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ABSTRACT

The performance of elementary students was measured at three different times during the school year, and examined across grades using measures of reading, spelling, and written expression. The measures were found to be sensitive to growth across grade levels, and similar within-grade trends were demonstrated, particularly in reading and spelling. The measures appear to be most sensitive to growth at grade levels one through four. Less consistent growth was observed at grades five and six. (Author/GK)

University of Minnesota

Research Report No. 49

AN ANALYSIS OF LEARNING TRENDS IN SIMPLE MEASURES OF READING, SPELLING, AND WRITTEN EXPRESSION: A LONGITUDINAL STUDY

Doug Marston, Lisa Lowry, Stanley Deno, and Phyllis Mirkin

IRLD

Institute for Research on Learning Disabilities

IRLD

Director: James E. Ysseldyke

Associate Director: Phyllis K. Mirkin

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Doug Marston, Lisa Lowry, Stanley Deno, and Phyllis Mirkin

Institute for Research on Learning Disabilities

University of Minnesota

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Abstract

The performance of elementary students was examined across grades using measures of reading, spelling, and written expression. The measures were found to be sensitive to growth across grade levels. In addition, when the measures were administered to students at each grade level, at three different times during the academic year, similar within-grade trends were demonstrated, particularly in reading and spelling. The measures appear to be most sensitive to growth at grade levels one through four. Less consistent growth was observed at grades five and six.

An Analysis of Learning Trends in Simple Measures of Reading, Spelling, and Written Expression: A Longitudinal Study

Considerable attention has been given to the assessment and instruction of children with learning disabilities. With the advent of Public Law 94-142 (Federal Register, 1977) much of that attention focuses on the evaluation of these children's academic skills. Jenkins, Deno, and Mirkin (1979) suggest that formative evaluation systems, which may be used continuously to measure the performance of children with learning disabilities, also may provide viable alternatives to the traditional pre and post testing approach to evaluation of academic programs. Such systems allow the educator to closely monitor a child's progress, giving feedback to both the teacher and the student during the ongoing process of instruction. Jenkins et al. argue that this continual measurement and evaluation process may be a key factor in the instructional program of the learning disabled child.

Essential to the formative evaluation methodology is the use of measurement procedures that are valid, reliable, efficient, and sensitive to growth in various academic areas. These psychometric characteristics have already been demonstrated for reading (Deno, Mirkin, & Chiang, in press), spelling (Deno, Mirkin, Lowry, & Kuehnle, 1980), and written expression (Deno, Marston, & Mirkin, in press). In addition to determining the technical adequacy of these measurement procedures, these studies confirm that increases in the scores obtained using these simple measurement procedures are related to increases in grade level. Simply stated, third grade students read more words correctly per minute from

a word list and from basal reading passages than do second graders.

This prior research was cross-sectional, however, and evidence of growth within grade levels over the course of the school year is necessary to substantiate these procedures as valid for use in monitoring the educational progress of learning disabled students. In addition, such data would provide standards by which teachers might judge student progress. The purpose of the present study was to gather this information for a group of elementary students measured at three different times during the school year: fall, winter, and spring. If the simple procedures for measuring reading, spelling, and written expression are going to be used to monitor growth, we would hope to obtain consistent increases in student scores across time.

Method

Subjects

Fifty-eight children were randomly selected from the elementary schools of a small, midwestern city. The students ranged in age from 6 years, 4 months to 12 years, 3 months. The students were in grades one through six, with 13 first graders, 9 second graders, 10 third graders, 7 fourth graders, 7 fifth graders, and 9 sixth graders. Twenty-eight of the students were males. None of the students were receiving special education services

Procedure

The simple procedures used to evaluate students in reading, spelling, and written expression were identical to the research materials used in previous studies of reading (Deno, Mirkin, & Chiang, in press), spelling (Deno, Mirkin, Lowry, & Kuehnle, 1980), and writing (Deno, Marston,

& Mirkin, in press). For reading, each child was presented three word lists consisting of words randomly selected from the pre-primer through third grade level of the Harris-Jacobson (1972) word list. The child was asked to read words aloud from each list for one minute. The number of words read correctly from a word list (WRCWL) was then tabulated for each list. Only the child's performance on the final list was used for the analysis. One minute oral reading rates were determined by the number of words a child read correctly from an "oral passage" (WRCOP). The stimulus materials were selected randomly from three different third grade basal reading series: Allyn-Bacon, Ginn 720, and Houghton-Mifflin. Again, only the third passage score was used in the analysis.

Each subject's spelling score was determined by the dictation of words randomly selected from the third grade level of the Harris-Jacobson (1972) word list. Words were dictated to the students individually in two three-minute trials. Total words spelled correctly (WSC) and total number of letter sequences correct (LSC), as described by White and Haring (1976), were computed for each trial. Only the score on the second trial was employed in the analysis.

Three written expression scores were obtained for each subject using compositions written in response to two story starters (see Deno, Marston, & Mirkin, in press). Each composition was scored for words written and spelled correctly (WWC), letter sequences written correctly (LWC), and total words (TWW). Each child was given three minutes to write on each story starter. The mean scores from both compositions were used for the analysis.

Identical sets of the reading, spelling, and written expression

materials were administered in the fall, winter, and spring. Fall testing occurred during the third week of November, winter testing was conducted in the third week of February, and the spring testing occurred during the last week of April.

All test protocols were scored by four undergraduate research assistants trained at the Institute for Research on Learning Disabilities. Average interrater agreement exceeded .90 on all academic measures.

Results

Preliminary analysis of the data centered on the mean performance of the entire group of elementary students for each academic measure. The mean performance on all seven measures for the fall, winter, and spring testing periods is presented in Table 1. On all seven of the measures there was an increment in mean performance between the fall and winter test periods. Between the winter and spring testings, again all seven measures demonstrated another increase in performance, although the change in Words Spelled Correctly from the Story Starter does not appear to be practically different.

Insert Table 1 about here

In general, the growth curves or trends appear to be linear. To test this hypothesis that scores for each measure increase with age, the group means were subjected to a repeated measures ANOVA for linear trend. As may be seen in Table 2, statistically significant F-ratios for linear trends were obtained for each of the seven measures.

Insert Table 2 about here

A second analysis conducted on the data consisted of an examination of mean performance of the elementary students by grade level. While sample sizes for each individual grade were small (ranging from 7 to 13) and inferences may be unreliable, visual inspection of the grade level means is meaningful. Tables 3 to 9 reveal mean scores that demonstrate growth within the school year and across grades. When discrepancies occur, however, they usually appear to be related to the upper grade levels. Conversely, dramatic changes and growth frequently are evident in the lower grade levels. The means in Tables 3 to 9 are graphed in Figures 1-7.

Insert Tables 3-9 and Figures 1-7 about here

A third approach to the analysis was the determination for each measure of the percentage of students at each grade level that increased their performance on each successive testing. The results in Table 10 indicate that the largest percentages of students who demonstrated growth on the academic measures for each session were enrolled in the lower grade levels. In addition, student growth was most apparent in reading and spelling.

Insert Table 10 about here

Measuring student performance in the fall, winter, and spring allowed us also to examine the average percentage growth on each

formative measure by grade level. Average percentage growth was determined by dividing the mean difference between fall and spring performance levels by mean performance in the fall. The average percentage growth rates for all measures by grade level and for the entire sample are presented in Table 11. Again it appears the measures of reading and spelling were most sensitive to growth. Growth coefficients for these measures over nine months ranged between a 9% increase and a 463% increase in performance. Percentage growth rates for the written expression measures ranged from .86 (a decrease in performance level) to 3.13 (a 213% increase).

Insert Table 11 about here.

Discussion

The results of this trend analysis of seven academic measures proposed for use in formative evaluation systems support the notion that the measures do indeed measure academic growth over time. Most impressive were the reading and spelling measures which exhibited fairly steep continual, linear increments or growth. The written expression measures did not fare quite as well, but Words Written Correctly and Total Words Written appeared to increase as expected.

In addition to interpreting the data as support for the simple measures' sensitivity to growth, two other observations are worth mentioning. The inconsistency in mean performances at the upper grade levels may mean there was a "ceiling effect" that influenced the grade level means, and suppressed the growth phenomenon. If true,

this would suggest that perhaps for some fifth and sixth graders evaluation would more appropriately be conducted using seventh or eighth grade level materials.

The second observation concerns the immediate and dramatic growth seen at the earlier grade levels. The sensitivity of these measures at these stages suggests that they may be especially useful for evaluating the instructional programs of learning disabled students, many of whom are functioning at similar levels.

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Table 1

Mean Performance of 58 Elementary Students on Seven Formative Evaluation Measures during Fall, Winter, and Spring Testing

Measure	Fall	Winter	Spring
Mean Number of Words Read Correctly from Word List (WRCWL)	54.0	60.8	69.7
Mean Number of Words Read Correctly from Oral Passage (WRCOP)	94.9	111.0	129.9
Mean Number of Words Spelled Correctly from Dictated Word List (WSC)	15.2	17.9	20.3
Mean Number of Letters in Correct Sequence from Dictated Word List (LCS)	107.3	123.4	142.0
Mean Number of Words Spelled Correctly on Story Starter (WWC)	29.4	32.7	32.8
Mean Number of Letter Sequences Written Correctly on Story Starter (LWC)	138.6	150.8	153.4
Mean Number of Words Written On Story Starter (TWW)	31.9	35.0	35.5

Table 2

Repeated Measure ANOVA's Testing for Linear Trends on Fall, Winter, and Spring Data

Measure	F-value for Linear Trend	Probability
Mean Number of Words Read Correctly from Word List	49.2	.0001
Mean Number of Words Read Correctly from Oral Passage	104.3	.0001
Mean Number of Words Spelled Correctly from Dictated Word List	76.3	.0001
Mean Number of Letters in Correct Sequence from Dictated Word List	102.9	.0001
Mean Number of Words Spelled Correctly on Story Starter	10.7	.0018
Mean Number of Letter Sequences Written Correctly on Story Starter	8.6	.0041
Mean Number of Words Written on Story Starter	10.1	.0024

Table 3

Mean Number of Words Read Correctly from Word List for Fall, Winter, and Spring by Grade Level

Grade	Fall	Winter	Spring
1	4.7	10.3	16.5
2	37.1	57.1	68.4
3	57.1	63.8	71.7
4	74.0	72.0	84.0
5	81.4	79.7	92.9
6	88.1	99.7	106.2

Table 4

Mean Number of Words Read Correctly from Oral Passage for Fall, Winter, and Spring by Grade Level

Grade	Fall	Winter	Spring
1	18.3	31.1	45.7
2	73.2	101.1	127.8
3	108.3	123.6	136.2
4	125.4	131.7	155.3
5	125.7	147.3	161.1
6	142.9	176.7	182.8

Table 5

Mean Number of Words Spelled Correctly on Dictated Word List for Fall, Winter, and Spring by Grade Level

Grade	Fall	Winter	Spring
1	.8	2.8	4.5
2	9.0	11.5	16.9
3	13.9	18.8	17.7
4	20.3	22.6	25.4
5	22.4	22.7	26.5
6	30.2	33.6	36.2

Table 6

Mean Number of Letters in Correct Sequence on Dictated Word List for Fall, Winter, and Spring by Grade Level

Grade	Fall	Winter	Spring
1	13.1	31.2	45.7
2	77.3	94.3	124.8
3	98.7	129.4	124.9
4	128.1	149.7	168.1
5	159.7	158.0	176.8
6	198.1	206.6	246.8

Table 7

Mean Number of Words Spelled Correctly on a Story Starter for Fall, Winter, and Spring by Grade Level

Grade	Fall	Winter	Spring
1	4.2	8.0	11.2
2	16.4	20.9	22.6
3	28.9	32.8	25.0
4	35.7	36.5	39.1
5	42.4	47.4	45.0
6	56.0	57.0	55.4

Table 8

Mean Number of Letters Written in Correct Sequence on a Story Starter for Fall, Winter, and Spring by Grade Level

Grade	Fall	Winter	Spring
1	16.7	33.4	52.3
2	78.4	97.2	104.3
3	137.1	132.2	118.7
4	167.5	167.8	181.1
5	200.0	224.8	182.5
6	267.4	265.3	266.7

Table 9

Mean Number of Words Written on a Story Starter for Fall, Winter, and Spring by Grade Level

Grade	Fall	Winter	Spring
1	5.1	9.5	14.5
2	20.6	24.2	26.2
3	31.7	34.5	27.4
4	38.7	39.7	41.7
5	47.0	50.7	47.1
6	58.6	58.5	57.9

Table 10

Percentage of Students Who Increased Their Performance from Fall to Winter to Spring on Seven Measures of Reading, Spelling, and Writing

Measure	Grade 1 (N=13)	Grade 2 (N=9)	Grade 3 (N=10)	Grade 4 (N=7)	Grade 5 (N=7)	Grade 6 (N=9)	Entire Sample (N=58)
Words Read Correctly on Word List	76.9	88.9	80.0	28.6	28.6	44.4	58.6
Words Read Correctly from Oral Passage	84.6	100.0	70.0	71.4	42.9	55.6	69.0
Words Spelled Correctly from Dictated List	69.2	88.9	30.0	57.1	28.6	66.7	56.9
Letter Sequences Correct on Story Starter	84.6	77.8	50.0	71.4	42.9	66.7	65.5
Total Words Written on Story Starter	46.2	33.3	0.0	14.3	14.3	22.2	24.1
Words Spelled Correctly on Story Starter	46.2	33.3	0.0	14.3	14.3	22.2	24.1
Letter Sequences Correct on Story Starter	53.8	33.3	10.0	14.3	14.3	11.1	25.9

Table 11

Average Percentage Growth for Each Grade Level and Entire Sample on Formative Measures of Reading, Spelling, and Writing*

Measure	Grade 1 (N=13)	Grade 2 (N=9)	Grade 3 (N=10)	Grade 4 (N=7)	Grade 5 (N=7)	Grade 6 (N=9)	Entire Sample (N=58)
Words Read Correctly on Word List	251	84	25	9	14	21	29
Words Read Correctly from Oral Passage	150	75	26	24	28	30	37
Words Spelled Correctly from Dictated List	463	88	27	25	18	20	34
Letter Sequences Correct on Story Starter	249	61	27	22	11	25	32
Total Words Written on Story Starter	184	27	-14	8	0	-1	12
Words Spelled Correctly on Story Starter	167	38	-13	10	6	-1	13
Letter Sequences Correct on Story Starter	213	33	-13	8	-9	-1	11

*Percentages with negative signs represent the average percentage decrease.

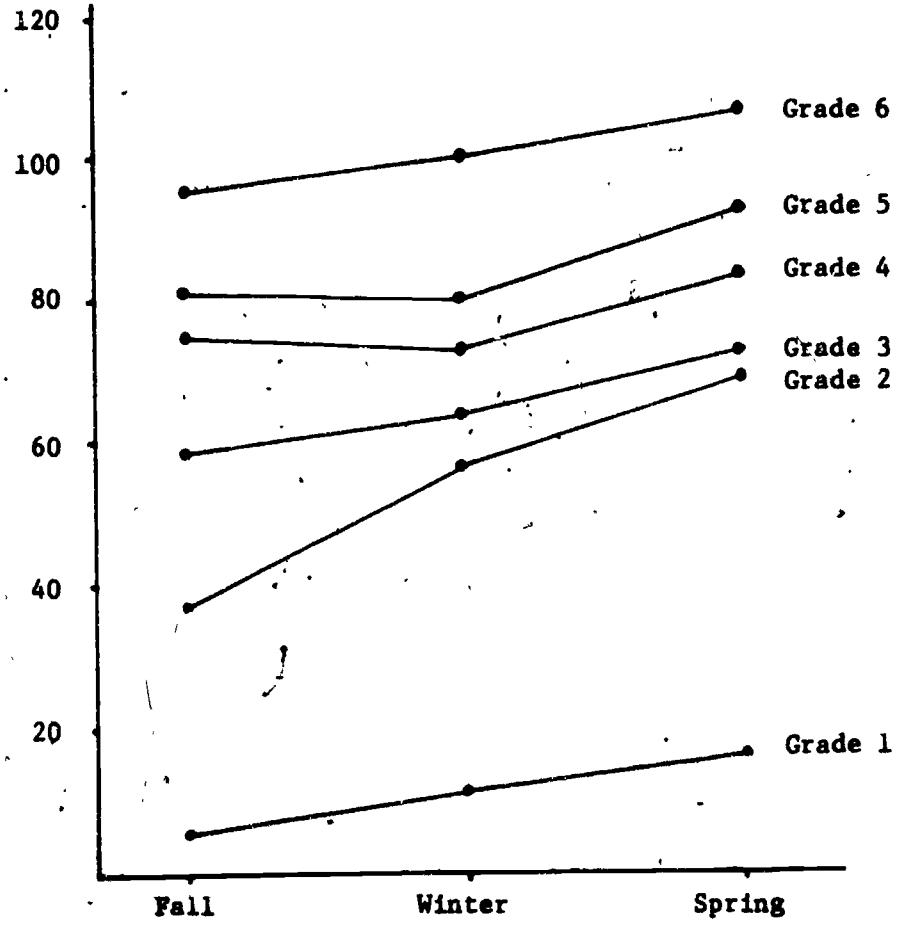

Figure 1. Mean Number of Words Read Correctly from Word List for Fall, Winter, and Spring by Grade Level.

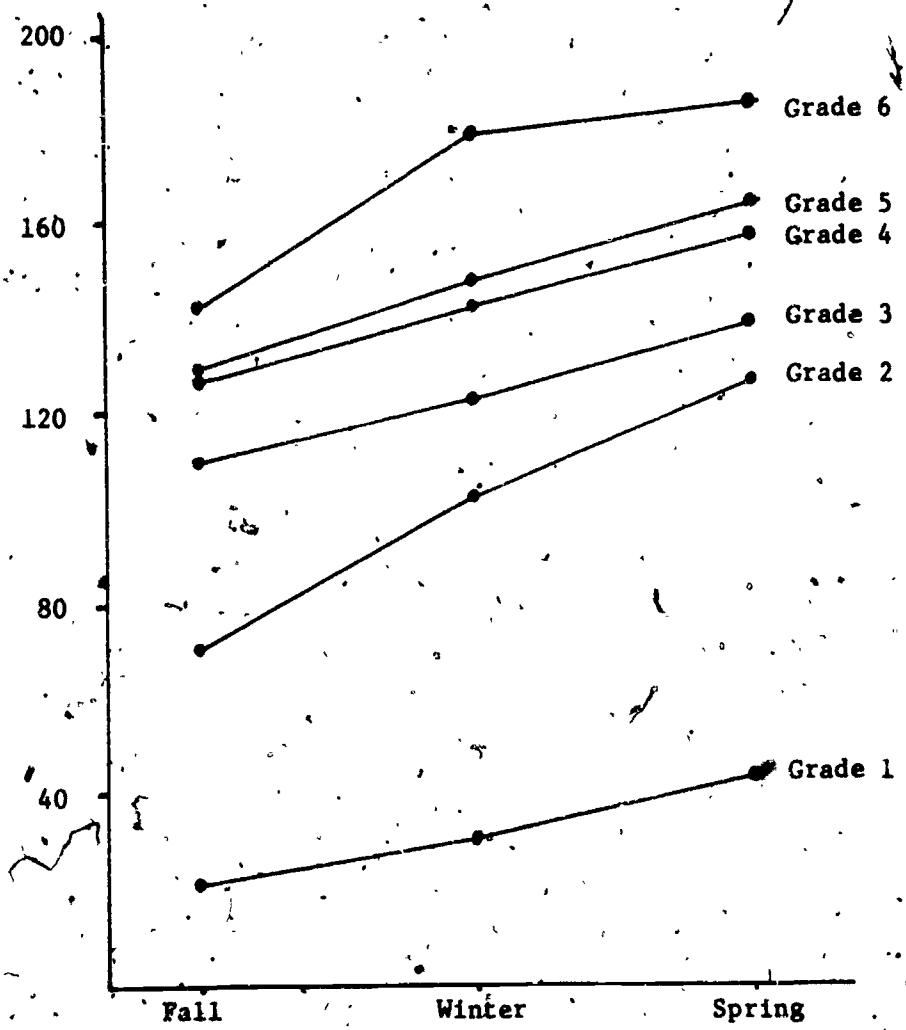

Figure 2. Mean Number of Words Read Correctly from Oral Passage for Fall, Winter, and Spring by Grade Level.

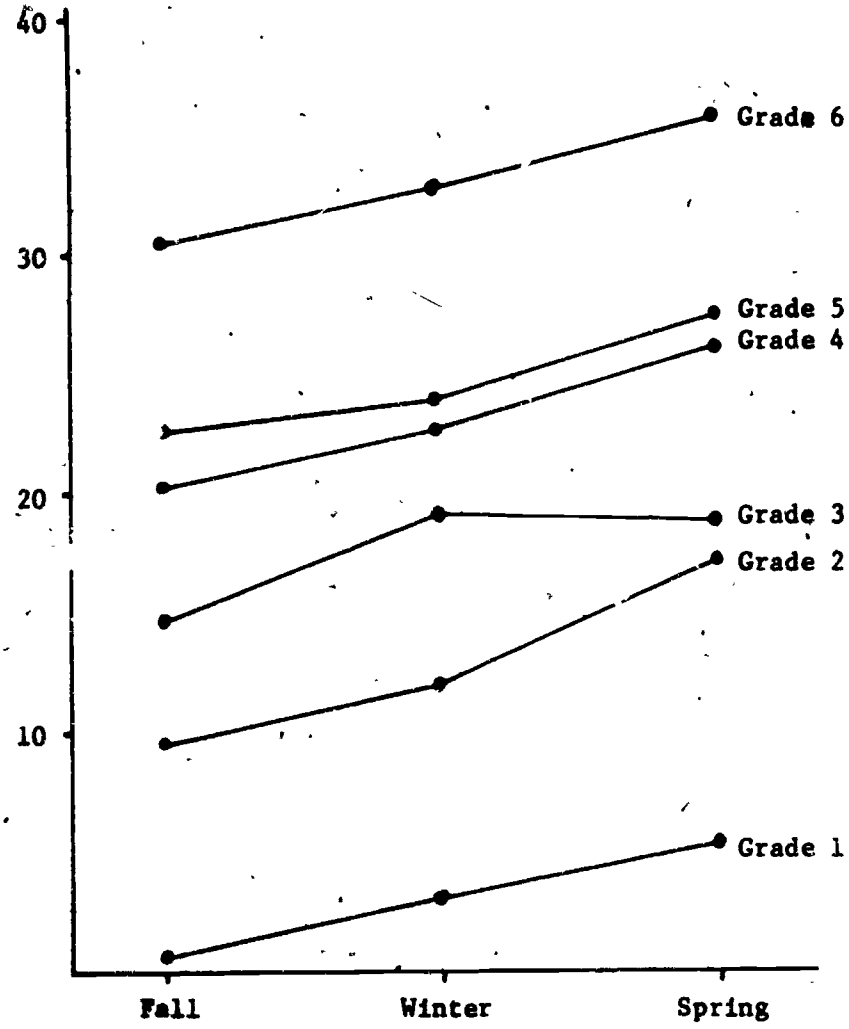

Figure 3. Mean Number of Words Spelled Correctly on Dictated Word List for Fall, Winter, and Spring by Grade Level.

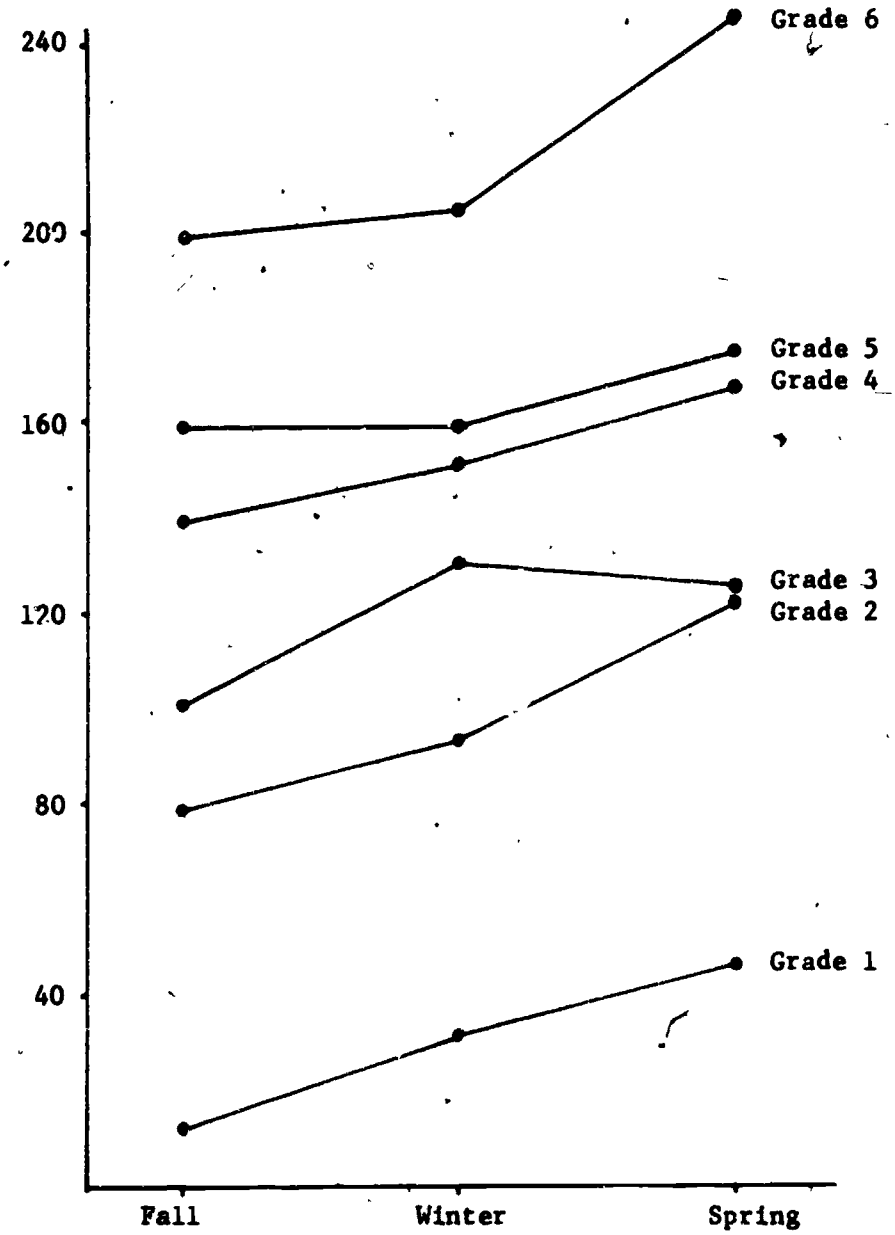

Figure 4. Mean Number of Letters in Correct Sequence on Dictated Word List for Fall, Winter, and Spring by Grade Level.

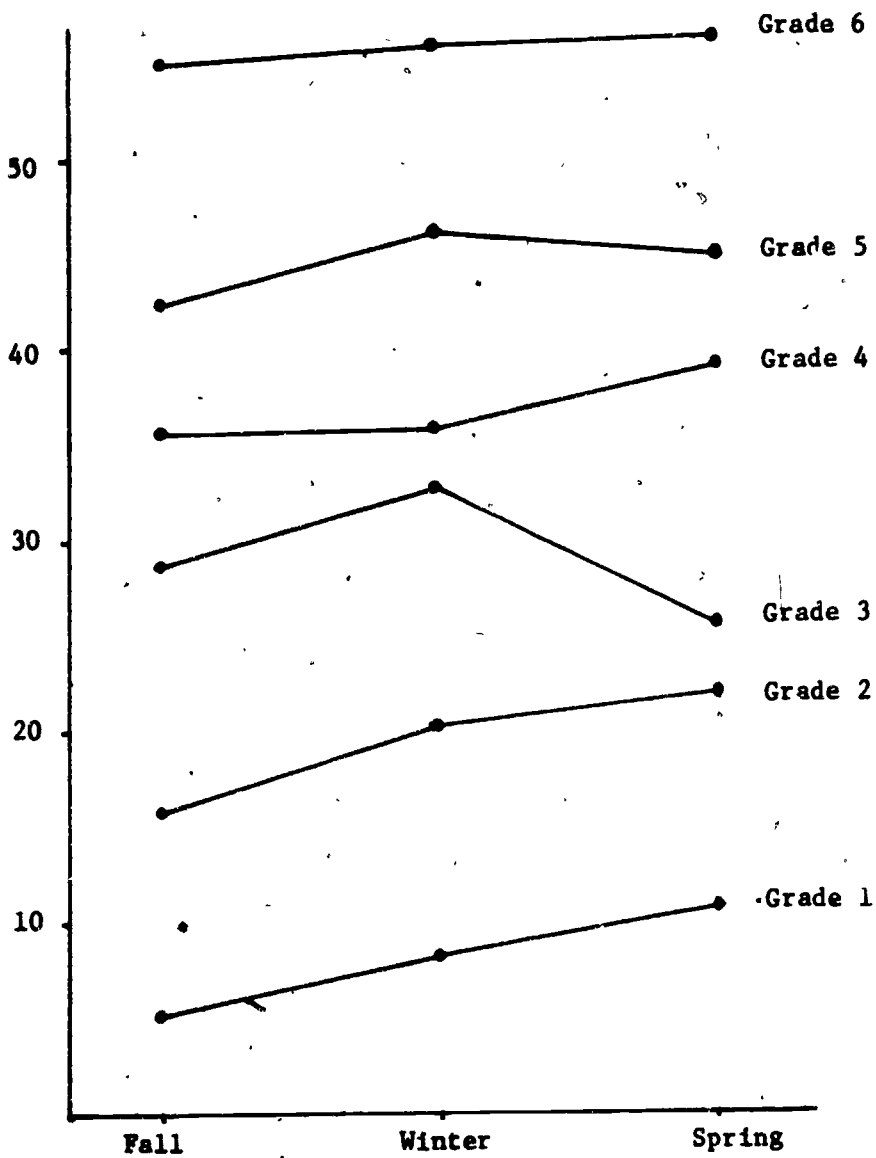

Figure 5. Mean Number of Words Spelled Correctly on a Story Starter for Fall, Winter, and Spring by Grade Level.

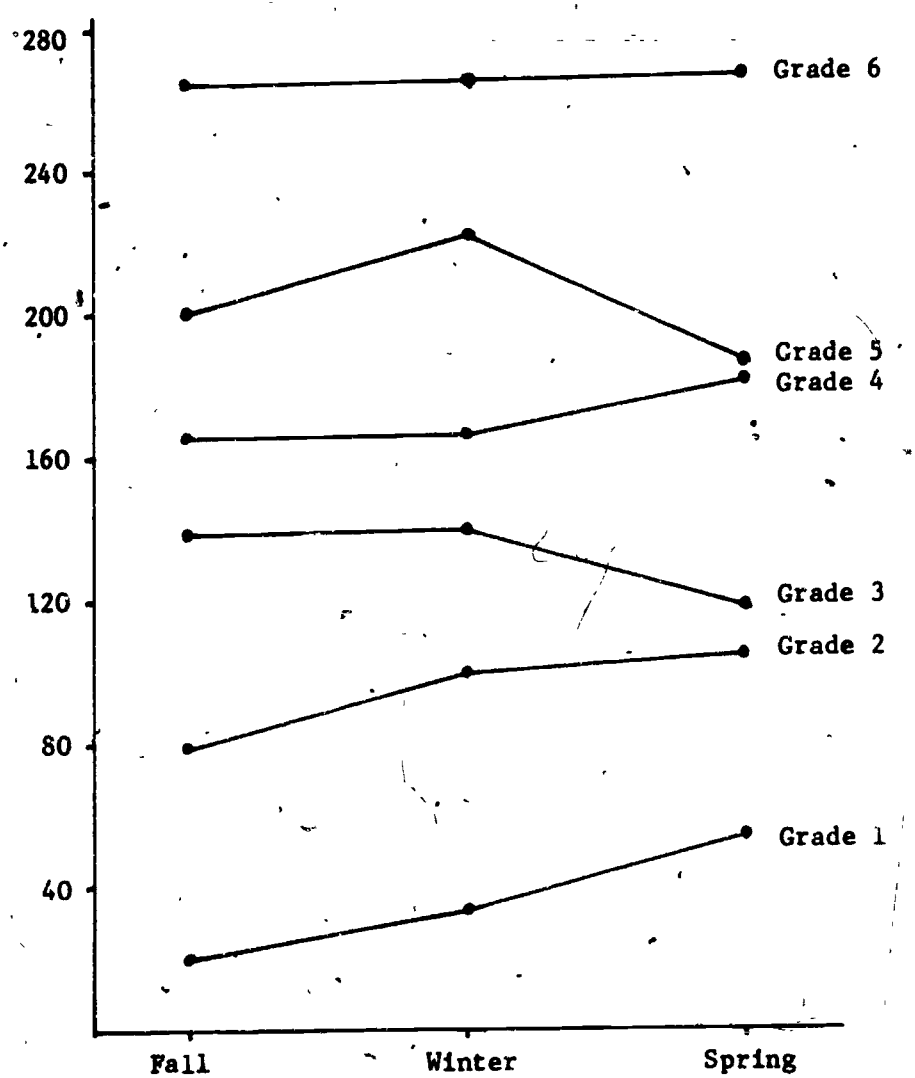

Figure 6. Mean Number of Letters Written in Correct Sequence on a Story Starter for Fall, Winter, and Spring by Grade Level.

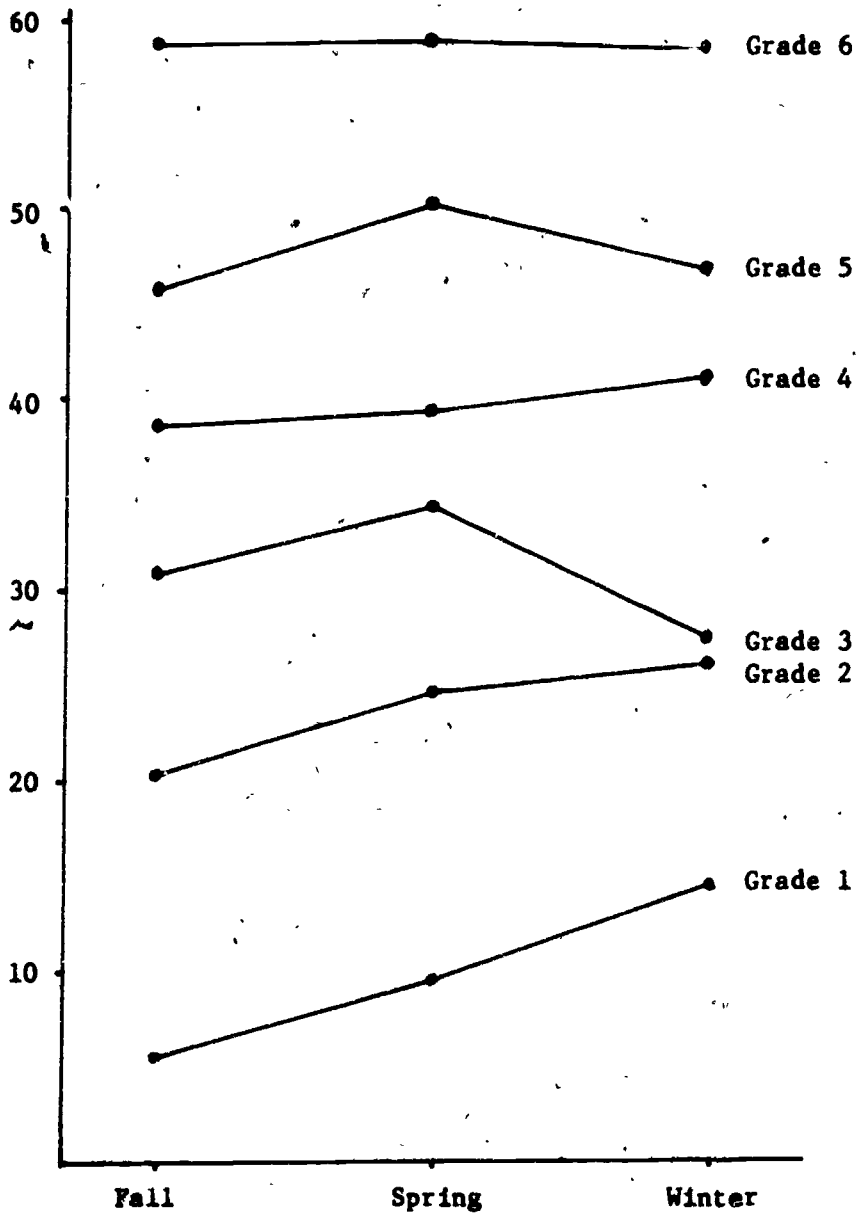

Figure 7. Mean Number of Words Written in a Story Starter for Fall, Winter, and Spring by Grade Level.

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