DOCUMENT RESUME

ED 137 416 TM 006 225

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TITLE The Relationship between Quantitative and Qualitative Measures of Writing Skills.
PUB DATE [Apr 77]
NOTE 38p.; Paper presented at the Annual Meeting of the American Educational Research Association (61st, New York, New York, April 4-8, 1977); For a related document, see ED 091 750

EDRS PRICE MF-$0.83 HC-$2.06 Plus Postage.
DESCRIPTORS *Composition Skills (Literary); *Elementary Secondary Education; Evaluation Criteria; Grade 4; Grade 6; Grade 9; Grade 12; Multiple Regression Analysis; Predictor Variables; Rating Scales; Reliability; Scoring; Statistical Analysis; *Student Evaluation; *Writing Exercises; *Writing Skills; Written Language
IDENTIFIERS ETS Composition Evaluation Scales; Virginia Educational Needs Assessment Program

ABSTRACT

The relationships of quantitative measures of writing skills to overall writing quality as measured by the E.T.S. Composition Evaluation Scale (CES) were examined. Quantitative measures included indices of language productivity, vocabulary diversity, spelling, and syntactic maturity. Power of specific indices to account for variation in overall writing quality was examined through use of multiple regression analysis. Subjects were 983 students in grades four, six, nine, and twelve; they were chosen from 20,000 participants in the Virginia Educational Needs Assessment Project who comprised a stratified random sample of 57 of Virginia's 140 school divisions. Subjects were matched on sex and levels of ability and achievement so that this sample resembled a nationwide rather than a statewide sample. Results of the correlation analysis indicated that quantitative and qualitative measures of writing skills are significantly related. Results of multiple regression analysis indicated that sizable amounts (from 21 percent to 57 percent in this study) of the variation in the qualitative assessement of writing performance can be accounted for by using the following quantitative predictors: total words written, total sentences written, percentage of unique words written, percentage of unique words misspelled, and number of words per T-unit. (Author/MV)

The Relationship between Quantitative and Qualitative Measures of Writing Skills

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Paper Presented at the Annual Meeting of the American Educational Research Association, New York, April 1977

Abstract

This study was focused upon an examination of the relationships of quantitative measures of writing skills to overall writing quality as measured by the E.T.S. Composition Evaluation Scale (CES). Quantitative measures included indices of language productivity, vocabulary diversity, spelling, and syntactic maturity. Power of specific indices to account for variation in overall writing quality was examined through use of multiple regression analysis. Subjects were 983 students in grades four, six, nine, and twelve; they were chosen from 20,000 participants in the Virginia Educational Needs Assessment Project who comprised a stratified random sample of 57 of Virginia's 140 school divisions. Subjects were matched on sex and levels of ability and achievement so that this sample resembled a nationwide rather than a statewide sample. Results of the correlation analysis indicated that quantitative and qualitative measures of writing skills are significantly related ($p<.001$). Results of multiple regression analysis indicated that sizable amounts (from 21%

to 57% in this study) of the variation in the qualitative assessment of writing performance can be accounted for by using the following quantitative predictors: total words written, total sentences written, percentage of unique words written, percentage of unique words misspelled, and number of words per T-unit.

The Relationship between Quantitative and Qualitative Measures of Writing Skills

There has been a growing concern regarding the gradual deterioration of writing skills of school-age children. In October 1975 the National Assessment of Educational Progress (NAEP) issued a report entitled Writing Mechanics, 1969-1974: A Capsule Description of Changes in Writing Mechanics. This publication of the results of the Writing Assessment prompted cries of indignation nationwide. The relevant findings were cited, interpreted, and analyzed in literary journals ranging from Research in the Teaching of English to Newsweek and the Parade supplement to Sunday newspapers. A major sign of the mounting concern about the apparent decline in quality of writing was an announcement by the College Entrance Examination Board, which usually relies upon multiple-choice tests, that it would begin testing the writing ability of college applicants. The rationale underlying this decision by the CEEB apparently was that if the College Board required writing as part of its basic testing program, then writing would be valued in

the schools, teachers would place more emphasis upon it, and, henceforth, writing quality would improve. The problem and its solution, unfortunately, are not that simple. The essence of "quality" in writing is elusive; the specific elements which comprise it are not readily agreed upon by educators. Opinions vary widely, ranging fron an adamant belief that "quality" writing can be attained only through the mastery of strict grammar rules to the notion that "good" writing must be free, loose, and unencumbered by dreary rules regarding sentence structure, syntax, etc.

Current research related to written composition is relatively sparse. This sparsity can be attributed, in part, to the difficulty of conducting relevant empirical analyses of written language. Several studies have been completed regarding specific elements of composition, such as language productivity (Myklebust, 1965; Rubin and Buium, 1974; Trent, Jacobson, and Selden, 1976; Virginia Educational Needs Assessment, 1976), vocabulary diversity (Rubin and Buium, 1974; Trent, et al., 1976), spelling errors (Boder, 1971; Trent, et al., 1976), syntactic complexity (Hunt, 1968; Christensen,

1968; Dixon, 1972), and correct usage (Rubin and Buium, 1974). The primary goal of these studies, however, appears to have been the analysis of the elements themselves rather than the determination of their relationship to the quality of written composition. Several researchers (Hunt, 1965; O;Donnell, 1967; and Dixon, 1972) have shown that syntactic measures indicate maturity in writing; specifically, mean length of T-unit has been cited as the best single indicator of syntactic maturity in the writing of school-age children. In studies by Mellon (1969), O'Hare (1973), and Combs (1976), increases in syntactic maturity were correlated with English teachers' judgments of writing quality; Mellon found no significant relationship, whereas, O'Hare and Combs reported positive relationships. Veal (1974) studied the relationships between specific aspects of syntax and overall quality of writing; he found that mean T-unit length was related to differing quality levels for grades two, four, and six.

The present study was focused upon an examination of the relationships of several quantitative measures of writing skills to overall writing quality. The

quantitative measures applied to written compositions included indices of language productivity, vocabulary diversity, spelling, and syntactic maturity. An attempt was made to examine also the power of the specific quantitative indices to account for the variation or variance of overall quality in student writing performance.

Method

Subjects

As part of the Virginia Educational Needs Assessment Project conducted by the Department of Research Methodology at the University of Virginia, measures of written composition were received from more than 20,000 students in grades four, six, nine, and twelve in the Fall of 1974 and again in the Spring of 1975. These students comprised a stratified random sample of fifty-seven of Virginia's 140 school divisions, from which approximately 250 subjects at each grade level were selected for investigation in the present study. These students also were given standardized achievement (SRA for elementary and STEP for secondary) and ability (STEA for elementary and SCAT for secondary) batteries; and

computerized sampling procedures were developed so that the sample of pupils at each grade level matched the national populations for these tests according to sex and levels of ability and achievement. Thus, these 1000 pupils resembled a nationwide rather than a statewide sample. Results presented in this paper are from the Fall 1974 testing.

Measurement

Data Collection. The compositions analyzed in this study were written by students as part of the Virginia Educational Needs Assessment. The composition exercises were administered to the students by local school personnel. Standard instructions were provided regarding procedures for administration. The statement of the composition was taken from the National Assessment of Educational Progress writing study (1972). Instructions to students regarding essay topics at each grade level were as follows:

Grades four and six:

> Here is a picture of something sad that is going on in the forest. (Picture of forest fire provided.) Look at the picture for a while. Do you see the forest

fire? Write a story about what is happening in the picture. This is an important story because you want people to know about this sad event.

Grades nine and twelve:

Most of us look up to some famous person as a representative of the things we believe in or as the kind of person we would like to be. This person may come from any part of our society. For instance, we might admire Winston Churchill or Martin Luther King, Walter Schirra or Hank Aaron, Florence Nightingale or Barbra Streisand. No matter where this person comes from or what kind of work he or she does, however, we can recognize such traits of greatness as determination, physical courage, the ability to inspire others, and faithfulness to some worthy cause.

Think about a famous person whom you admire. Select a particularly admirable characteristic or quality of that person—such as Mickey Mantle's courage in the face of crippling physical handicaps or Florence Nightingale's determination to fight against strong governmental pressure. Write an essay of about 200-250 words describing this characteristic or quality. Be sure to provide an illustration of it from the person's life. Try to show that the person is great at least partly because of this characteristic or quality.

Fourth and sixth grade students were allowed twenty minutes to write; those in the ninth and twelfth grades were allowed thirty minutes. Students were instructed

not to read over and revise their work. The completed compositions were sent to the Department of Research Methodology at the University of Virginia for quantitative and qualitative analysis.

Quantitative Assessment of Written Language. The compositions were prepared for computer entry; computer procedures developed at the University of Virginia were used to obtain the following measures for each composition:

(a) Measures of language productivity
    (1) total words written
    (2) total sentences written
    (3) mean number of words per sentence

(b) Measure of vocabulary diversity — unique words written (words used only once in a particular composition)

(c) Measures of spelling
    (1) total words misspelled
    (2) unique words misspelled (spelling errors occurring only once in a particular composition)

(d) Measures of syntactic maturity

(1) total T-units written (minimal terminable syntactic unit, as defined by Hunt, 1965)

(2) mean number of words per T-unit

These measures of written language have been employed and validated in other studies (Myklebust, 1973; Trent et al., 1976; Boder, 1971; Hunt, 1965; and Veal, 1974).

Qualitative Assessment of Written Language. Each composition was subjected to an overall quality analysis using Diederich's E.T.S. Composition Evaluation Scale (CES) (1961). The CES was developed by researchers at Educational Testing Service after factor-analytic studies of the reasons teachers gave for their judgments of compositions. It is comprised of eight scales: ideas, organization, wording, flavor, usage, punctuation, spelling, and handwriting. Each scale is marked on a five-point line—with the scales of ideas and organization receiving double weight—yielding a total score of 50. There are two subscores provided: a General Merit score, consisting of the ratings for the four former scales; and a Mechanics score, consisting of the ratings for the four latter scales. The instructions

for the CES include descriptions of low, middle, and high points for each component.

According to Diederich, who is given credit for being "better than anyone . . . on the problem of obtaining reliable scores on pieces of writing" (Cooper, 1975), two or more people should rate each composition. Therefore, two raters who were trained in using the CES rated each composition for the present study; the average ratings were derived for use in further analysis. Inter-rater reliability coefficients were computed for both subscores as well as for the total score at each grade level using Pearson product-moment correlations. The coefficients ranged across grade levels from .54 to .86 for the General Merit subscore; from .65 to .85 for the Mechanics subscore; and from .64 to .90 for the total score. These coefficients fall within the range considered adequate by Diederich (1967).

Data Analysis

The data were analyzed through the use of descriptive statistics, correlation analysis, and multiple regression analysis. Means and standard deviations were

computed for all measures to provide a general picture of the performance of students on the measures. Correlation coefficients were computed to examine the relationships between the quantitative and qualitative measures of writing behavior. Stepwise multiple regression was used to extract the best set of independent variables predictive of writing quality as measured by the CES.

Results and Discussion

Descriptive Statistics

Means and standard deviations computed for the quantitative and qualitative measures are presented in Table 1.

Insert Table 1 about here

It may be noted that total words written increased steadily across grade levels; whereas, there is a decrease evident in percentage of unique words written between grades four and six and grades nine and twelve. As expected, the percentages of misspelled words decreased across the four grade levels. The average totals of sentences written were less than the totals of T-units written by 29 percent in grades four and six, by 22 percent in grade nine, and by 19 percent in grade twelve. Moreover, the average numbers of words per T-unit were less than the numbers of words per sentence by 47 percent, 37 percent, 31 percent, and 21 percent in grades four, six, nine, and twelve, respectively.

There is a decrease noted for both subscores and the total score of the CES between grades four and six;

whereas, there is minimal change in scores indicated between grades nine and twelve.

The Correlation Analysis

This portion of the analysis was conducted to determine the extent of relationships between the quantitative measures of writing and the results of the CES quality scale. Pearson product-moment correlation matrices for the entire sample at each grade level were computed and tests for significance were applied (Dayton and Stunkard, 1971). The correlations for grades four, six, nine, and twelve are presented in Table 2.

Insert Table 2 about here

Correlations between the quantitative and qualitative measures of written language are indicative of the interactive relationship between the two aspects of measurement. Of the 96 correlations computed ~~across the~~ four grade levels, 71% were significant at the .001 level; these correlations ranged in magnitude from .19 to .64. An additional 20% were significant at either the .01 or the .05 level.

Of particular interest are the significant correlations of the quantitative measures with the General Merit subscore, which is comprised of ratings considered to be relatively subjective in nature, and with the total CES score. Further, the correlations of the quantitative measures with the General Merit subscore and the total score of the CES were generally greater in magnitude than were those between the quantitative measures and the Mechanics subscore, which is comprised of ratings considered to be less subjective in nature. Exceptions to this trend included correlations regarding the two indices of spelling errors and the mean number of words per sentence index; these indices produced negative correlations which were greater in magnitude for the Mechanics subscore than for the General Merit subscore or the total score.

An interesting pattern may be noted regarding the magnitude of the correlations across the four grade levels. The correlations for each set of measures generally tended to decrease as the grade level increased. The only exceptions to this trend occurred at the ninth grade level where all but one of the

correlations of the quantitative measures with the Mechanics subscore and 50% of those with the total CES score increased between grade six and grade nine. The overall pattern seems to indicate that quantitative measures may become less appropriate as indicators of writing quality as grade level and, presumably, complexity of writing increase.

Measures of language productivity. Correlations of the total words and total sentences indices with the CES scores were generally positive and significant. This finding supports similar results reported by Veal (1974): namely, that significant differences in composition length were found between levels of quality. Support was not found, however, for the theory that average number of words per sentence is a stable indicator of facility with the written word (Myklebust, 1965); to the contrary, the correlations between words per sentence and the CES scores were consistently negative, indicating that writers of the poor quality compositions generally used fewer but longer sentences which were, perhaps, improperly punctuated.

When intercorrelations among the quantitative measures were computed, it was found that words per sentence generally did not correlate significantly with total words and that it produced negative correlations of moderate magnitude with total sentences. This secondary finding supports similar results reported by Rubin and Buium (1974) and Trent, et al. (1976), indicating that, perhaps, words per sentence is not as appropriate an indicator of language productivity as are total words and total sentences.

Measure of vocabulary diversity. Surprisingly, percentage of unique words was inversely related to the CES scores across all four grade levels, with one exception. (At the twelfth grade level, the correlation between percentage of unique words and the Mechanics subscore was positive but insignificant, .06.) Although these correlations were not high (range = .01 -.24), 58% of them were significant at the .05 level or better. It was expected that the unique word measure would indicate richness and diversity of vocabulary (Trent, et al., 1976) and, accordingly, would correlate positively with the quality ratings of the CES. The negative

correlations of the index with the CES scores, therefore, are puzzling. Coupled with the fact that two of the productivity measures, total words and total sentences, produced higher and more significant correlations with the CES scores than did the unique word index, this finding seems to indicate that compositions of higher quality generally were greater in length but contained smaller percentages of unique words than did compositions of less quality. This phenomenon can, perhaps, be attributed to a minimal use of articles and conjunctions, which are among the types of words most typically repeated (Betts, 1976), by writers of poor quality themes. Further in-depth analyses of the individual compositions would be needed to confirm this speculation.

Measures of spelling. As anticipated, percentages of total words misspelled and unique words misspelled produced strong negative correlations with the CES scores; these correlations were consistently significant at the .001 level across all four grade levels. This result appears to lend support to earlier findings that fewer spelling errors are made by individuals with higher cognitive abilities (Boder, 1971; Trent et al.,

1976).

Measures of syntactic maturity. All of the correlations between the T-unit indices and the CES scores were significant at the .05 level or better, indicating that syntactic maturity and writing quality are positively related. This finding supports similar results reported by O'Hare (1973), Veal (1974), and Combs (1976): specifically, that T-unit length is indicative of quality. In the present study, total T-unit correlations were greater in magnitude than were those for words per T-unit; however, when quantitative intercorrelations were computed, total T-units produced very strong significant correlations with total words and total sentences but insignificant correlations with words per T-unit. This secondary finding appears to indicate that, perhaps, total T-units represents more a measure of language productivity than of syntactic maturity.

The Multiple Regression Analysis

The power of the quantitative variables in predicting overall writing quality was examined through the use of multiple linear regression models. The eight variables— total words, total sentences, words per

sentence, percentage of unique words written, percentage of total words misspelled, percentage of unique words misspelled, total T-units, and words per T-unit—were included in regression equations to predict each of the two subscores and the total score of the CES for each grade level.

Stepwise regression analysis was employed whereby the predictor variables entered each regression equation in order of their greatest contribution to the increase in R^2. Each entering variable was tested for significance and optimum predictive ability was present when no additional variable entered at a significant level.

The Composition Evaluation Scale was used as an index of the quality of the students' writing performance. Measured against this performance were the students' behaviors in writing as examined through several quantitative measures regarding language productivity, vocabulary diversity, spelling errors, and syntactic maturity. The purpose of this analysis was to produce the best combination of quantitative measures of writing behavior to predict quality of writing performance for each grade level.

In Tables 3 through 6 the results of the regression analyses for the three criterion variables at each grade level are presented. The F values presented were evaluated with 1 and 168 degrees of freedom for grade four, 1 and 226 df for grade six, 1 and 212 for grade nine, and 1 and 254 for grade 12. Only subjects for whom complete sets of data were available were considered in the regression analyses; therefore, revised simple r's are included in the tables for comparison with the coefficients presented previously in Table 2. The .05 level of significance was used.

Insert Tables 3 through 6 about here

Each of the eight quantitative indices used as predictors contributed significantly to the prediction of at least one of the three qualitative variables indexed by the criterion measure. Several inclusion patterns may be noted. Two of the quantitative measures, percentage of unique words misspelled and percentage of unique words written, were each included in 11 of the 12 regression equations computed. Percentage of unique

words misspelled was entered on the first step in six of the equations (including all four of the equations predicting the Mechanics subscore as well as the equations predicting the total CES score for grades six and nine). Percentage of unique words written was not entered on the first step in any of the equations, but its inclusion in 11 of the 12 equations is an interesting finding in light of its negative correlations with the criterion measures, as previously noted in the discussion of the correlation analysis. Total words written was included in 10 of the 12 equations, on the first step for five of them (including all four of the equations predicting the General Merit subscore as well as the equation predicting the Total CES score at the twelfth grade level).

Other variables entering the equations as significant predictors of writing quality included: total sentences written (included in nine equations, on the first step for one equation); mean words per T-unit (included in seven equations); total T-units written (included in three equations); and percentage of total words misspelled and mean words per sentence (each included in one equation).

The effectiveness of prediction of the measures was indicated by the $\underline{R}^2$ statistic. This statistic revealed that from 21% to 57% of the variation in the dependent variable could be ascribed to variation in the independent variables, depending upon grade level and the subscore of the dependent variable. A trend similar to that discussed with respect to the correlation analysis may be noted across grade levels. The value of the computed $\underline{R}^2$ statistic generally decreased as grade level increased (with the same ninth grade exceptions as were noted in the correlation analysis). This finding, again, appears to indicate that quantitative measures may become less appropriate predictors of quality as grade level and writing complexity increase.

Due to the nature of the technique of stepwise multiple regression, several additional observations should be noted at this point. In the stepwise technique the independent variable contributing the most variance is included on the first step of the regression equation. Because the independent variables included on subsequent steps are in reality partial correlations, any variable which has a high correlation with an

independent variable already in the regression equation will have "lost" some of its variance and will, therefore, be less likely to be included in the equation at the specified significance level. This "loss" of variance will lessen the liklihood that such a variable will contribute sufficient variance for inclusion in the equation, even if it is significantly correlated with the dependent measure. This phenomenon appears to have taken place in this study in several instances. For example, the intercorrelations between percentage of total words misspelled and percentage of unique words misspelled ranged from .93 to .97 across the four grade levels. Consequently, only one of these indices was included in the regression equations although both were significantly related to the dependent variables. Similar relationships were noted among the total words, total T-units, and total sentences indices confirming the suggestion noted earlier in this paper that, perhaps, total T-units is more a measure of productivity than of syntactic maturity.

Summary

The results reported in this paper have indicated

that quantitative and qualitative measures of writing skills are, indeed, significantly related. Sizable amounts of the variation in the qualitative assessment of writing performance can be accounted for through the use of these quantitative measures. This finding appears to be particularly applicable at the lower grade levels but tends to become slightly less applicable as grade level increases. Even at the twelfth grade level, however, results indicate that from 21% to 24% of the variation in quality may be attributed to quantitative variables.

Results further indicate that the best set of quantitative predictors of overall writing quality of school-age children includes the following indices:

(a) Measures of language productivity
    (1) total words written
    (2) total sentences written
(b) Measure of vocabulary diversity— percentage of unique words written (inverse relationship noted)
(c) Measure of spelling— percentage of unique words misspelled

(d) Measure of syntactic maturity—mean number of words per T-unit

General implications of these findings are as follows:

(a) Evaluation of written language might be facilitated through the use of quantitative measures as initial indices of quality. This application would be particularly pertinent in situations where large numbers of compositions were involved and computer facilities were available.

(b) Parameters of written language which merit further study include the measures previously listed as significant predictors of quality.

(c) The teaching of structural options to enhance maturity in writing might also enhance quality.

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Table 1

Descriptive Statistics for Quantitative and Qualitative Variables at Each Grade Level

Variable	Grade 4			Grade 6			Grade 9			Grade 12		
	N	$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD
X_1 Total words	197	85.90	43.87	267	110.35	59.41	232	211.49	78.53	287	233.61	76.62
X_2 Total sentences	197	7.80	4.90	267	9.12	5.50	232	14.53	6.32	287	14.42	5.66
X_3 Words per sentence	197	14.92	12.78	267	14.73	9.56	232	16.66	13.07	287	17.38	7.81
X_4 % Unique words	197	60.90	10.61	267	61.30	9.46	232	54.00	7.05	287	54.70	6.90
X_5 % Total words misspelled	197	7.76	7.54	267	4.44	5.46	232	2.95	2.94	287	1.79	1.71
X_6 % Unique words misspelled	197	10.75	9.46	267	6.20	7.04	232	4.61	4.22	287	2.79	2.60
X_7 Total T-units	170	11.02	5.40	228	12.81	7.88	214	18.63	7.07	256	17.88	6.89
X_8 Words per T-unit	170	7.86	2.05	228	9.21	2.38	214	11.57	2.68	256	13.70	3.14
Y_1 General Merit subscore	202	15.01	4.99	284	13.12	5.91	236	19.26	5.43	293	19.58	5.01
Y_2 Mechanics subscore	201	11.39	3.48	284	9.74	3.65	236	12.99	3.56	293	13.55	3.34
Y_3 CES	201	26.36	7.80	284	22.83	8.87	236	32.24	8.31	293	33.11	7.75

Table 2

Correlations of Quantitative Measures of Writing Performance

with the E.T.S. Composition Evaluation Scale

	General Merit Subscore				Mechanics Subscore				Total CES			
	4	6	9	12	4	6	9	12	4	6	9	12
Total words	.59***	.51***	.48***	.34***	.35***	.22***	.33***	.20***	.54***	.43***	.46***	.30***
Total sentences	.58***	.46***	.41***	.23***	.51***	.32***	.42***	.16**	.60***	.44***	.45***	.22***
Words per sentence	-.21**	-.19***	-.14*	-.00	-.35***	-.31***	-.30***	-.12*	-.29***	-.25***	-.22***	-.05
% Unique words	-.24***	-.19***	-.18**	-.05	-.12*	-.01	-.07	.06	-.20**	-.13*	-.15**	-.01
% Total words Misspelled	-.41***	-.37***	-.33***	-.20***	-.55***	-.55***	-.59***	-.32***	-.51***	-.47***	-.47***	-.27***
% Unique words Misspelled	-.40***	-.38***	-.32***	-.19***	-.56***	-.57***	-.64***	-.35***	-.50***	-.48***	-.48***	-.27***
Total T-units	.56***	.40***	.33***	.16**	.35***	.12*	.22***	.08	.52***	.32***	.31***	.14**
Words per T-unit	.17**	.13*	.32***	.20***	.13*	.11*	.23***	.11*	.17**	.13*	.31***	.18**

*p<.001

**p<.01

***p<.05

Table 3

Stepwise Regression for the Quantitative Measures of Written Language as Predictors of the E.T.S. Composition Evaluation Scale, Grade Four

Step number	Variable	F to enter equation	Significance	R^2	r
	General Merit Subscore				
1	Total words written	93.75	.000	.36	.60
2	% Unique words misspelled	23.37	.000	.44	-.40
3	Total sentences written	7.18	.008	.46	.58
4	% Unique words written	6.91	.009	.48	-.26
	Mechanics Subscore				
1	% Unique words misspelled	76.76	.000	.31	-.56
2	Total sentences written	41.70	.000	.45	.51
3	Words per T-unit	6.15	.014	.47	.13
4	% Unique words written	6.20	.014	.49	-.15
	Total CES Score				
1	Total sentences written	95.02	.000	.36	.60
2	% Unique words misspelled	38.03	.000	.48	-.50
3	Words per T-unit	12.59	.001	.52	.17
4	Total words written	5.49	.020	.54	.56

Table 4

Stepwise Regression for the Quantitative Measures of Written Language as Predictors of the E.T.S. Composition Evaluation Scale, Grade Six

Step number	Variable	F to enter equation	Significance	R^2	r
	General Merit Subscore				
1	Total words written	80.20	.000	.26	.51
2	% Unique words misspelled	28.73	.000	.35	-.37
3	% Unique words writtwn	7.48	.007	.37	-.21
4	Total T-units written	5.66	.018	.38	.40
5	Total sentences written	13.46	.000	.42	.44
	Mechanics Subscore				
1	% Unique words misspelled	117.03	.000	.34	-.58
2	Total sentences written	9.54	.002	.37	.29
3	% Unique words written	8.82	.003	.39	-.01
4	Words per T-unit	6.68	.010	.41	.11
5	Words per sentence	4.23	.041	.42	-.29
	Total CES Score				
1	% Unique words misspelled	68.67	.000	.23	-.48
2	Total words written	43.63	.000	.36	.42
3	% Unique words written	9.23	.003	.38	-.15
4	Total sentences written	5.42	.021	.40	.41
5	Total T-units written	18.81	.000	.44	.32

Table 5

Stepwise Regression for the Quantitative Measures of Written Language as Predictors of the E.T.S. Composition Evaluation Scale, Grade Nine

Step number	Variable	F to enter equation	Significance	R^2	r
	General Merit Subscore				
1	Total words written	59.88	.000	.22	.47
2	% Unique words misspelled	13.36	.000	.27	-.33
3	% Unique words written	11.34	.001	.30	-.18
4	Words per T-unit	9.33	.003	.33	.32
5	Total sentences written	8.16	.005	.36	.41
	Mechanics Subscore				
1	% Unique words misspelled	146.33	.000	.41	-.64
2	Total sentences written	23.06	.000	.47	.42
3	Total T-units written	24.17	.000	.52	.22
4	Total words written	17.91	.000	.56	.34
5	% Unique words written	7.27	.008	.57	-.07
	Total CES Score				
1	% Unique words misspelled	67.53	.000	.24	-.49
2	Total words written	38.02	.000	.36	.46
3	% Unique words written	16.79	.000	.40	-.14
4	Words per T-unit	10.16	.002	.43	.31
5	Total sentences written	17.18	.000	.48	.45

Table 6

Stepwise Regression for the Quantitative Measures of Written Language as Predictors of the E.T.S. Composition Evaluation Scale, Grade Twelve

Step number	Variable	F to enter equation	Significance	R^2	r
General Merit Subscore					
1	Total words written	28.28	.000	.10	.32
2	% Unique words written	18.15	.000	.16	-.04
3	% Total words misspelled	9.99	.002	.19	-.19
4	Words per T-unit	7.05	.008	.21	.20
Mechanics Subscore					
1	% Unique words misspelled	33.18	.000	.12	-.34
2	Total words written	7.26	.008	.14	.18
3	% Unique words written	29.45	.000	.23	.08
Total CES Score					
1	Total words written	21.70	.000	.08	.28
2	% Unique words written	23.49	.000	.16	.01
3	% Unique words misspelled	21.81	.000	.22	-.26
4	Words per T-unit	4.80	.029	.24	.18