of the commonly used reading measures. Langsam (1941), for example, administered a diversified battery of reading tests comprising 21 variables to 100 college students and obtained a correlation matrix for those variables. Centroid factor analysis of the correlation matrix yielded five factors. One of these factors was a word factor that reflected the subjects' ability to deal with single or isolated words. In other words, the study indicated that even at the college level the ability to recognize words accounted for a significant percentage of the total variance of the reading tests used.

Using college freshmen as his subjects, Davis (1944) constructed a large number of multiple-choice tests to measure each of nine skills considered basic to reading comprehension. When the intercorrelations

of the nine skills were factored, knowledge of word meanings was found to be the most fundamental factor of comprehension in reading. The positive loadings of the word knowledge component in each of the nine basic skills gave strong support to the proposition that "to read at all it is necessary to recognize words and to recall their meanings" (Davis, 1944, p. 191).

A total of 927 students in grades three through six was the sample used by Singer (1965) to investigate the substrata-factors related to improvement in speed and power of reading. Word recognition in context again was found to correlate reliably with power of reading or reading comprehension (3rd grade r = .72, 4th grade r = .70, 5th grade r = .70). In addition, the correlations between reading rate and comprehension measures were so high that the factor analyses with orthogonally rotated varimax factors indicated that speed and power of reading had the largest loadings on that same factor.

Sassenrath (1972) factor analyzed the attentuated matrix of reading measures for the same 28 variables used by Singer. The subjects for this study were 283 fourth graders, 400 high school youngsters, and 126 college students. Although speed and comprehension in reading were separate factors at the college level, they were found to have loadings of the same magnitude on the general reading ability factor for the elementary and high school samples.

An early conclusion based on these factor analytic investigations of reading is that word recognition rate and comprehension are highly enough related that a measure of one enables predictions about performance on the other one. Further, we conclude that either word

recognition or comprehension performance alone shows promise as an index of general achievement in reading.

A more recent comprehensive review of the skill deficiencies of poor readers (Guthrie & Tyler, 1978) buttresses our conclusion. The authors reported that decoding proficiency and rapid word recognition rate are valuable for comprehension at the primary grade levels. The concept that single word decoding and comprehension are mutually facilitative was confirmed in a study by Perfetti and Hogaboam (1975). Sixty-four third-grade and fourth-grade children were assigned to either skilled or less skilled comprehension groups based on their performance on the Metropolitan Achievement Test (Durost, Bixler, Wrightstone, Prescott, & Balow, 1971). Forty words either of high frequency or low frequency, or nonsense pseudo words were presented to these children and their vocalization latencies to these single words were recorded. The skilled comprehension group was found to respond significantly faster in the word identification task than the less skilled comprehension group. Since the group differences for pseudo words were greatest, and were greater for less frequent words than for more frequent words, the authors argued for the importance of automaticity for the decoding skill. Accordingly, a shared limited capacity hypothesis was raised to support the relationship between word decoding and comprehension.

Kaufman (1976) intercorrelated eight identified variables to determine whether word recognition and oral reading performances were good predictors of comprehension. The number of total words read correctly was found to correlate with comprehension as measured by two

standardized tests of reading. The statistically significant correlation led the authors to conclude that comprehension could be predicted on the basis of performance level on errors in word recognition.

Froese (1976) adduced evidence to show that there is a significant relationship between word list reading and reading of extended discourse measured by the full scale Standard Reading Inventory (McCracken, 1966) among 146 students in grades one through six. The correlations between the number of words correct on each grade level list and oral reading of passages at the independent, instructional, and frustration levels ranged from .84 to .98. The variance of the full scale SRI was, therefore, significantly accounted for by the word list performance. In principle, then, predictions of functional reading made from word list reading performance may be as accurate as predictions from the complete SRI.

The studies summarized here were sufficiently persuasive that word recognition and comprehension constitute crucial factors in general reading performance, and that a significant relationship exists between the two. Such findings point to the potential use of frequent measures of children's word recognition and comprehension performance to index progress in general reading ability. To determine whether simply developed measures of word recognition and comprehension that are administered regularly possess sufficient concurrent validity, a series of three studies was conducted.

Three Studies of Reading Performance

The studies described here were conducted to identify student performance data in reading that could be used in the formative evaluation of reading instruction delivered as a part of learning disabilities service. The methodology and results of each study are presented in this section.

Study I

Method

Subjects. Eighteen (M=9, F=9) regular class students and 15 (M=11, F=4) learning disabilities resource program students were randomly selected from a master list of student names in a suburban St. Paul public school. The grade placement levels of these 33 subjects ranged from grades one through five.

Materials. Five measures that potentially could be used in formative evaluation and two standardized reading tests were administered. The standardized instruments selected were the Stanford Diagnostic Reading Test (SDRT; Karlsen, Madden, & Gardner, 1975), Subtest Five, Part A (Reading Comprehension) of Form B, and the Woodcock Reading Mastery Tests (WRMT; Woodcock, 1973), Word Identification and Word Comprehension subtests of Form A. The five formative evaluation measures (Words in Isolation, Words in Context, Oral Reading, Cloze Comprehension, and Word Meaning) were ones that had potential for routine use by classroom teachers. The materials used for the five measures are described in the following paragraphs.

The Words in Isolation measure consisted of three alternative forms

of 60 words each that were randomly selected by grade level from the Core List of 5,167 words listed in Basic Elementary Reading Vocabulary (Harris & Jacobson, 1972). Each 60-word list consisted of 10 words from each of the six grade levels. Words were included on the word lists only if they had a frequency index of more than 10 per million words in the Teacher's Wordbook of 10,000 Words (Thorndike & Lorge, 1944). After a pool of 60 words was obtained for each list, the words were typed in 12 rows with five words in each row. (See Appendix A.)

The Words in Context measure consisted of three passages of approximately 600 words selected from the beginning, the middle, and the latter parts of the sixth grade book for three different basal reading series: Allyn-Bacon, Ginn 720, and Houghton-Mifflin. These were typed with every fifth word in each passage underlined. (See Appendix B.) The reading levels for these passages were computed using the Fry Readability Index formula (Fry, 1968) and each was at the sixth grade level.

The Oral Reading measure included three additional passages of 300 words each. These were selected from the same basal readers and typed on a sheet of paper. Each passage consisted of the first part of the story. (See Appendix C.) The reading levels for the passages were computed using the Fry Readability Index formula (Fry, 1968) and each was at the sixth grade level.

The Cloze measure was developed from three additional passages of 300 words each that were selected from the same basal readers. The first and last sentence in each passage was left intact, but every fifth word was deleted from all the other sentences in the passage.

The passages were then typed with five-space blanks in place of the deleted words. (See Appendix D.)

The Word Meaning measures involved the use of three passages consisting of 300 words each that were selected from the same basal readers. Every fifth word of the passage was underlined unless it was a function word (i.e., articles, prepositions, and proper nouns). (See Appendix E.)

Procedure. Both the five formative evaluation measures and the subtests of the two standardized tests were individually administered in one session lasting approximately 60 minutes. Each subject was taken to a quiet room by one of three psychometricians who had been trained to administer and score these measures. Each student was given the measures in the following order: Words in Isolation, Words in Context, Oral Reading, Cloze, Word Meaning, SDRT, and WRMT.

The Words in Isolation test instructions were read verbatim to the subject:

> Here is a word list that I want you to read. When I tell you to start, you can read across the page. Use the cardboard to help you keep your place. Please read as fast and accurately as you can. If you get stuck on any of the words, move on to the next one. I will tell you when to stop reading. Are there any questions? Ready? Begin.

Then the word list was given to the child and the stopwatch was triggered for a 60-second timing. The psychometrician marked whether each word was correctly read on a follow-along sheet that was identical to the word list itself. If the child failed to respond after an interval of approximately six seconds, the psychometrician urged the child to move on to the next word. Immediately following the 60-second timing of the first word list, the second list was given to the child for

reading. Then, the third list was given. Responses had to be completely accurate to be scored as correct.

The procedures for Words in Context were similar to those used for Words in Isolation. The following instructions were read to the child:

> I am going to show you a story that has underlined words in it. Say the underlined words as quickly and accurately as you can. Start at the top of the page and try not to skip any words. If you do not know a word, try the next word. Here is a cardboard strip that you can use to help you keep your place. Remember to do the best you can, and I will tell you when the time is up. Are you ready? Here is the story. Begin.

The first, second, and third lists were given one after the other, with a 60-second limit for each list. Words had to be read accurately to be scored as correct.

The three Oral Reading passages were read during three consecutive one-minute timings after the following instructions were given:

> Now I am going to give you a story that I would like you to read aloud to me. Do your best and go on reading if you get stuck on a word. I'll let you know when to start and stop. Do you have any questions? Remember to do your best, but do not take a lot of time on hard words. Here's the story. Ready? Begin.

Omissions, insertions, substitutions, and mispronunciations were all tallied as errors.

The three Cloze passages were given during three one-minute timings. The first two sentences in each passage were used as examples to illustrate the procedure. The test instructions were:

> I'm going to give you a story that has some words missing in it. You are to try to read the story and fill in the blanks of the missing words. Let's read the first sentence together. [Sentence read with subject.] Now read aloud the next sentence and try to fill in the blank of the missing word. [Subject reads sentence.] It is not easy to guess what the missing word could be, but do the best you can. If you cannot put a word into the blank, move on to the next blank and try to work quickly. Are you ready to begin? Begin.

Synonyms of the deleted words were considered correct.

The instructions for the Word Meaning measure were:

> I am going to show you a story that has underlined words in it. Tell me the meaning of the underlined words. Try to do your best and work quickly. If you do not know the meaning of a word, skip it, and go on to the next word. You can use the cardboard strip again to help you keep your place. Remember to do your best, and I will tell you when the time is up. Are you ready? Here is the story. Look at the first line and tell me the meaning of the underlined words. Begin.

Psychometricians had been trained as to the types of responses that were acceptable. Decisions were made as to the correctness of each response immediately after the response was given.

The test instructions used for the SDRT and WRMT standardized reading subtests were those described in the test manuals. The raw scores obtained for each of these measures, rather than the grade equivalent scores, were used for data analyses.

Results

The primary datum generated and analyzed for each student on each formative evaluation measure was the student's mean score correct and incorrect for the three samples on that measure. The raw score means and standard deviations on the eight measures are presented in Table 1 for the resource, regular, and combined group samples. As is evident, LD resource program subjects performed below regular group subjects on all measures.

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Insert Table 1 about here

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The correlations between the eight measures in terms of rate correct are presented in Tables 2, 3, and 4 for the resource, regular,

and combined group samples, respectively. An inspection of Table 4 reveals that the correlations between the three word recognition measures (Words in Isolation, Words in Context, Oral Reading) and the standardized reading measures ranged from .73 to .91 with most coefficients in the .80's. Cloze and word meaning measures, on the other hand, also were found to be significantly related to the three criterion measures with a range from .60 to .83.

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Insert Tables 2-4 about here

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The equivalent data for error performance are presented in Tables 5 through 7. Examination of these correlations reveals a pattern of generally lower coefficients, with isolated exceptions. Further, in contrast to the correlations for correct performance, many of the coefficients for incorrect performance were unreliable.

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Insert Tables 5-7 about here

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Percentage scores were then computed and analyzed so that students' error rates would be taken into account along with their rates of correct performance. The correlation matrices for the percentage measures are shown in Tables 8, 9, and 10. The correlation coefficients for the word recognition measures generally were higher when percentage scores, rather than correct rates, were used as the dependent measures. That was not true for the cloze and word meaning measures.

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Insert Tables 8-10 about here

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A comparison of the mean number of correct responses on the three formative evaluation word recognition measures by the students' grade level appears in Figures 1 and 2 for the resource and regular groups, respectively. The graphs indicate that there was an increasing trend in students' performance across successive grades. The trends of the data among the three measures also appear to be consistent, with oral reading rate being at a higher level than reading words in context and reading words in isolation.

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Insert Figures 1 and 2 about here

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Study II

The results obtained in Study I provided strong evidence that a simple word recognition measure might be used to index a student's reading proficiency. Since the purpose of the research was to develop useful measures for LD teachers, a second study was organized to answer questions related to the parameters of test construction: namely, does varying either the grade level from which stimulus materials are selected or the duration of the test sample alter correlations among the simple word recognition and comprehension measures? The stimulus difficulty question is important because teachers need to know what stimulus materials to use and how long a test must be used to yield sufficient performance data for making formative evaluation decisions. Further, since low functioning students in Study I could make very few correct responses on the simple word recognition and comprehension tasks, it seemed important to determine whether simpler tasks yielding higher correct response rates could be constructed.

Method

Subjects. Twenty-seven (M=17, F=10) regular students and 18 (M=13, F=5) resource program students from two Minneapolis public schools participated in this study. The 45 children were enrolled in the first through sixth grades.

Materials. Only the five formative evaluation reading measures (Words in Isolation, Words in Context, Oral Reading, Word Meaning, and Cloze) were used in Study II. For each of the three word recognition measures (Words in Isolation, Words in Context, Oral Reading) used in Study I, an additional form was developed. For Words in Isolation, additional lists were constructed consisting of words from Pre-primer through third grade from the Harris-Jacobson Word List. For the Words in Context and Oral Reading measure, the additional forms were developed using selections from third grade basal readers. Each sixth grade word list was also revised so that there were 120 words on each list. The third grade word lists, on the other hand, contained 180 words.

The Cloze comprehension passages were identical to the ones used in Study I, except that every 10th word instead of every fifth word was left blank. Omitting fewer words was an attempt to simplify the task and thereby increase the level of correct responses - particularly for low functioning students. The materials for the word meaning passages were modified to include only words that were clearly definable. This change was made to increase the reliability of tester judgments.

Procedure. The testing instructions for the three word recognition measures were identical to those in Study I. Each student was given two

30-second and two 60-second tests on parallel forms for each of the word recognition measures. For the Cloze measure, each test was extended to two minutes. In addition, a sample passage was included at the beginning of the first cloze passage to ensure that subjects understood the task. A duplicate sheet was used by psychometricians for the Word Meaning measure so that student responses to each word stimulus could be recorded for later scoring.

Results

For purposes of analysis, a mean score was computed using the pairs of 30-second and 60-second scores for each student. The data, then, consisted of: 12 word recognition scores (2 levels X 2 test times X 3 types of word recognition), one cloze score, and one word meaning score. The descriptive data for these scores appear in Table 11.

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Insert Table 11 about here

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The 14 scores for each student were then intercorrelated. Tables 12, 13, and 14 contain the correlation matrices among the 14 variables for the resource, regular, and combined groups, respectively. As can be seen, the correlation coefficients between third grade and sixth grade materials on the three word recognition measures were consistently in the .80's and .90's. The 30-second tests also were correlated very highly with the one-minute tests for the three word recognition measures. Examination of the correlations between word recognition measures and the comprehension measures (Cloze and Word Meaning) reveals high consistent correlations for Cloze and somewhat lower correlations for Word Meaning.

The Words in Context and Oral Reading measures appear to correlate more highly with the Cloze and Word Meaning measures than do the Isolated Word measures.

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Insert Tables 12-14 about here

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Study III

The purpose of this study was to integrate and replicate the findings from Studies I and II. The emphasis again was on the concurrent validity of the word recognition measures used in Studies I and II. To establish the generality of the findings from those studies, the research was done using students from inner city schools and using different standardized reading tests. The sample size of Study III was increased in order to increase the reliability of previous findings.

Method

Subjects. Forty-three (M=22, F=21) regular program students and 23 (M=19, F=4) resource students participated in this study. The grade placement level of these 66 children ranged from first through sixth grades. Their ages ranged from 78 months to 156 months with a median of 112 months. The subjects were from three Minneapolis inner city schools.

Materials. The materials used in Study III included one third grade word list, one sixth grade word list, one 300-word third grade oral reading passage, and one sixth grade cloze passage. In addition,

the Phonetic Analysis and the Reading Comprehension subtests from the Stanford Achievement Test (SAT ; Madden, Gardner, Rudman, Karlsen, & Merwin, 1973), and the Reading Comprehension subtest from the Peabody Individual Achievement Test (PIAT; Dunn & Markwardt, 1970) were administered to each subject.

Procedure. The Words in Isolation, Oral Reading, and Cloze measures were administered to the children following the procedures used in the previous studies. The PIAT and the SAT reading comprehension subtests were given on an individual basis according to the instructions given in the test manuals. Subjects were allowed only two minutes for the SAT phonetic analysis measure. Before the first test, subjects were told they would be given an award for their performance.

Results

The performance of each subject on the four formative evaluation measures and the four measures from the standardized reading tests was analyzed. The raw score means and standard deviations for correct performance on these measures for the resource, regular, and the combined groups, respectively, are presented in Table 15. As in Studies I and II, the score for each subject on Words in Isolation and Oral Reading is a mean of two one-minute timings. An inspection of Table 15 reveals that the scores of the Resource Group children were relatively low on all of the measures, particularly the Cloze and Phonetic Analysis measures. Regular class students scored four to five times higher than the Resource students on both levels of the Words in Isolation measure, more than three times higher on the Oral Reading measure, and nine times higher on Cloze. In contrast, the raw scores

for regular class students on the measures from the PIAT and the Stanford exceeded the Resource Program students by factors ranging from about 1.5 to 2.5.

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Insert Table 15 about here

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Intercorrelations among the raw scores for correct performance by the combined regular class and LD resource program sample on the eight measures are presented in Table 16. Inspection of the table reveals high correlations among the three word recognition measures and similarly high correlations between the word recognition measures and the Cloze comprehension measure. The correlations between each of the four formative evaluation measures and PIAT raw scores is approximately .10 lower and consistent across all measures. The remaining correlations range from a low of .64 between the Phonetic Analysis and Literal Comprehension subtests to a high of .95 between the Literal and Inferential Comprehension subtests. In general, the word recognition measures correlated as high, or higher than the Cloze measure with standardized tests of comprehension. Particularly noteworthy is the fact that Oral Reading correlations with both Literal and Inferential Comprehension exceeded the correlations between the Cloze comprehension measure and those two subtests.

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Insert Table 16 about here

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In Table 17 the same intercorrelation matrix is presented for the Regular Class sample. The pattern for the Regular Class sample alone is the same as for the combined sample, with the magnitude of the correlations slightly diminished. Again, among the correlations between the formative evaluation measures and the Literal and Inferential Comprehension subtests, the correlations for the Oral Reading measure were the highest.

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Insert Table 17 about here

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Table 18 presents correlations for the LD resource program sample. The correlations between the formative evaluation measures and two of the standardized measures (i.e., PIAT and SAT-Phonetic Analysis) are markedly lower when compared to previous analyses. None of the correlations between the formative evaluation measures and the Phonetic Analysis subtest is reliable for the Resource Program sample. Examination of the correlations between the formative evaluation measures and the Literal and Inferential Comprehension subtests reveals that they are somewhat lower than for the combined sample. The Phonetic Analysis subtest correlations with both the Literal and Inferential subests are low and, in one case, unreliable. Finally, the correlation between the Literal and Inferential subtests again approaches unity.

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Insert Table 18 about here

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To determine the basis for the different pattern of correlations obtained from the LD Resource Program sample, scatterplots were created representing the correlations between isolated word and oral reading performance and performance on the standardized tests (see Figures 3-6). The Phonetic Analysis subtest was excluded because the range of scores on this measure was too restricted.

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Insert Figures 3-6 about here

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Inspection of the scatterplots reveals two interesting results. First, and perhaps most important, the SAT Comprehension subtest has a functional ceiling at a raw score of 30. The effect of that ceiling is to reduce correlation coefficients between that measure and any of the word reading measures that do not have such a ceiling. Under that circumstance it is remarkable that the obtained coefficients were so high.

A second finding is evident in Figure 6. Isolated word reading from third grade lists is much more difficult than oral reading from third grade passages. The result is a floor of zero on the isolated word lists with no obvious floor on oral reading. No clear evidence exists in the data, however, that the floor substantially reduced the correlation coefficients.

The validity coefficients for oral reading performance alone are presented in Table 19. Virtually all coefficients were high and significant, with the only exception being that for the Resource sample on the Phonetic Analysis Subtest of the SAT.

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Insert Table 19 about here

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Developmental Performance

To provide a perspective on age related differences in performance on the formative measures, data from isolated word reading, oral reading, Cloze, and word meaning were collapsed across the three studies. Those data appear in Tables 20, 21, and 22 for the combined sample, the Regular Class sample, and the Resource Program sample, respectively. The number of students entering into the data differs from measure to measure since each measure was not used in all three studies.

- - - - - - - - - - - - - - - - - -

Insert Tables 20-22 about here

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A visual display of the grade level means for the same data is provided in Figures 7-9.

- - - - - - - - - - - - - - - - - -

Insert Figures 7-9 about here

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Inspection of the grade level data reveals that growth is quite consistent from one grade to the next through Grade 4. Beyond this point, trends for mean scores become inconsistent for oral reading, Cloze, and word meaning data. That result may be a function of the sample, or it could reflect a leveling off of oral reading performance from Grades 4 to 6. When the performance of Regular Class students in Figure 8 is contrasted with the LD Resource Program students in Figure 9, support for both explanations can be found. While Regular class student performance on oral reading increased through Grade 4 and then became variable, their performance at reading from isolated word lists increased consistently through Grade 6. A reasonable in-

ference is that the isolated word lists are a more controlled, and perhaps more valid, measure of reading proficiency through Grade 6 than are the oral reading passages. That conclusion is supportable in the data for the LD Program sample displayed in Figure 9. In contrast to the Regular Class sample, the performance of the LD Program sample at reading from isolated word lists decreased sharply and steadily after Grade 4. Since only two students enter into the mean for oral reading from the sixth grade passage, it is likely that the mean is not representative. However, eight students read the third grade passage and their performance was also low. Another explanation is that students receiving LD services in Grades 5 and 6 were, in fact, the most retarded in reading skills - relatively more deficient than those receiving service in the primary grades.

Marked differences appeared between LD program and Regular Class students at all grade levels. The differences were found for both level and variability of performance, with the LD program sample performance lower and less dispersed. All means differed by a factor of at least two, with most differing by much more. Differences at Grade 2, for example, ranged from approximately 3.5 times for oral reading from a third grade passage to 15 times for reading isolated third grade words. Since the number of cases entering into analysis at each grade is small for the LD program sample, caution should be exercised in interpreting these results.

Looking only at group means across grade levels provides a more reliable basis for contrasting the performance of Resource Program students and Regular Class students. Here again, differences in means

and standard deviations were clearly in the same relation as with grade level performance. Mean performance between groups differed from approximately two times on oral reading from a sixth grade passage to more than four times with reading isolated third grade words and cloze completion. The one exception was a factor of 1.5 difference between word meaning performance for the two groups.

Discussion and Conclusions

The purpose of the research described here was to develop an empirical basis for answering the first critical question raised when developing formative evaluation procedures for teachers to use in improving reading instruction for students in learning disabilities programs; namely, what student performance data can be routinely and easily obtained that index achievement in reading? An analysis of the results from the three studies reported here provides a firm basis for answering that question.

First, reading aloud from a basal reader, reading aloud from lists of isolated words, and guessing at what words have been deleted from a reading passage (i.e., Cloze comprehension) all relate closely to performance on standardized reading tests. Since the validity coefficients for measures based on these behaviors are all high and reliable, data on any one, or combination, of these behaviors can be used to estimate proficiency in both decoding and comprehension. At the same time, all behaviors are more closely associated with word recognition performance on standardized tests than they are with comprehension performance. Nevertheless, the correlation coefficients are high and establish the criterion validity of measures based on those behaviors.

An additional point to be made is that the Cloze measure, which many use to assess comprehension, is also more closely related to word recognition performance than to comprehension performance on standardized tests, and further, the validity coefficients for cloze measures at best equal those for measures based on reading words aloud from isolated lists and in context.

Second, correct performance is a more valid measure of reading proficiency than error performance and, when used alone discriminates among reading proficiencies as well as a combination of correct and incorrect performance. Since data on number of word reading errors is economical to obtain while collecting data on correct performance, however, a record of both correct and error performance could easily be maintained as a more complete record of individual student proficiency. The fact that many reading diagnosticians recommend using information on types of reading errors as a basis for instructional planning makes recording both correct and error even more sensible. Whether teachers are actually more effective when they use information from error performance to plan instruction, however, has not been widely tested.

Third, valid data on reading aloud from a reader or from isolated word lists can be obtained by measuring those behaviors for one minute. In fact, the results from Study II provide a basis for inferring that a 30-second sample of those behaviors would be sufficient to discriminate those students who will do well on standardized tests from those who will do poorly. Correlations between 30-second and one minute samples for words or passages of the same difficulty were all .90 or greater. Since little efficiency is gained by reducing the sample duration to 30-seconds, and since it is common to use one minute as a base for reporting rate of responding, a one-minute sample would seem optimal.

An item worth noting in this context is that since one minute samples of word reading performance yield sufficient information for discriminating among reading proficiencies, much time and money could

be saved by using one minute samples instead of standardized tests for estimating reading level. Using one minute samples for classifying readers is not the purpose of the present research, of course; nevertheless, the data from these studies force the conclusion that when a global index of relative reading proficiency is the purpose of measurement, such an index may be easily obtained within one minute without using a standardized test.

Fourth, within limits, the difficulty of words to be read does not determine the validity of the data on word reading. Only when students read none of the words is difficulty an important variable. The results presented here illustrate that seldom do even the lowest functioning first grade students fail to read at least one word from a third grade reading passage. Discrimination at high levels of proficiency is less of a problem since performance need not be limited by the number of words presented. If the sample duration is fixed at one minute and students are allowed to read as many words as they can in that period, a functional ceiling on performance does not occur even for third grade reading passages. Whether that would hold true for even simpler passages, however, we do not know.

A Concluding Caveat

We would be remiss in closing this report if we did not acknowledge a potentially major limitation of the research presented here: That is, without careful controls, it is likely that teachers using one minute samples of reading aloud from isolated word lists or basal passages will teach the test rather than use the test to evaluate their teaching. In related research we have already discovered that teachers who are

asked to use isolated word recognition to monitor reading growth assume that what they should do is teach isolated words or reward improved test performance. Nothing about the research reported here supports practice on reading words aloud as an effective approach to improving reading proficiency. To assume so is to act as if practice at taking a patient's temperature is an effective approach to reducing a fever. Just as medical practice has developed procedures for obtaining "vital sign" data as a basis for evaluating physical health, so too are we striving to develop efficient procedures for monitoring educational health (Deno & Mirkin, 1977). Teachers must be taught to distinguish teaching from testing and to use tests to improve teaching.

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Table 1

Means and Standard Deviations on Formative and Criterion Measures of Reading for Resource, Regular, and Combined Groups

Measure	Resource[a]		Regular[b]		Combined[c]	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
SDRT						
Correct	11.33	7.95	19.11	6.14	15.58	7.95
Error	12.67	7.95	4.61	5.70	8.27	7.84
% Correct	47	33	80	25	65	33
Words in Isolation						
Correct	12.13	11.28	29.37	19.30	21.53	18.15
Error	19.38	15.59	7.50	4.43	12.90	12.36
% Correct	37	22	72	20	56	27
Words in Context						
Correct	21.49	16.45	39.06	21.89	31.07	21.26
Error	14.29	11.22	4.69	2.92	9.05	9.12
% Correct	53	26	83	19	69	27
Oral Reading						
Correct	33.28	26.93	76.83	48.43	57.03	45.26
Error	15.47	7.99	9.47	8.27	12.20	8.57
% Correct	59	22	83	20	72	24
Cloze						
Correct	.89	1.48	2.64	2.81	1.84	2.44
Error	3.48	2.60	4.07	2.45	3.80	2.50
% Correct	13	16	30	21	22	21
Word Meaning						
Correct	1.28	1.20	2.04	1.62	1.69	1.47
Error	5.99	2.81	5.54	3.12	5.75	2.95
% Correct	19	15	24	17	21	16
WRMT - Word Identification						
Correct	48.87	29.41	85.06	27.99	68.61	33.62
WRMT - Comprehension						
Correct	11.87	10.64	23.50	9.32	18.21	11.42

[a] N=15.

[b] N=18.

[c] N=33.

Table 2

Correlation Matrix for Mean Correct Rate of Raw Scores on Five Formative Evaluation and Three Standardized Reading Measures for Resource Group (N=15)[a]

	Words in Isolation	Words in Context	Oral Reading	Cloze	Word Meaning	SDRT	WRMT - Wd Ident	WRMT - Comp
Words in Isolation		.95**	.95**	.89**	.68**	.77**	.87**	.81**
Words in Context			.97**	.79**	.66**	.81**	.86**	.76**
Oral Reading				.80**	.68**	.80**	.83**	.67**
Cloze					.46*	.50*	.63*	.48*
Word Meaning						.73**	.76**	.74**
SDRT							.87**	.81**
WRMT-Wd Ident								.90**
WRMT-Comp								

[a]Significance levels of correlations are indicated as follows:
* $p < .05$
** $p < .005$

Table 3

Correlation Matrix for Mean Correct Rate of Raw Scores on Five Formative Measures and Three Standardized Measures for Regular Group (N=18)[a]

	Words in Isolation	Words in Context	Oral Reading	Cloze	Word Meaning	SDRT	WRMT - Wd Ident	WRMT - Comp
Words in Isolation		.96**	.92**	.87**	.90**	.76**	.91**	.83**
Words in Context			.95**	.86**	.87**	.80**	.90**	.84**
Oral Reading				.88**	.81**	.73**	.87**	.82**
Cloze					.78**	.60*	.83**	.82**
Word Meaning						.66*	.77**	.73**
SDRT							.90**	.80**
WRMT-Wd Ident								.86**
WRMT-Comp								

[a]Significance levels are indicated as follows:
*$p < .05$
**$p < .001$

Table 4

Correlation Matrix for Mean Correct Rate of Raw Scores on Five Formative Measures and Three Standardized Measures for Combined Group (N=33)[a]

	Words in Isolation	Words in Context	Oral Reading	Cloze	Word Meaning	SDRT	WRMT - Wd Ident	WRMT - Comp
Words in Isolation		.96**	.92**	.87**	.90**	.76**	.91**	.83**
Words in Context			.95**	.86**	.87**	.80**	.90**	.84**
Oral Reading				.89**	.81**	.73**	.87**	.82**
Cloze					.78**	.60*	.83**	.82**
Word Meaning						.66*	.77**	.73**
SDRT							.90**	.80**
WRMT-Wd Ident								.86**
WRMT-Comp								

[a]Significance levels are indicated as follows:
*p < .05
**p < .001

Table 5

Correlation Matrix of Error Means
on Five Formative Measures and Three Standardized Measures
for Resource Group (N=13)[a]

	SDRT	Words in Isolation	Words in Context	Oral Reading	Cloze	Word Meaning
SDRT		.181	.402	.265	-.189	-.005
Words in Isolation			.818**	.816**	.005	.295
Words in Context				.919**	-.116	.201
Oral Reading					.223	.310
Cloze						.421*
Word Meaning						

[a]Significance levels are indicated as follows:
* $p < .05$
** $p < .01$

Table 6

Correlation Matrix of Error Means
on Five Formative Measures and Three Standardized Measures
for Regular Group (N=18)[a]

	SDRT	Words in Isolation	Words in Context	Oral Reading	Cloze	Word Meaning
SDRT		.123	.637**	.725**	-.561**	-.315
Words in Isolation			.561**	.390*	.058	.408*
Words in Context				.759**	-.441*	.188
Oral Reading					-.511**	-.123
Cloze						.463*
Word Meaning						

[a]Significance levels are indicated as follows:
* $p < .05$
** $p < .01$

Table 7

Correlation Matrix of Error Means
on Five Formative Measures and Three Standardized Measures
for Combined Group (N=33)[a]

	SDRT	Words in Isolation	Words in Context	Oral Reading	Cloze	Word Meaning
SDRT		.371*	.575**	.563**	-.362*	-.091
Words in Isolation			.848**	.664**	-.045	.275
Words in Context				.774**	-.202	.178
Oral Reading					-.205	.081
Cloze						.430**
Word Meaning						

[a]Significance levels are indicated as follows:
* $p < .05$
** $p < .01$

Table 8

Correlation Matrix for Mean Percentage of Raw Scores on Five Formative Measures and Three Standardized Measures for Resource Group (N=15)[a]

	Words in Isolation	Words in Context	Oral Reading	Cloze	Word Meaning	SDRT	WRMT - Wd Ident	WRMT-Comp
Words in Isolation		.88**	.86**	.78**	.60	.81**	.93**	.83**
Words in Context			.96**	.63	.47	.88**	.96**	.83**
Oral Reading				.56	.49	.91**	.94**	.79**
Cloze					.21	.50	.73**	.68*
Word Meaning						.61	.56	.67*
SDRT							.87**	.81**
WRMT-Wd Ident								.90**
WRMT-Comp								

[a]Significance levels of correlations are indicated as follows:
* $p < .005$
** $p < .001$

Table 9

Correlation Matrix for Mean Percentage of Raw Scores in Five Formative Measures and Three Standardized Measures for Regular Group (N=18)[a]

	Words in Isolation	Words in Context	Oral Reading	Cloze	Word Meaning	SDRT	WRMT - Wd Ident	WRMT-Comp
Words in Isolation		.83**	.82**	.77**	.69**	.78**	.90**	.78**
Words in Context			.98**	.81**	.59*	.91**	.89**	.86**
Oral Reading				.76**	.53	.94**	.89**	.78**
Cloze					.74**	.74**	.84**	.81**
Word Meaning						.62*	.76**	.74**
SDRT							.90**	.80**
WRMT-Wd Ident								.86**
WRMT-Comp								

[a]Significance levels of correlations are indicated as follows:
*p < .005
**p < .001

Table 10

Correlation Matrix for Mean Percentage of Raw Scores on Five Formative Measures and Three Standardized Measures for Combined Group (N=33)[a]

	Words in Isolation	Words in Context	Oral Reading	Cloze	Word Meaning	SDRT	WRMT-Wd Ident	WRMT-Comp
Words in Isolation		.90*	.87*	.80*	.58*	.85*	.94*	.86*
Words in Context			.97*	.76*	.50*	.92*	.94*	.89*
Oral Reading				.74*	.51*	.94*	.94*	.94*
Cloze					.55*	.69*	.83*	.79*
Word Meaning						.59*	.64*	.67*
SDRT							.91*	.85*
WRMT-Wd Ident								.91*
WRMT - Comp								

[a]Significance levels of correlations are indicated as follows:
*$p < .001$

Table 11

Raw Score Means and Standard Deviations on the Fourteen Formative Evaluation Measures

	Resource[a]		Regular[b]		Combined[c]	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
PP-3 Isolated Words						
30-second	14.17	9.48	19.33	16.01	23.33	15.60
60-second	24.06	19.54	50.76	23.46	40.08	25.45
PP-6 Isolated Words						
30-second	8.97	7.19	19.41	10.02	15.23	10.30
60-second	19.14	14.39	39.46	20.67	31.33	20.83
3rd Grade Words in Context						
30-second	17.25	8.19	23.61	8.33	21.07	8.77
60-second	33.03	14.84	47.44	16.31	41.68	17.13
6th Grade Words in Context						
30-second	14.25	7.56	21.69	8.91	18.71	9.09
60-second	30.36	13.39	42.07	15.64	37.39	15.73
3rd Grade Oral Reading						
30-second	27.50	16.02	44.70	21.11	37.82	20.86
60-second	60.22	35.26	98.28	47.43	83.06	46.53
6th Grade Oral Reading						
30-second	23.53	13.95	40.93	20.74	33.97	20.09
60-second	52.28	28.26	84.69	41.75	71.72	39.95
Cloze	1.43	1.49	3.85	2.58	2.88	2.50
Word Meaning	5.33	2.10	6.77	3.43	6.19	3.03

[a] N=18.

[b] N=27.

[c] N=45.

Table 12

Correlation Matrix for Mean Correct Rate of Raw Scores on Fourteen Formative Evaluation Measures for the Resource Group Sample (N=18)[a]

	PP-3 Isolated Words		PP-6 Isolated Words		3rd Grade Words in Context		6th Grade Words in Context		3rd Grade Oral Reading		6th Grade Oral Reading			
	30 sec	60 sec	30 sec	60 sec	30 sec	60 sec	30 sec	60 sec	30 sec	60 sec	30 sec	60 sec	Cloze	Word Meaning
PP-3 Isolated Words														
30 sec	.97		.94	.97	.83	.83	.88	.89	.93	.91	.90	.93	.78	.66
60 sec			.95	.96	.77	.77	.87	.82	.88	.89	.88	.92	.75	.59
PP-6 Isolated Words														
30 sec				.96	.80	.82	.90	.87	.85	.89	.88	.90	.80	.67
60 sec					.83	.82	.92	.90	.90	.88	.93	.92	.84	.59
3rd Grade Words in Context														
30 sec						.92	.89	.93	.86	.86	.86	.89	.72	.80
60 sec							.91	.95	.87	.89	.87	.90	.82	.82
6th Grade Words in Context														
30 sec								.94	.88	.87	.92	.93	.84	.73
60 sec									.89	.89	.91	.92	.84	.75
3rd Grade Oral Reading														
30 sec										.96	.90	.95	.80	.66
60 sec											.88	.97	.78	.71
6th Grade Oral Reading														
30 sec												.92	.92	.60
60 sec													.80	.71
Cloze														.50
Word Meaning														

[a] All correlations are statistically significant ($p < .001$).

Table 13

Correlation Matrix for Mean Correct Rate of Raw Scores on Fourteen Formative Evaluation Measures for the Regular Group (N=27)[a]

	PP-3 Isolated Words		PP-6 Isolated Words		3rd Grade Words in Context		6th Grade Words in Context		3rd Grade Oral Reading		6th Grade Oral Reading			
	30 sec	60 sec	30 sec	60 sec	30 sec	60 sec	30 sec	60 sec	30 sec	60 sec	30 sec	60 sec	Cloze	Word Meaning
PP-3 Isolated Words														
30 sec		.95	.95	.94	.80	.83	.87	.84	.89	.91	.89	.92	.86	.59
60 sec			.97	.96	.86	.88	.92	.88	.91	.92	.89	.92	.84	.60
PP-6 Isolated Words														
30 sec				.97	.85	.87	.91	.88	.89	.91	.90	.92	.86	.62
60 sec					.86	.87	.92	.90	.89	.94	.90	.92	.86	.63
3rd Grade Words in Context														
30 sec						.96	.94	.95	.86	.87	.85	.87	.76	.71
60 sec							.95	.96	.87	.88	.86	.88	.81	.72
6th Grade Words in Context														
30 sec								.94	.90	.91	.90	.92	.85	.68
60 sec									.84	.87	.87	.86	.81	.75
3rd Grade Oral Reading														
30 sec										.97	.93	.96	.86	.49
60 sec											.95	.98	.86	.57
6th Grade Oral Reading														
30 sec												.97	.86	.55
60 sec													.87	.56
Cloze														.50
Word Meaning														

[a] All correlations are statistically significant ($p < .001$).

Table 14

Correlation Matrix for Mean Correct Rate of Raw Scores on Fourteen Formative Evaluation Measures for the Combined Group (N=45)[a]

	PP-3 Isolated Words		PP-6 Isolated Words		3rd Grade Words in Context		6th Grade Words in Context		3rd Grade Oral Reading		6th Grade Oral Reading			
	30 sec	60 sec	30 sec	60 sec	30 sec	60 sec	30 sec	60 sec	30 sec	60 sec	30 sec	60 sec	Cloze	Word Meaning
Words														
		.95	.94	.94	.80	.83	.87	.84	.89	.91	.89	.92	.86	.59
			.96	.96	.86	.88	.92	.88	.91	.92	.89	.92	.84	.60
Words														
				.97	.85	.87	.91	.88	.89	.91	.90	.92	.86	.62
					.86	.87	.92	.90	.89	.94	.90	.92	.86	.63
s in Context														
						.96	.94	.95	.86	.87	.85	.87	.76	.71
							.95	.96	.87	.88	.86	.88	.81	.72
s in Context														
								.94	.90	.91	.90	.92	.85	.68
									.84	.87	.87	.86	.81	.75
Reading														
										.97	.93	.96	.86	.49
											.95	.98	.86	.57
Reading														
												.97	.86	.55
													.87	.56
														.50

ons are statistically significant ($p < .001$).

Table 15

Raw Score Means and Standard Deviations on Four Formative Evaluation and Four Standardized Measures

	Resource[a]		Regular[b]		Combined[c]	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
3rd grade Isolated Words	9.17	13.39	47.37	32.56	34.06	32.89
6th grade Isolated Words	8.09	9.71	36.74	27.96	26.76	26.95
Oral Reading	31.96	25.31	92.54	51.10	71.42	52.44
Cloze	.57	.84	4.14	3.69	2.89	3.67
PIAT	23.83	9.88	39.07	11.53	33.76	13.13
SAT - Phonetic Anal	4.96	2.71	9.00	5.21	7.59	4.88
SAT - Literal Comp	10.52	8.92	22.74	7.85	18.49	10.06
SAT - Inferential Comp	8.78	7.39	20.56	8.28	16.46	9.74

[a] N=23.

[b] N=43.

[c] N=66.

Table 16

Correlation Matrix for Mean Correct Rate of Raw Scores on Four Formative Evaluation and Four Standardized Measures for Combined Group (N=66)[a]

	Isolated Words 3rd Grade	Isolated Words 6th Grade	Oral Reading	Cloze	PIAT	SAT Phonetic Anal	SAT Literal Comp	SAT Inferential Comp
3rd Grade Isolated Words		.96	.90	.84	.76	.68	.71	.75
6th Grade Isolated Words			.87	.87	.78	.71	.68	.74
Oral Reading				.80	.76	.71	.78	.80
Cloze					.76	.76	.67	.71
PIAT						.67	.82	.84
SAT - Phonetic Anal							.64	.68
SAT - Literal Comp								.95
SAT - Inferential Comp								

[a]All correlations are statistically significant ($p < .001$).

Table 17

Correlation Matrix for Mean Correct Rate of Raw Scores on Four Formative Evaluation and Four Standardized Measures for Regular Group (N=43)[a]

	Isolated Words 3rd Grade	Isolated Words 6th Grade	Oral Reading	Cloze	PIAT	SAT Phonetic Anal	SAT Literal Comp	SAT Inferential Comp
3rd Grade Isolated Words	.95	.86	.80	.72	.66	.61	.66	
6th Grade Isolated Words		.83	.85	.77	.70	.61	.67	
Oral Reading			.75	.69	.70	.73	.74	
Cloze				.76	.75	.66	.67	
PIAT					.62	.74	.78	
SAT - Phonetic Anal						.66	.67	
SAT - Literal Comp							.93	
SAT - Inferential Comp								

[a]All correlations are statistically significant ($p < .001$).

Table 18

Correlation Matrix for Mean Correct Rate of Raw Scores on Four Formative Evaluation and Four Standardized Measures for Resource Group (N=23)

	Isolated Words 3rd Grade	Isolated Words 6th Grade	Oral Reading	Cloze	PIAT	SAT Phonetic Anal	SAT Literal Comp	SAT Inferential Comp
3rd Grade Isolated Words		.95**	.86*	.65**	.44*	.12	.63**	.61**
6th Grade Isolated Words			.84	.55*	.40*	.12	.60**	.65**
Oral Reading				.72	.55	.17	.70**	.67**
Cloze					.58*	.27	.71**	.61**
PIAT						.48*	.74**	.72**
SAT-Phonetic Anal							.33	.38*
SAT-Literal Comp								.92**
SAT-Inferential Comp								

*Reliable ($p < .05$)
**Reliable ($p < .001$)

Table 19

Comparative Validity Coefficients for Oral Reading

Measure	Resource[a]	Regular[b]	Combined[c]
3rd grade Isolated Words	.86	.86	.90
6th grade Isolated Words	.83	.83	.87
Cloze	.71	.74	.80
PIAT	.55	.69	.76
SAT-Phonetic Analysis	.17	.70	.71
SAT-Literal Comp	.70	.73	.78
SAT-Inferential Comp	.67	.74	.80

[a] N=23.

[b] N=43.

[c] N=66.

Table 20

Grade Level Performance on the Formative Measures for the Combined Samples Across All Three Studies

Measure		Grade 1	2	3	4	5	6	Average
6th Grade Isolated Words	$\bar{X}$	13.13	15.62	23.43	31.78	36.49	47.11	26.99
	SD	17.14	14.98	19.80	19.47	24.11	33.98	23.46
	N	18	26	33	26	27	14	144
3rd Grade Isolated Words	$\bar{X}$	20.31	20.50	34.69	41.46	43.70	55.64	36.50
	SD	26.23	21.80	30.02	24.88	30.10	37.03	30.12
	N	13	17	24	23	20	14	111
6th Grade Oral Reading	$\bar{X}$	35.92	48.29	69.01	80.09	73.32	71.00	65.51
	SD	40.53	37.55	39.10	36.30	51.13	37.81	42.62
	N	9	13	15	19	17	5	78
3rd Grade Oral Reading	$\bar{X}$	48.65	54.38	69.42	88.30	79.05	115.46	76.14
	SD	54.99	42.12	46.44	45.18	39.08	58.98	50.24
	N	13	17	24	23	20	14	111
Cloze	$\bar{X}$	1.33	1.67	7.21	3.29	3.03	6.12	2.89
	SD	2.27	1.99	2.33	2.81	3.06	5.04	3.23
	N	13	17	24	23	20	14	111
Word Meaning	$\bar{X}$	2.28	1.86	3.04	6.73	4.81	6.93	4.29
	SD	3.62	2.09	2.11	3.41	2.57	2.93	3.34
	N	9	13	15	19	17	5	78

Table 21

Grade Level Performance on the Formative Measures for the Regular Class Samples Across all Three Studies

Measure		Grade 1	2	3	4	5	6	Average
6th Grade Isolated Words	$\bar{X}$	15.47	22.71	33.64	41.45	52.12	61.10	36.07
	SD	17.93	15.19	18.71	16.89	20.54	29.87	24.31
	N	15	16	18	14	15	10	88
3rd Grade Isolated Words	$\bar{X}$	22.00	30.14	53.29	54.35	61.75	72.50	48.68
	SD	26.65	21.58	26.29	18.07	24.44	29.34	29.25
	N	12	11	12	13	12	10	70
6th Grade Oral Reading	$\bar{X}$	45.24	63.62	83.48	94.45	125.55	78.83	81.54
	SD	41.65	35.40	39.08	32.22	50.29	47.72	44.17
	N	7	9	9	11	6	3	45
3rd Grade Oral Reading	$\bar{X}$	52.46	72.95	93.83	111.92	101.58	140.05	94.75
	SD	55.62	38.66	42.79	35.47	32.97	48.18	49.44
	N	12	11	12	13	12	10	70
Cloze	$\bar{X}$	1.44	2.30	3.81	4.67	4.47	7.93	4.03
	SD	2.34	2.18	2.25	2.66	3.14	4.86	3.50
	N	12	11	12	13	12	10	70
Word Meaning	$\bar{X}$	2.85	2.31	3.12	7.96	6.54	7.89	4.87
	SD	3.97	2.32	1.52	3.52	2.88	1.92	3.67
	N	7	9	9	11	6	3	45

Table 22

Grade Level Performance on the Formative Measures for the LD Program Samples Across all Three Studies

Measure		Grade 1	2	3	4	5	6	Average
6th Grade Isolated Words	$\bar{X}$	1.40	4.28	11.18	20.49	16.95	12.13	12.72
	SD	.72	2.55	13.27	16.32	9.35	6.41	12.52
	N	3	10	15	12	12	4	56
3rd Grade Isolated Words	$\bar{X}$	0	2.83	16.08	24.70	16.63	13.50	15.71
	SD	0	3.37	20.92	22.93	11.11	6.56	17.80
	N	1	6	12	10	8	4	41
6th Grade Oral Reading	$\bar{X}$	3.30	13.80	47.32	60.35	44.84	59.25	43.64
	SD	.99	2.69	29.93	33.70	19.73	26.52	28.87
	N	2	4	6	8	11	2	33
3rd Grade Oral Reading	$\bar{X}$	3.00	20.33	45.00	57.60	45.25	54.00	44.37
	SD	0	23.19	37.12	38.20	16.16	32.56	32.90
	N	1	6	12	10	8	4	41
Cloze	$\bar{X}$	0	.50	.61	1.50	.88	1.58	.94
	SD	0	.84	.81	1.88	1.02	.96	1.23
	N	1	6	12	10	8	4	41
Word Meaning	$\bar{X}$	.30	.83	2.92	5.04	3.86	5.50	3.49
	SD	.42	1.09	2.97	2.58	1.90	4.48	2.68
	N	2	4	6	8	11	2	33

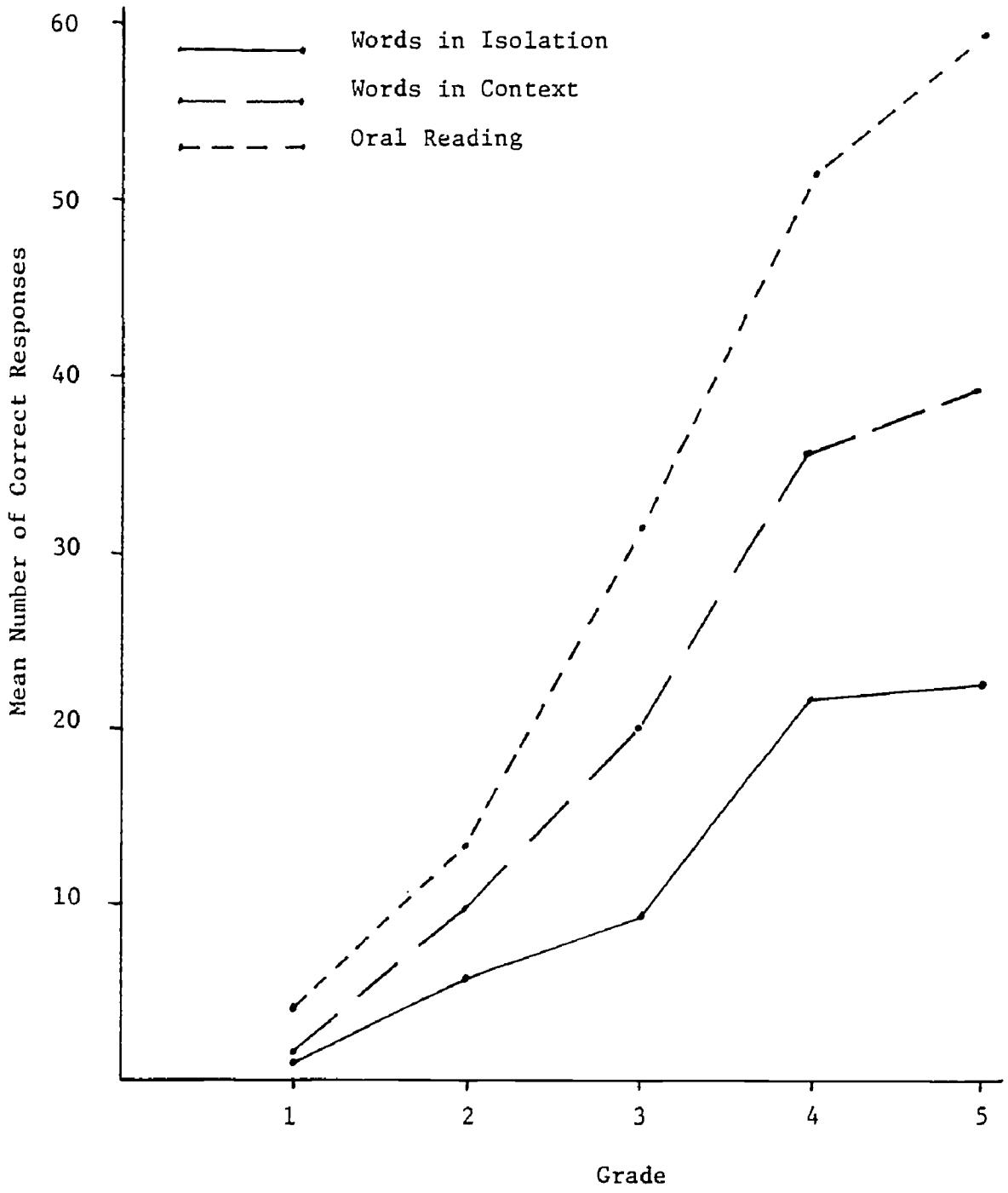

Figure 1. Mean number of correct responses in one-minute timing on three formative measures by Resource Subjects at each grade level.

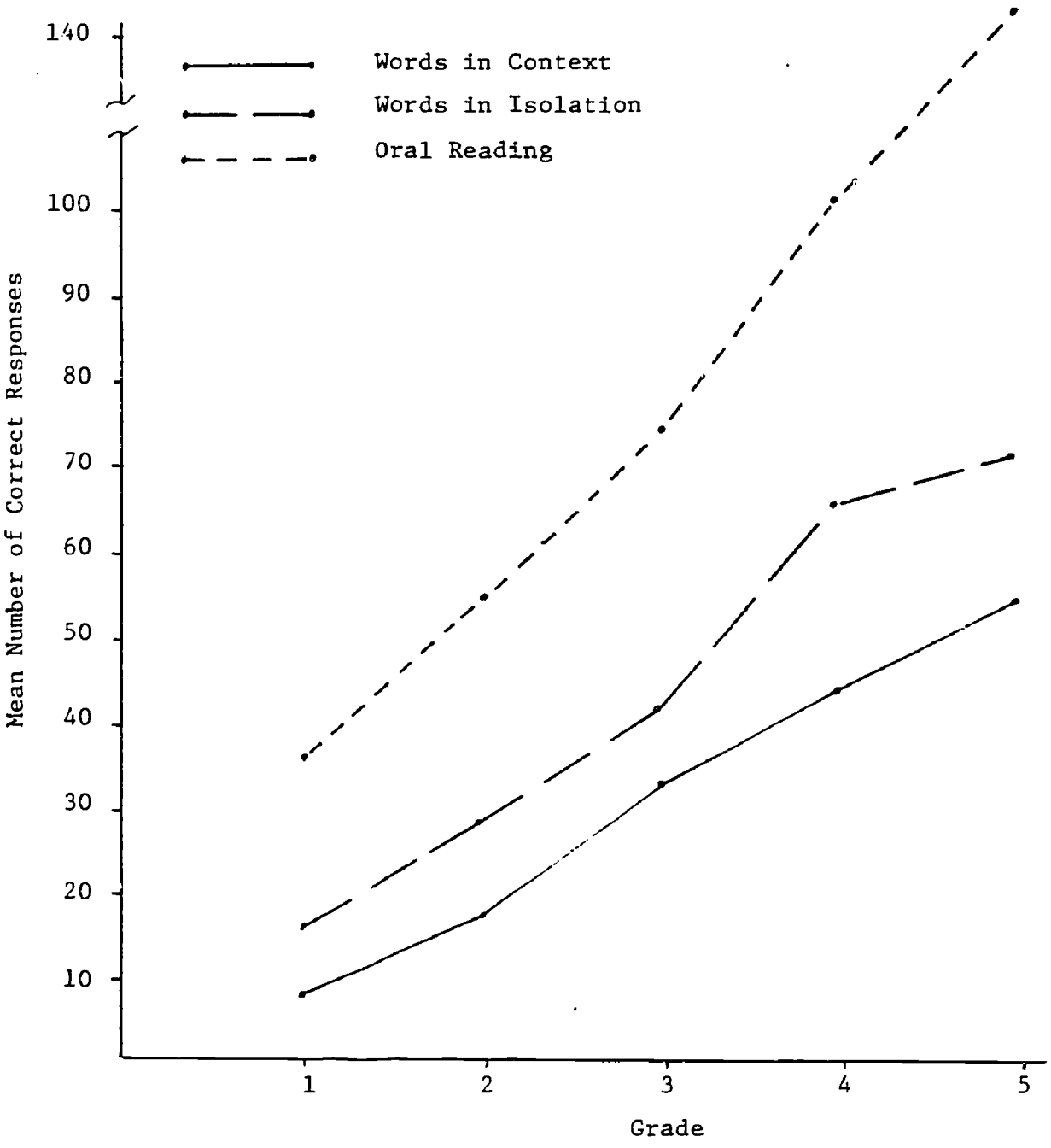

Figure 2. Mean number of correct responses in one-minute timing on three formative measures by Regular Subjects at each grade level.

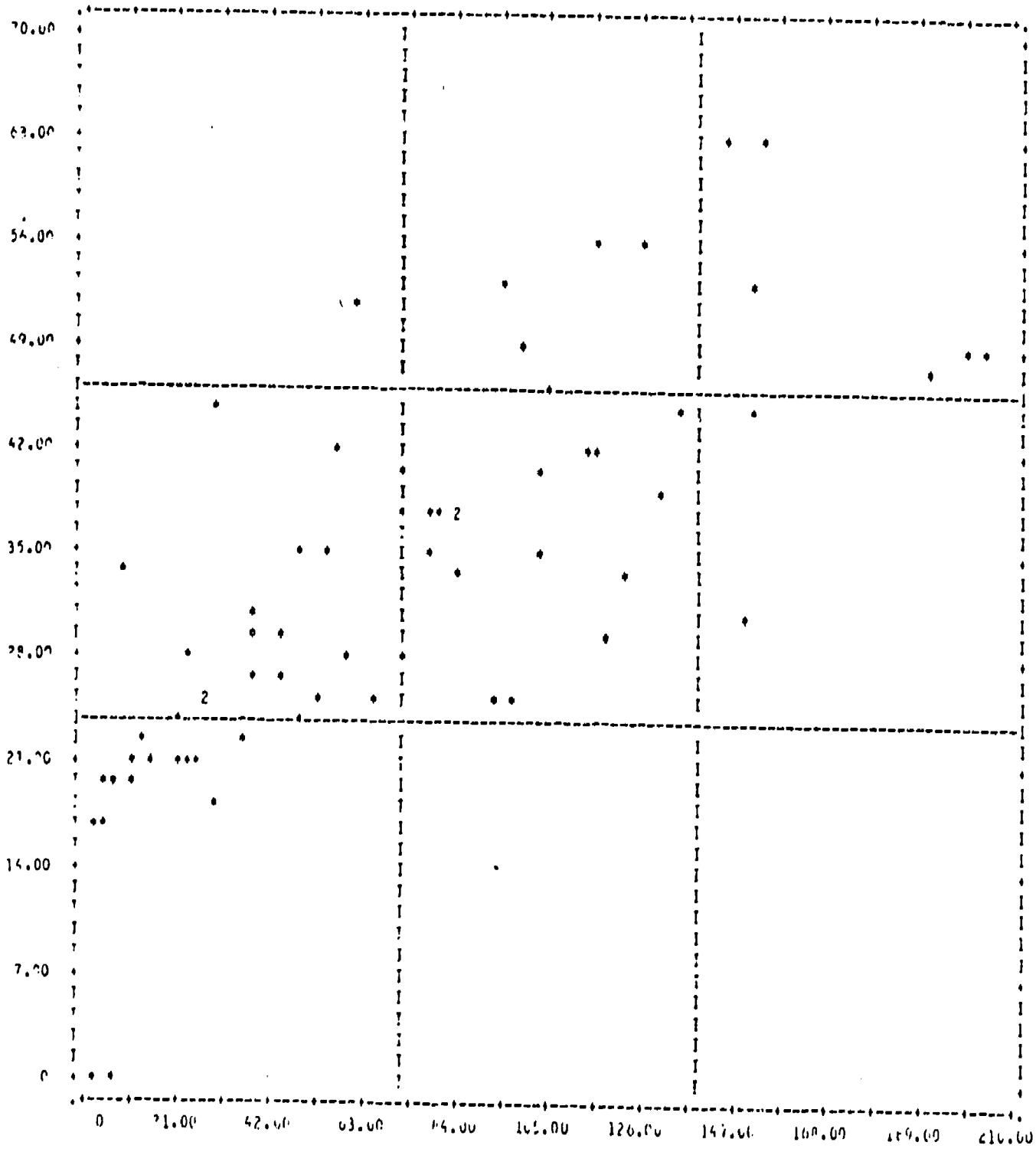

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Figure 3. Scattergram illustrating the relationship between Oral Reading Score and Subtest Total from PIAT for 66 subjects.

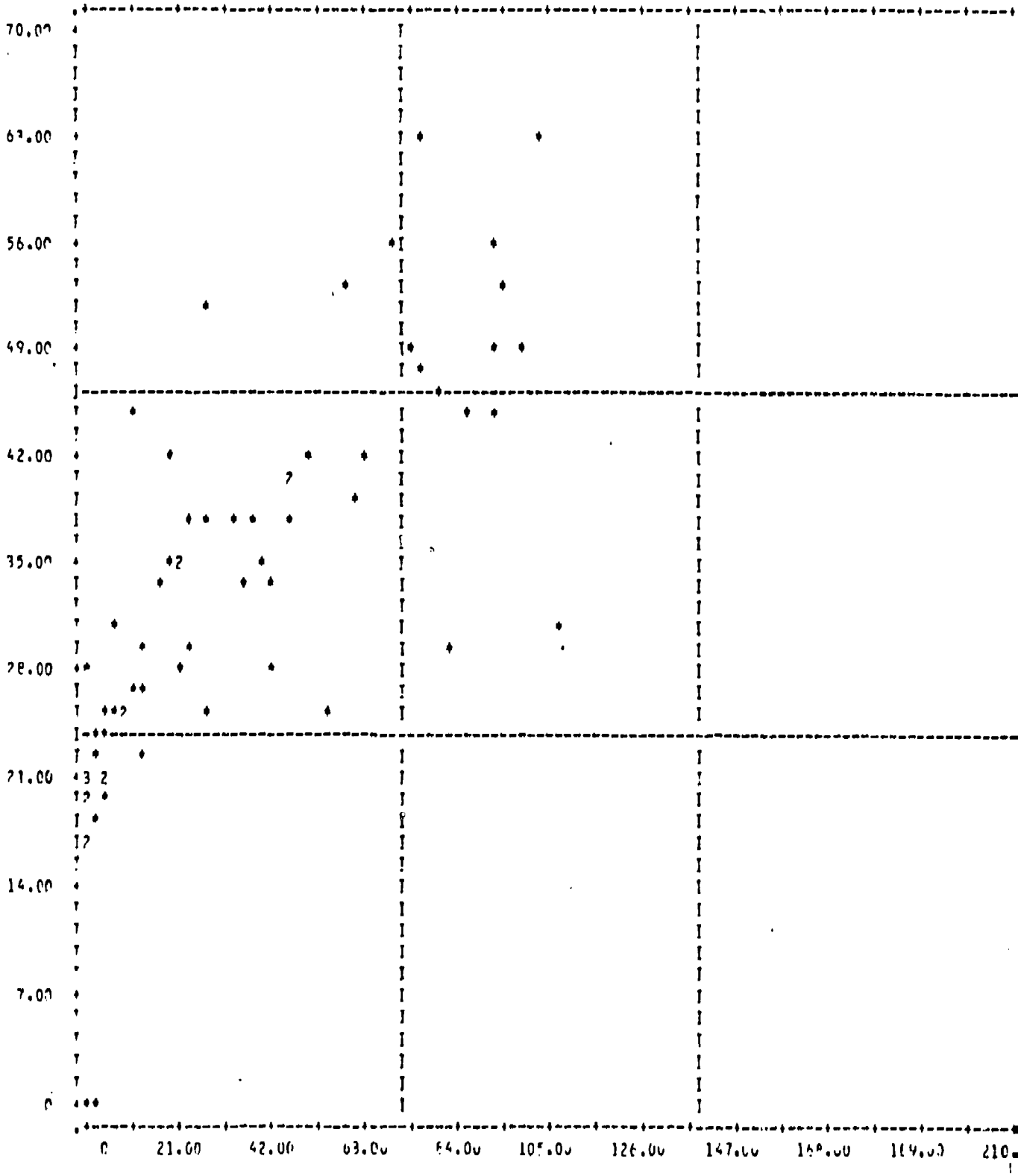
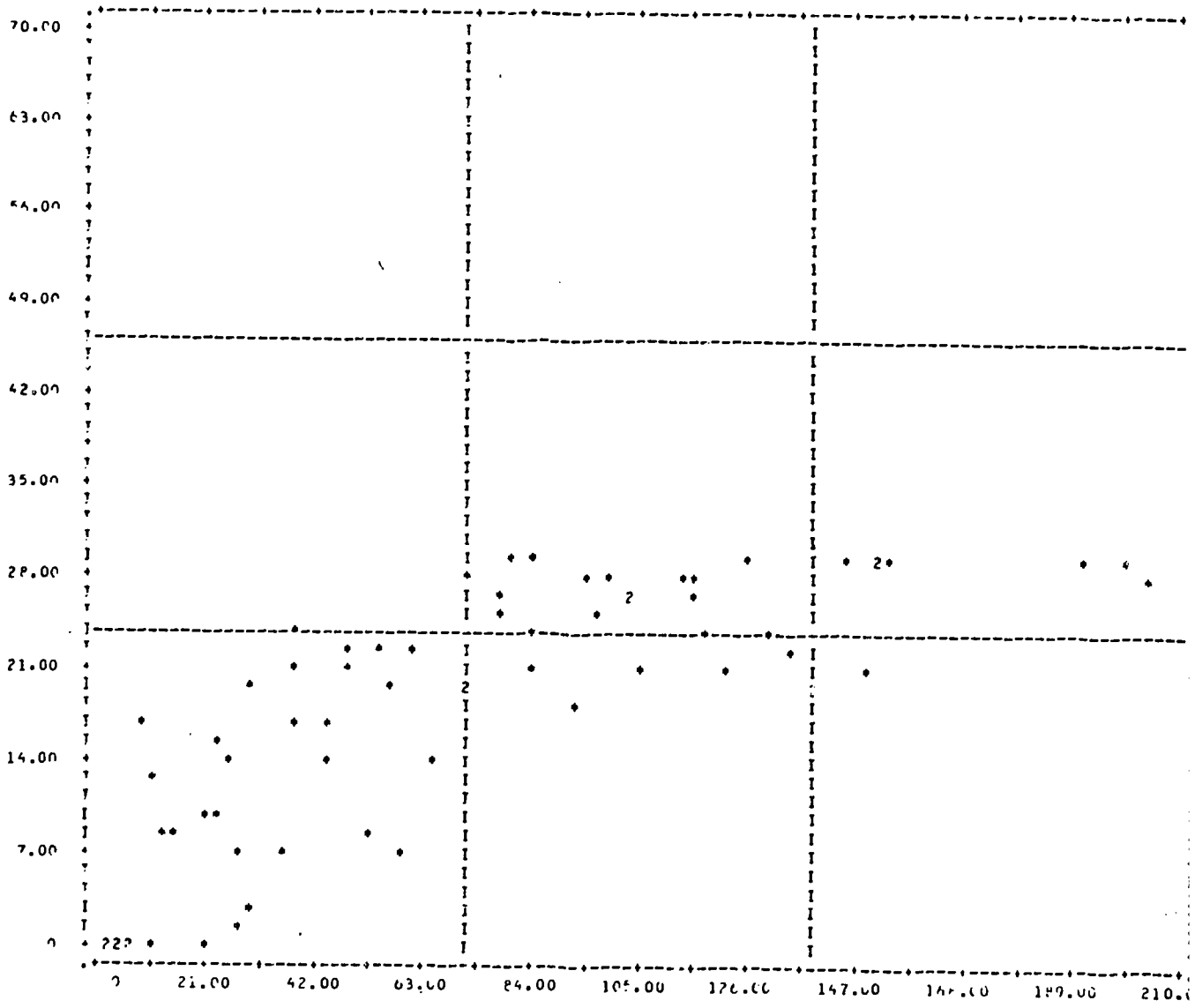


Figure 4. Scattergram illustrating the relationship between 3rd Grade Isolated Word Score and Subtest Total from PIAT for 66 subjects.



Literal Comprehension Subtest Total from SAT

Oral Reading

Figure 5. Scattergram illustrating the relationship between Oral Reading Score and Literal Comprehension Subtest Total from SAT for 66 subjects.

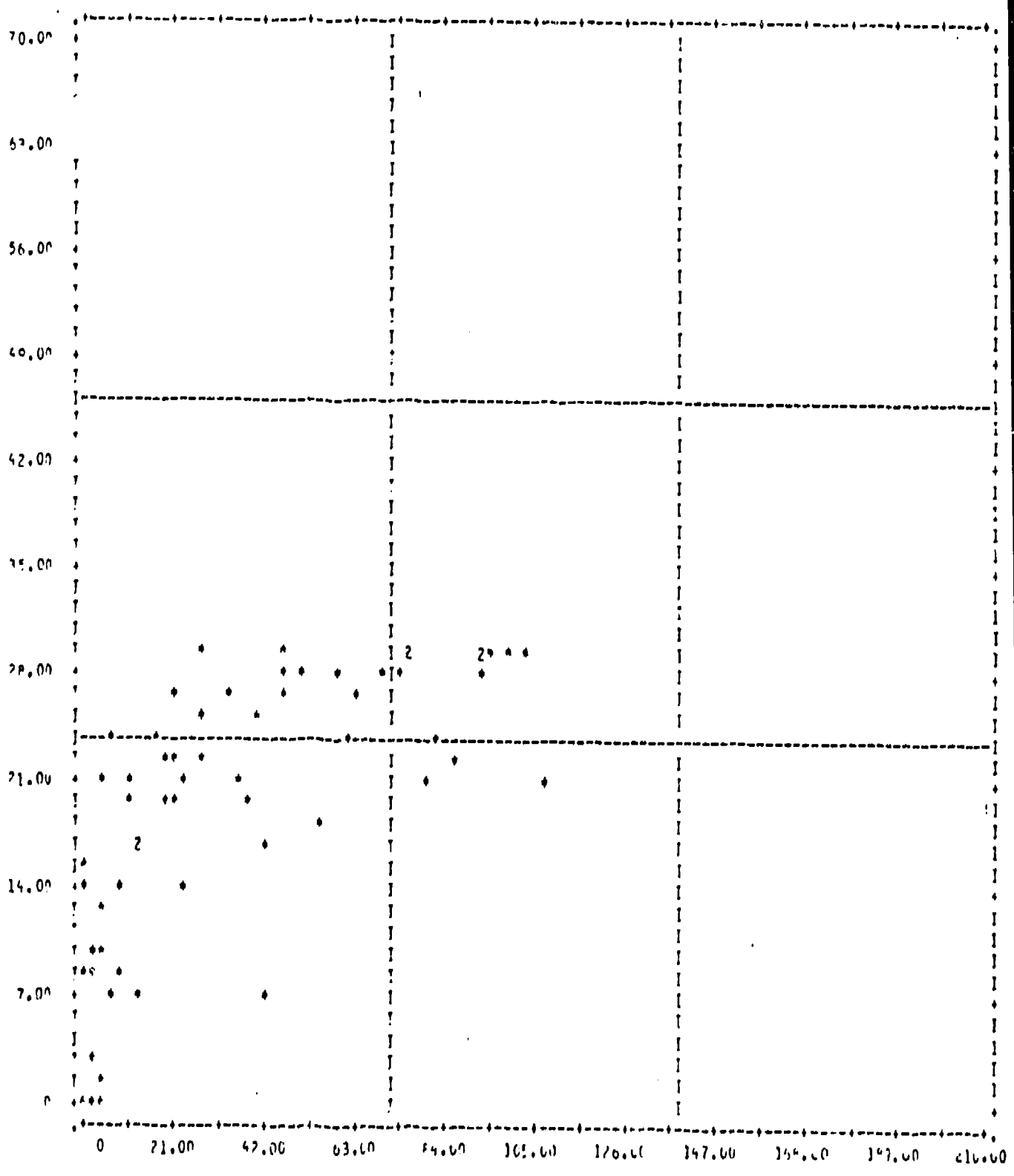


Figure 6. Scattergram illustrating the relationship between 3rd Grade Isolated Word score and Literal Comprehension Subtest from SAT for 66 subjects.

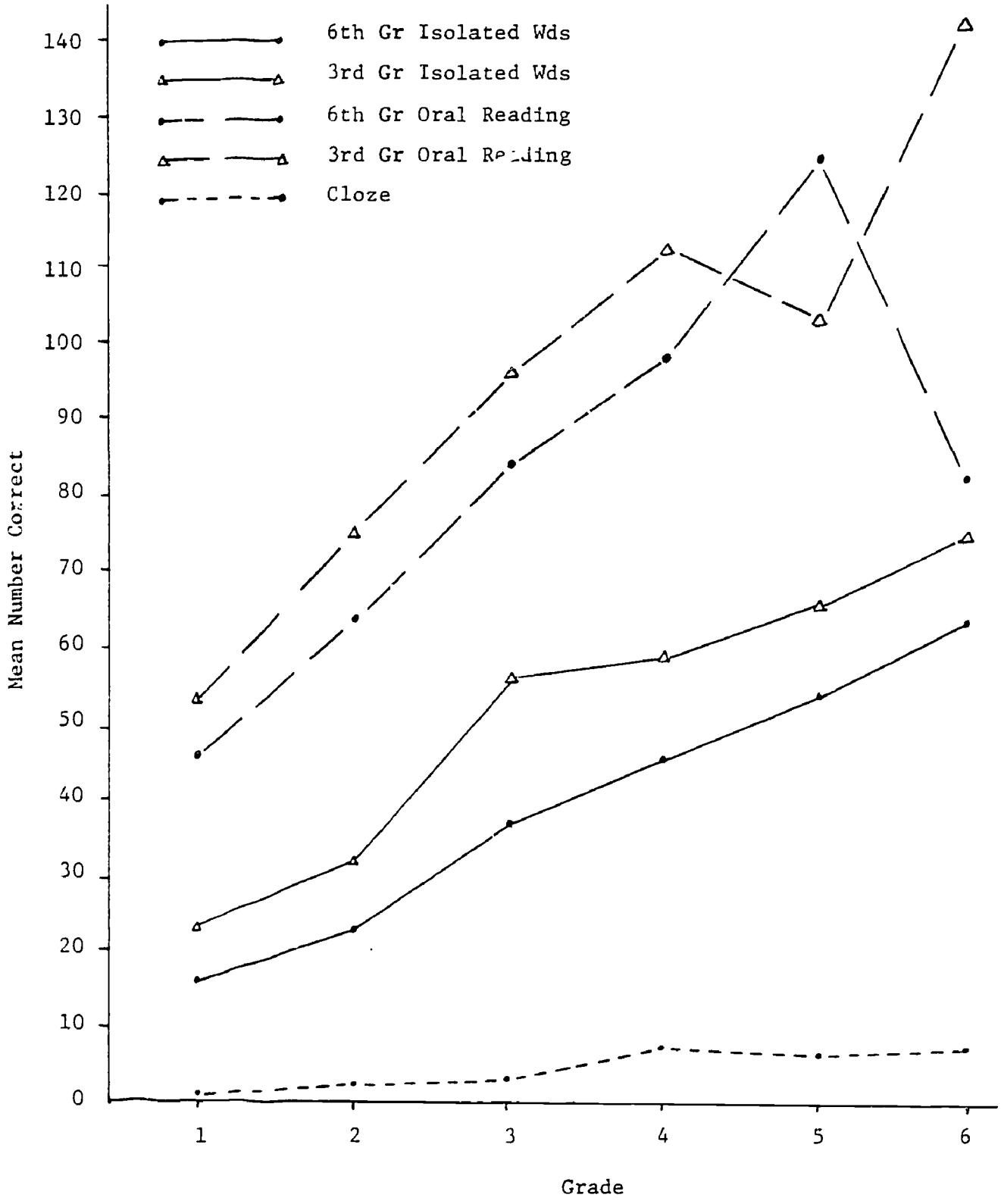


Figure 7. Mean performance by grade for Regular Class students on the formative measures.

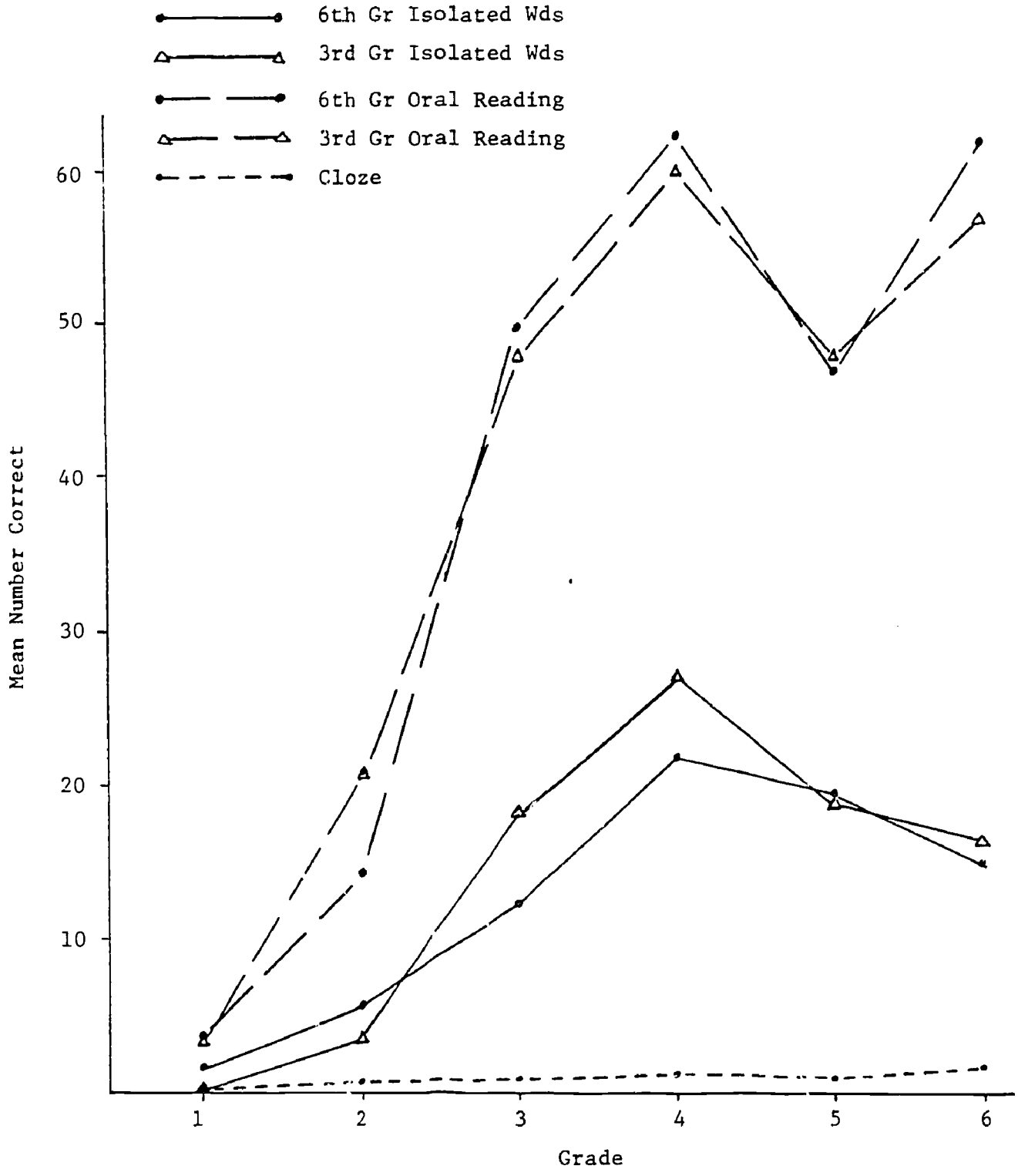


Figure 8. Mean performance by grade for Resource Program students on the formative measures.

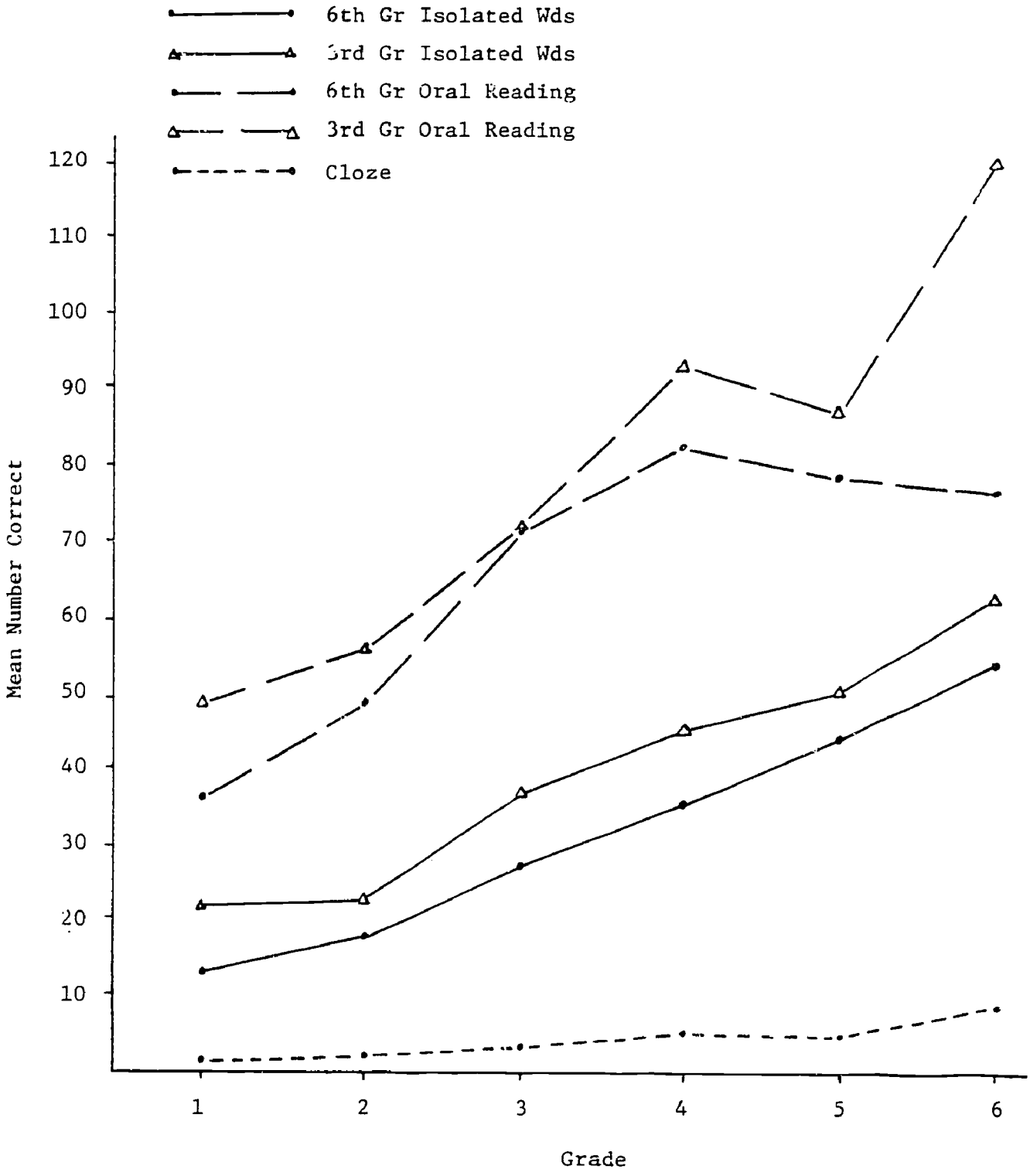


Figure 9. Mean performance by grade for the Combined sample on the formative measures.

APPENDIX A

Study I Words in Isolation Lists

ceiling	occur	gleam	hostile	secretary
finger	trip	stew	clover	pillar
dense	have	resolve	different	command
cage	pound	library	talk	sport
built	between	minister	girl	fern
button	industry	goal	right	they
golden	kept	brim	feet	trout
porter	bike	yet	kindle	shield
twist	rose	concrete	discussion	tunnel
brother	brave	fringe	register	barn
green	dungeon	familiar	require	pump
grind	pot	sample	modern	queer

am	deliberate	tie	ancient	start
notion	pet	coat	everyone	gym
shallow	halt	fish	pickle	pony
eastern	ruin	collect	disturb	never
estimate	prepare	sympathetic	fall	suspect
connect	cage	journal	marvelous	hid
honest	brain	at	oppose	injure
beyond	lamb	brief	robin	victory
grab	mirror	much	blew	interesting
kitty	farewell	chase	except	cost
hatred	condemn	under	solution	garbage
deep	fork	deal	value	automatic

words in isolation

List 3

forgotten	blue	what	got	shout
constant	had	an	saint	snow
buy	nice	person	saddle	front
man	ferry	rid	explorer	avenue
ourselves	pistol	show	chosen	pardon
bishop	central	space	robber	sway
plump	aim	scare	humble	beef
cluck	cold	summit	fan	been
lance	slam	direction	can	license
mysterious	prophecy	underground	rock	yonder
airplane	hurt	snare	mattress	stew
penetrate	scramble	wretched	fill	response

APPENDIX B

Study I Words in Context Passages

Tom's mind was made up now. He was gloomy and desperate. He was a forsaken friendless boy, he said; nobody loved him; when they found out what they had driven him to, perhaps they would be sorry; he had tried to do right and get along, but they would not let him; since nothing would do them but to be rid of him, let it be so; and let them blame him for the consequences - why shouldn't they? What right had the friendless to complain? Yes, they had forced him to it at last; he would lead a life of crime. There was no choice.

By this time he was far down Meadow Lane, and the bell for school to "take up" tinkled faintly upon his ear. He sobbed, now, to think he should never, never hear that old familiar sound any more - it was very hard, but it was forced on him; since he was driven out into the cold world, he must submit - but he forgave them. Then the sobs came thick and fast.

Just at this point he met his soul's sworn comrade, Joe Harper - hard-eyed, and with evidently a great and dismal purpose in his heart. Plainly, here were "two souls with but a single thought." Tom, wiping his eyes with his sleeve, began to blubber out something about a resolution to escape from hard usage and lack of sympathy at home by roaming abroad into the great world never to return, and ended by hoping that Joe would not forget him.

But it transpired that this was a request which Joe had just been going to make of Tom and had come to hunt him up for that purpose. His mother had whipped him for drinking some cream which he had never tasted and knew nothing about; it was plain that she was tired of him and wished him to go; if she felt that way, there was nothing for him to do but succumb; he hoped she would be happy, and never regret having driven her poor boy out into the unfeeling world to suffer and die.

As the two boys walked sorrowing along, they made a new compact to stand by each other and be brothers and never separate till death relieved them of their troubles. Then they began to lay their plans. Joe was for being a hermit, and living on crusts in a remote cave, and dying at last of cold and want and grief; but after listening to Tom, he conceded that there were some conspicuous advantages about a life of crime, and so he consented to be a pirate.

Three miles below St. Petersburg, at a point where the Mississippi river was a trifle over a mile wide, there was a long, narrow, wooded island, with a shallow bar at the head of it, and this offered well as a rendezvous. It was not inhabited; it lay far over toward the further shore, abreast a dense and almost wholly unpeopled forest. So Jackson's Island was chosen. Who were to be the subjects of their piracies was a matter that did not occur to them. Then they hunted up Huckleberry Finn, and he joined them promptly, for all careers were one to him; he was indifferent. They presently separated to meet at a lonely spot on the river bank two miles above the village at the favorite hour - which was midnight. There was a small log raft there which they meant to capture. Each would bring hooks and lines, and such provision as he could steal in the most dark and mysterious way - as became outlaws.

There are three main types of veterinary medicine, and I was lucky to be exposed to all three as a child. In small animal practice, a veterinarian cares mainly for pets. An equine practice consists of racehorses and horse breeding farms. And a large animal practice includes cattle and large farm animals. I got to know all three because my parents had a farm on which they bred horses. Later they began breeding and selling dogs. And when they bought a new farm that had been a dairy farm, my mother decided it should be a dairy farm again and she bought a herd of cows.

Our veterinarian was a close friend of the family, but when he came to treat sick animals, my mother wouldn't allow us children to watch, since sick animals are not on their best behavior, and she was afraid we'd be hurt. Since I wasn't able to see the doctor make the animals well, what he did had an element of mystery. I wanted to be able to do such things too, and would tell anyone who asked that I wanted to be a veterinarian.

I would go to the veterinary clinic on Saturdays and help out, just to be around. As I got older, I was able to work there in the summers as a helper—getting things ready for surgery, cleaning kennels, and working as a receptionist. As I learned more about veterinary medicine, I was as sure as ever that I wanted to study it, so I took all the science courses I could in high school. During my junior year my parents helped me look for a college. I went to visit one in my home state first, but the man who interviewed me there tried to discourage me. He didn't think women should try to be veterinarians because he felt no one would hire them. This was nonsense, but I didn't argue with him since I thought that a school which allowed such an attitude in its staff would be a terrible place to study.

The next school I inquired at had an entirely different outlook. I was told that everything depended on my grades in the first year of school - so I made sure they were good.

As I studied, I remained as interested in animals as before, but I became even more interested in medicine. I wanted to specialize in surgery. I found that in small animal practice I could use the more advanced surgical techniques I was learning. So that's what I chose for my special field.

After graduation, I soon found a place with a veterinary clinic. There were several other veterinarians on the staff and we worked from eight to six, and took our turns being on call for emergencies. When my daughter was born, I began to limit my work to special surgery for a while. This allowed me to work at prearranged times, and also let me do only the work that interested me most of all.

Some people have shown surprise when they see that the doctor is a woman. When I start working with their animals, however, they have confidence in me. In a clinic, it is gratifying to know that people request that I be the one to take care of their pets.

There are some special considerations in working with animals. Just like a baby doctor, you are working with something that cannot tell you how it feels. You have to rely on signs of illness and laboratory tests. A sick animal is not going to be itself, and when it finds itself in strange surroundings at the veterinary clinic it will be afraid. If you have an abrupt manner, you will turn that animal's nervousness into defensive biting. I would never think of approaching an animal without speaking to it. Though they don't understand the words, animals can tell by the tone of your voice how you feel about them, and whether you want to help or harm them. You must also know how to interpret an animal's behavior. They give you signs too. There are very few dogs that won't growl before they try to bite, for example. And a person who is afraid of animals is going to get bitten more often than someone who is not.

The town may be one of the human-built towns, string out like knots that tie together a fishnet of country roads.

Or the town may be deep in the forest. Its exact location may be a bog, or a cave, or a small hill, or a hollow log.

A dead log may, in fact, be rich with life. Here a thousand varied creatures live, making up a community. In some brisk autumn dawn, these log-dwellers stir. Black crickets and green-gold beetles search busily for food. The last wildflowers of the year strain toward the dwindling sun. A crab spider scurries out of the range of a passing lizard, back to its web.

Within a hive in the log, an aging queen of bees is already in winter sleep, full of the eggs she will lay in the spring. A caterpillar wraps itself carefully into a cocoon. And the log rot gives slow growth to living molds and mosses.

In the burrow formed when the falling oak tore itself from the earth, a chipmunk family breakfasts on a windfall of seeds and berries.

This is the Logtown community. Here a toad shares citizenship with a toadstool. The redbud is neighbor to a green snake curled against the warmth of the decaying log. Countless other creatures live here that are visible only through a magnifying lens.

From the eye level of an insect, this community bustles with life. Like the human community, it has its share of quarrels, its small tragedies, its daily rhythm of food-gathering, resting, mating, homemaking.

The inhabitants of the log are not as separate as they may seem. They are each and all members of a real community, bound to one another in countless ways. Their town has a clear-cut form and pattern.

The forest is filled with such towns, all parts of the wider woodland community.

And just as there are towns in the forest, so there are cities in the sea and villages on the prairie. Of all the communities on this planet, only the smallest number is peopled by human beings.

A wide range of animals may share lightless lives in the never ending darkness of a deep cave - all of them whitish and blind. Strange bedfellows may be found living in a sea sponge. An interesting group of creatures may make their home toegther on some rocky crag. The communities in the rain forest harbor a rich variety of living things. And still another type of community is the tiny sea island where assorted beings live in the shadow of a smoldering volcano.

Wherever such wildlife communities appear, they stir the same haunting questions: Who and how and why? These towns in nature are webbed with a thousand mysteries.

But the questions are not idle ones for human beings to ask. Our own lives are woven deeply into the answers.

Nature withheld few secrets from the American poet-naturalist Henry David Thoreau. He was a Harvard graduate, class of 1837. Some of his classmates went into law, others into the ministry. Thoreau took to the woods.

"Many a forenoon have I stolen away," he recounted, "preferring to spend thus the most valued part of the day; for I was rich, if not in money, in sunny hours and summer days, and spent them lavishly."

He described himself as a self-appointed inspector of rainstorms, surveyor of forest paths, and keeper of the wildstock. He roamed silently through the woods. His pockets bulged with the gear of the naturalist - a spyglass, a jackknife, twine, and a small microscope. He carried an old music book for pressing plants, and a notebook in which he captured the sights and sounds of the wildlife in soaring poetry or in singing prose.

APPENDIX C

Study I Oral Reading Passages

From the rocky bank of the small, swift stream at the bottom of the canyon, the cliff rose up, straight as a wall for nearly seven hundred feet into the sky. About sixty feet below the rimrock at the top, there was a shelf that thrust out over the empty air for ten feet and ran along the face for twenty. Near one end of it there was a cave four feet wide and six deep. A person kneeling could just about move around in it. From this cave and the shelf there was a wide view of the canyon, across it over the lower ridge on the other side, and beyond to the Colorado plain, fading off into the haze to the east.

In the middle of the shelf there was a golden eagle's nest. It was made of criss-crossed sticks and brush and was covered on the outside with gray-green moss that blended into the gray rock of the cliff face.

There were two young eagles in the nest, one much larger than the other. This was the female. She would always be a third larger than her brother, after the manner of birds of prey. They were both about ready to fly. The crown and hackle feathers on the male's head were dark and would grow paler as he matured. The female's were already dark gold and gleamed in the sun.

They had been quiet for a time, lying together in the nest. But presently the female, whom we shall call Kira, began to grow restless. She stood, bowed her bright head, and stretched the great seven-foot wings up over her back. After she folded them again, she looked at her brother and decided to bedevil him. She often did this, and he knew he would be roughly handled.

Often you read a group of paragraphs about some subject that your class will discuss soon. After you have done such reading, do you see clearly how the important points in that article are related to one another? When the time for class discussion comes, can you remember and state those points well? Making a good outline of such an article can help you do these things.

To begin making a good outline of an article that you need to study well, first look to see whether the article has a title. If it does, you can use that title as the title for your outline. If the article has no title, read all the paragraphs quickly to decide what one thing they all talk about. Then make a title of your own which names that one thing.

Try now to decide on a title for the article that follows:

On many pages in a newspaper, you can see large advertisements that are often illustrated and that vary in size from a few square inches to one or more pages. These advertisements, called display ads, are of two kinds. One kind, the local display ads, advertise the merchandise and services of different businesses in the community which the newspaper serves. Thus department store ads may tell about clothing available at those stores, describe household furnishings on sale there, or point out advantages of appliances which the stores carry. Ads about restaurants may describe special meals to be served in those places or feature types of entertainment to be presented there. Bank ads may explain services which those institutions offer. Usually the theater adverstisements in a newspaper are local display ads.

Some of the largest local display ads in a newspaper are those which supermarkets place there. Usually these ads show prices of foods including meats, vegetables, fruit, canned goods, and bakery products.

It was a long journey, with the light draining out of the sky and the forest seeming to press closer. I stumbled once and fell and got a smack across the shoulders from a club to rouse me. I wondered what awaited us at the end of the trek but was too numb to bother much. The nagging ache in my belly was almost lost in a need to lie down and forget everything.

Then as we rounded a bend, there was a light ahead. I saw a fire, a huge blaze crackling against the dark screen of trees. I could hear voices as well. Our savage guides called out and were greeted in return. They pushed us forward and we stood, blinking, in the glare.

It was difficult to tell how many there were in this new band, but more than a score, I thought. They were all wearing trousers and shirts made from green cloth. Their faces, when they looked at us, seemed to show more contempt than curiosity.

Then a voice called, "Bring them over here. Let me have a look at them."

But the voice was surprising. It had a city accent. We were taken round the campfire to where a man sat, cross-legged, on the ground. He rose to his feet, and I saw that he was very tall, well over six feet, with a curly beard touched in places with white, and a big nose. As he stared at us, unsmiling, I felt the last of my strength draining out of my legs.

"City boys," he said. The contempt was very plain. "Which city?"

He was looking at me and I told him, "London. But the others...."

"What about them?"

I pointed to them. "Sunyo's from Kyoto, Kelly from Jacksonville."

He seemed more interested. "Explain that."

I told him briefly about the island and our escape. His face showed nothing. In the end he said, "So you ran away because life was hard. That may not have been very wise of you."

APPENDIX D

Study I Cloze Passages

The Earth is only a small planet, but it is an unusually beautiful one. It is rich with _____ and animal life. In _____ short stay on Earth, _____ have only begun to _____ the other life in _____ biosphere around them.

As _____ on Earth has slowly _____ over millions of years, _____ kinds of plants and _____ have developed and others _____ died out, or become _____. This process still goes _____. Just as the last _____ the dinosaurs died out _____ million years ago, other _____ of animals are becoming _____ today.

Someday, even humans _____ become extinct. Before that _____, however, the activities of _____ will have sped the _____ of hundreds of kinds _____ other living things.

Today _____ than five hundred kinds _____ animals are listed as _____ or endangered. The blue _____ is simply being hunted _____ death. Other kinds of _____ die out because their _____ living areas, or habitats, _____ destroyed. The Everglades kite, _____ example, is a bird _____ depends on a single _____ of snail for most _____ its food. The marshes _____ lakes of Florida where _____ snails live are being _____ by humans. The kite _____ adapt to a new _____ of food, so its _____ drop as its habitat _____ in size.

You may _____, "Does it really matter _____ people cause the extinction _____ this bird? It probably _____ died out in _____ few hundred more years _____?"

Some answers to this _____ come from biologists, the _____ who study living things. _____ point out that each _____ on Earth is unique. _____ as humans are unique _____ some ways, so too _____ other animals. As citizens _____ the Earth, humans have _____ right to wipe out _____ creatures. Once gone, a _____ cannot be brought back. For all their power, humans cannot make a whooping crane or a grizzly bear.

Paddington stared at Mrs. Brown as if he could hardly believe his ears. "You've dropped my tooth _____ the waste-disposal!" he _____. "I shan't even be _____ to put it under _____ pillow now!"

Mrs. Brown _____ helplessly into the gaping _____ at the bottom of _____ kitchen sink. "I'm awfully _____, dear, " she replied. "It _____ have been in the _____ when I cleared up _____ breakfast. I think you'll _____ to leave a note _____ what happened."

It was _____ tradition in the Browns' _____ that anyone who lost _____ tooth and left it _____ their pillow that night _____ find it replaced by _____ sixpence the next morning, _____ Paddington looked most upset _____ being deprived of this _____.

"Perhaps we could try _____ under the cover outside," _____ Judy hopefully. "It might _____ be in the drain."

"_____ shouldn't think so," said _____. "Those waste-disposals are _____ good. They grind up _____. It even managed that _____-lasting toffee Paddington gave _____ yesterday."

"It was a _____ one," he added hastily, _____ he caught Paddington's eye. "_____ wish I could make _____ half as nice. It _____ a bit big, though. _____ couldn't quite finish it."

"_____," said Mr. Brown, returning _____ the vexed question of _____ tooth. "at least it _____ jam the machine. We've _____ had it a fortnight."

_____ if Mr. Brown was _____ to strike a cheerful _____ he failed miserably, for _____ gave him a very hard _____ indeed.

"I've had _____ tooth ever since I _____ born," he said. "And _____ was my best one. _____ don't know what Aunt _____ going to say when _____ write and tell her."

And with that parting shot he hurried out of the kitchen and disappeared upstairs in the direction of his room leaving behind a very unhappy group of Browns indeed.

It happened that after walking for a long time through sand, and rocks, and snow, the little prince at last came upon a road. And all roads lead _____ the abodes of men.

"_____ morning," he said.

He _____ standing before a garden, _____ a-bloom with roses.

"_____ morning," said the roses.

_____ little prince gazed at _____. They all looked like _____ flower.

"Who are you?" _____ demanded, thunderstruck.

"We are _____," the roses said.

And _____ was overcome with sadness. _____ flower had told him _____ she was the only _____ of her kind in _____ the universe. And here _____ five thousand of them, _____ alike, in one single _____!

"She would be very _____ annoyed," he said to _____, "if she should see _____...She would cough most _____, and she would pretend _____ she was dying, to _____ being laughed at. And _____ should be obliged to _____ that I was nursing _____ back to life - for _____ I did not do _____, to humble myself also, _____ would really allow herself _____ die...."

Then he went _____ with his reflections: "I _____ that I was rich, _____ a flower that was _____ in all the world; _____ all I had was _____ common rose. A common _____, and three volcanoes that _____ up to my knees - _____ one of them perhaps _____ forever.... That doesn't make _____ a very great prince...."

_____ he lay down in _____ grass and cried.

It _____ then that the fox _____.

"Good morning," said the _____.

"Good morning," the little _____ responded politely, although when _____ turned around he saw _____.

"I am right here," _____ voice said. "under the _____ tree."

"Who are you?" asked the little prince, and added, "You are very pretty to look at."

APPENDIX E

Study I Word Meaning Passages

Storms came early with rain, and between the rains fierce winds struck the island and filled the air with sand. During this time, I made myself another dress, but most of the days I spent fashioning a spear to catch the giant devilfish.

I had seen this spear made, as I had seen my father make bows and arrows. yet I knew little about it, no more than I had about the others. Still I remembered how it looked and how it was used. From these memories I made it after many errors and many hours of work, sitting on the floor while Rontu slept nearby and the storms beat upon the roof.

Four of the sea-elephant teeth were left, and though I broke all except one, this I worked down to a head with a barbed point. I then made a ring and fastened it to the end of the shaft, and into this ring fitted the head, which was tied to a long string made of braided sinew. When the spear was thrown and struck a devilfish, the head came loose from the shaft. The shaft floated on the water, but the pointed barb was held by the string which was tied to your wrist. This spear was especially good because it could be thrown from a distance.

On the first day of spring, I went down to Coral Cove with my new spear. I knew it was spring because that morning at dawn the sky was filled with flocks of darting birds. They were small and black and came only at this time of year. They came out of the south and stayed for two suns, hunting food in the ravines, and then flew off in one great flight toward the north.

Rontu did not go with me to the beach because I had let him out of the fence and he had not returned. The wild dogs had been to the house many times that winter and he had paid no heed to them, but the night before, after they had come and gone, he stood at the fence.

Out there in the cold water, far from land, we waited every night for the coming of the fog. And it came, and we oiled the brass machinery and lit the fog light up in the stone tower. Feeling like two birds in the gray sky, McDunn and I sent the light touching out, red, then white, then red again, to eye the lonely ships. And if they did not see our light, then there was always our Voice, the great deep cry of our Fog Horn shuddering through the rags of mist to startle the gulls away like decks of scattered cards and make the waves turn high and foam.

"It's a lonely life, but you're used to it now, aren't you?" asked McDunn.

"Yes," I said. "You're a good talker, thank the Lord."

"Well, It's your turn on land tomorrow," he said, smiling.

"What do you think, McDunn, when I leave you out here alone?"

"On the mysteries of the sea." McDunn lit his pipe. It was a quarter past seven on a cold November evening, the heat on, the light switching its tail in 200 directions, the Fog Horn bumbling in the high throat of the tower. There wasn't a town for a hundred miles down the coast, just a road which came lonely through dead country to the sea, with few cars on it, a stretch of two miles of cold water out to our rock, and rare few ships.

"The mysteries of the sea," said McDunn thoughtfully. "You know, the ocean's the biggest snowflake ever? It rolls and swells a thousand shapes and colors, no two alike. Strange. One night, years ago, I was here alone, when all of the fish of the sea surfaced out there. Something made them swim in and lie in the bay, sort of trembling and staring up at the tower light going red, white, red, white across them so I could see their funny eyes. I turned cold. They were like a big peacock's tail, moving out there until midnight. Then, without so much as a sound, they slipped away, the million of them was gone.

I live in a room in the city with my grandfather. I have lived there as long as I can remember. It is not a pretty room, but it has a sink, and my grandfather says that is lucky. And on the wall is a picture of a hill with trees, and the sky in the picture is gold and red. My grandfather found the picture in a magazine. He tells me that is what a sunset looks like.

First thing in the morning my grandfather is awake. He walks over to the window to see if it is a day for walking. He does not like to stay in our room, and there is nowhere else to be. And so we walk.

But before we leave, we have something to eat, my grandfather and I.

First on our little burner, my grandfather makes coffee, and then while we are drinking our coffee my grandfather makes oatmeal. My grandfather says I must have oatmeal each day. He says that is the way my mother would have wanted me to eat.

"Tell me about my mother," I say.

My grandfather has told me many times of my mother, but today I want him to tell me again.

"Beautiful, and brown as the bark of a tree," says my grandfather, "with a smile to shame the sun. And fast as the brook she ran, and her laughter set the birds to singing."

"Why did she die?" I ask.

"No one dies if they are remembered," says my grandfather. "And we remember her, you and I."

The oatmeal is ready and today my grandfather opens a can of milk and pours some on my oatmeal, and I drink the rest of the milk from the can. Otherwise it will turn sour before we are back in the room again.

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