

THE ATTAINMENTS OF FIRST-YEAR TYPEWRITING STUDENTS  
ON DIFFERENT GRADE LEVELS AND IN DIFFERENT SIZE SCHOOLS  
IN SELECTED HIGH SCHOOLS IN OKLAHOMA  
DURING THE YEAR 1940-1941

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DURING THE YEAR 1940-1941

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Chapter I  
INTRODUCTION

Beta Chapter of Delta Pi Epsilon, a national honorary organization of graduate students in business education at Oklahoma Agricultural and Mechanical College, voted in June, 1940 to sponsor annually some worth-while project that would point out some significant facts and implications in the field of business education.

During the school year 1940-1941 the first of these research projects, "A Study of the Attainments of First-year Typewriting Students in the State of Oklahoma at Five-week Intervals during the Year 1940-1941," was conducted.<sup>1</sup> In making this study 7,115 straight-copy speed test papers were collected and checked under the sponsorship of Beta Chapter of Delta Pi Epsilon. These test papers were collected at five different periods from twenty-two white high schools widely scattered throughout the state. From these papers attainments were measured in terms of gross words a minute and per cent of accuracy. Comparisons were made of the attainments between boys and girls and to some extent between those students with vocational and non-vocational objectives. Norms were set up which may be used as standards for typewriting classes.

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<sup>1</sup> Margaret Robertson Neece, "A Study of the Attainments of First-year Typewriting Students in the State of Oklahoma at Five-week Intervals during the Year 1940-1941." Unpublished Master's Thesis. Stillwater, Oklahoma: Oklahoma Agricultural and Mechanical College, 1941.

This study should give teachers an opportunity to compare their students with the averages or norms already presented. This comparison should lead to an evaluation on the part of teachers of the classroom procedures and techniques employed by them. If this is done, the purpose of Beta Chapter of Delta Pi Epsilon in sponsoring this study will have been achieved.<sup>2</sup>

### Purpose

The purpose of this immediate study is to carry this 1940-1941 project a little further and, by using the material collected and checked at that time, determine the differences in attainments, if any, in first-year typewriting students on different grade levels, and, also, to determine the differences, if any, in first-year typewriting students in the different size white secondary schools in Oklahoma.

Specifically this study has a four-fold purpose:

(1) To determine the attainments of first-year typewriting students in the tenth, eleventh, and twelfth grades according to test periods.

(2) To compare the attainments of first-year typewriting students in the tenth, eleventh, and twelfth grades according to test periods.

(3) To determine the attainments of first-year typewriting students in the different size schools according to test periods.

(4) To compare the attainments of first-year typewriting students in the different size schools according to test periods.

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<sup>2</sup> Margaret Robertson Neece, op. cit., p. 42.



### Need for Study

There exists at the present time a question as to the attainments of students in first-year typewriting on different grade levels. High school inspectors do not recommend first-year typewriting for sophomores, therefore, it is desired that a study be made to determine the attainments of sophomores in comparison with that of juniors and seniors. It is hoped that this study will give some implications as to the most advantageous time to begin the study of typewriting in high school.

There, also, exists at the present time a question about the quality of instruction in small schools in comparison with that in large schools. Therefore, it is worth-while that such a study be made.

### Scope

This study will be made of typewriting attainments in terms of gross words a minute and per cent of accuracy checked according to the 1939 International Typewriting Rules (see appendix for copy).

The purpose of this study is not to reveal individual attainments, but rather to indicate the prevailing attainments of the groups studied.

No attempt is to be made to study sex differences as this has been done in the previous study.

The material used as the basis of this study is 7,115 straight-copy speed test papers collected and checked in 1940-1941 under the sponsorship of Beta Chapter of Delta Pi

Epsilon, a national fraternity for graduate students in business education. These tests were given in beginning typewriting classes in twenty-two widely scattered white high schools, all of which were in the State of Oklahoma, and the students participating were those who had had no instruction in typewriting previous to the 1940-1941 school year. The tests were secured from the Gregg Publishing Company (copies of each test given may be found in the appendix). They were chosen by a committee representing Beta Chapter of Delta Pi Epsilon because it was quite unlikely that they would be familiar to any first-year typewriting student in the state.

The first test was given during the thirteenth week after the beginning of school and was five minutes in length, while the remaining four tests of ten-minutes in length were given in succeeding five-week intervals. The second test was given during the eighteenth week; the third test during the twenty-third week; the fourth test during the twenty-eighth week; and the last test during the thirty-third week of school. Each student was asked to put the following information at the top of his test paper: (1) The Code Number by which the school was known, (2) Age, (3) Grade in School, (4) Sex, (5) Strokes, (6) Gross Words, (7) Errors, (8) Net Words, (9) Words Per Minute, and (10) Per Cent of Accuracy.

The following was the method used in determining gross words a minute and per cent of accuracy:

Strokes + 5 = Gross Words  
 Errors x 10 = Penalty  
 Gross Words - Penalty = Net Words  
 Net Words + Gross Words = Per Cent of Accuracy  
 Gross Words + Length of Test = Gross Words a Minute

The papers were first checked by the student or one of his classmates. They were then rechecked by various business education groups and faculty members on the campus of Oklahoma Agricultural and Mechanical College, by individual teachers giving the tests, or by the Delta Pi Epsilon members sponsoring the tests in that school. All results were obtained by using 1939 International Typewriting Rules.

#### Procedure

The test papers were first sorted into five groups according to the test period. After the papers were sorted in this manner, each group was then divided as to the student's classification, that is, sophomore, junior, or senior.

The gross words a minute and per cent of accuracy were tabulated according to the grade level of the students.

Papers were replaced into their five original test-period groups and then they were divided each into four classifications according to the size of high school that each student attended. The division was based upon the North Central Association division of schools, which has the following four groups according to enrollment: 0-199, 200-499, 500-999, and those over 1000.

Tabulations were again made showing gross words a minute and per cent of accuracy.

Using these tabulations, frequency tables for gross words a minute and per cent of accuracy were set up for these groups. Results were obtained and verified by the application of various statistical formulae.

Wherever possible this study follows the form and procedures used in the earlier study, "A Study of the Attainments of First-year Typewriting Students in the State of Oklahoma at Five-week Intervals during the Year 1940-1941," in order that data may be compared if desired.

## Chapter II

### DATA REGARDING AVAILABLE MATERIAL

Since the material to be used in this research has been used in a previous study it is first necessary to determine the extent of the data available for the immediate study.

Tables I and II (see following pages) give the locations of the twenty-two schools in Oklahoma who contributed test papers for the study to determine the attainments of first-year high school typewriting students in the state at five-week intervals during the year. The locations of the schools are fairly well distributed over the state, with the greatest number appearing in the north eastern section. This may be due to the fact that most Delta Pi Epsilon members are located in the north eastern part of Oklahoma. There are no schools representing the extreme north western section.

The schools are classified according to the North Central Association division of schools. There are four schools with a total enrollment of less than 199; eight with an enrollment between 200-499; five with an enrollment between 500 and 999; and five schools with a total enrollment of over 1000.

Table III shows the per cent of students representing different grade levels. Although the papers contributed by the junior group range from 53.4 per cent on test one to 60.7 per cent on test three, an adequate number of test papers were contributed by the sophomore and senior groups to make a study of the attainments of each group.

TABLE 1<sup>1</sup>

## GENERAL INFORMATION CONCERNING SCHOOLS PARTICIPATING

School	Total Highschool Enrollment	Commerce Department Enrollment	Typewriting Instructors
Tulsa: Central High	3400	2100	4
Oklahoma City: Central Classen	2300 1997	(No Count) 1500	3 2
Enid	1200	702	4
Ponca City	1000	498	4
Stillwater	968	252	2
Lawton	800	300	1
Sapulpa	732	288	2
Bristow	566	219	1
Idabel	559	166	1
Stilwell	386	117	1
Hugo	370	122	2
Heavener	350	115	1
Bixby	350	150	2
Oklahoma City: Northeast	320	175	2
Cleveland	300	128	1
Pryor	380	120	1
Yukon	235	45	1
Sayre	190	107	3
Dale	135	65	1
Pleasant Hill Con. Dist. 65 Southeast of Drumright	50	20	1
Foraker	45	20	1

<sup>1</sup> Margaret Robertson Neece, op. cit., Appendix

## TABLE II

## DISTRIBUTION OF SCHOOLS



## Enrollment

- 0-199
- 200-499
- 500-999
- Over 1000

T A B L E I I I  
 PER CENT OF STUDENTS REPRESENTING  
 DIFFERENT GRADE LEVELS

Grade Level	Test 1	Test 2	Test 3	Test 4	Test 5
Sophomore	20.6	12.9	10.7	15.0	12.5
Junior	53.4	57.4	60.7	54.8	55.6
Senior	23.3	25.3	24.9	24.1	25.7
Unclassified	2.7	4.4	3.7	6.1	6.2
<b>TOTAL</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

This table should be read as follows: Sophomores contributed 20.6 per cent of the papers on test one; 12.9 per cent on test two; 10.7 per cent on test three; 15.0 per cent on test four; and 12.5 per cent on test five.



Table IV presents the per cent of students representing different size schools. When the different schools are put into the North Central divisions according to size, the schools with a total enrollment of over 1000 consistently contributed the greatest number of papers. The per cent of test papers received from the schools with an enrollment of less than 199 was consistently low, probably due to the number of students enrolled and also to the small number of schools representing this division.

A study to determine the attainments of first-year typewriting students on different grade levels and different size schools in Oklahoma is limited because of the small representation of test papers from the sophomore group and from the schools with an enrollment of less than 199.

TABLE IV<sup>2</sup>

## PER CENT OF STUDENTS REPRESENTING DIFFERENT SIZE SCHOOLS

Total Enrollment	Number In All Schools	Per Cent of Total Enrollment		Per Cent of Total Papers Received				
		In All Schools	In first Year Typewriting	Test 1	Test 2	Test 3	Test 4	Test 5
1000 & over	5	59.5	51.0	39.7	38.3	31.7	47.1	36.3
500 - 999	5	21.8	23.4	25.7	15.0	12.5	15.0	17.1
200 - 499	8	16.2	20.8	21.7	17.7	26.4	21.6	28.7
0 - 199	4	2.5	4.8	3.9	4.7	3.5	5.4	5.3
Papers Unaccounted For:				9.0	24.3	25.9	10.9	12.6
TOTAL	22	100.0	100.0	100.0	100.0	100.0	100.0	100.0

This table should be read as follows: Five of the twenty-two schools had an enrollment of 1,000 or over. Enrollment in these five schools represented 59.5 per cent of the enrollment in all the twenty-two schools and enrollment in first-year typewriting in these five schools was 51 per cent of the enrollment in first-year typewriting in the twenty-two schools. This group contributed 39.7 per cent of the papers on test one; 38.3 per cent on test two; 31.7 per cent on test three; 47.1 per cent on test four; and 36.3 per cent on test five.

<sup>2</sup> Margaret Robertson Neece, op. cit., Appendix

## Chapter III

### FINDINGS

In Chapter I a previous study of attainments in first-year typewriting was described and explained, the purpose and need of this study were given, and the scope and procedure used were briefly outlined. The extent of the material available for use in this study was determined in Chapter II.

The results will be presented in this chapter. Tables will be used to express the findings and comparisons will be made wherever possible. Little discussion is necessary except to point out outstanding and significant facts.

#### Test I Given During the Thirteenth Week

The test papers for Test I, given during the thirteenth week of school, were divided into three groups according to the grade level of the student. In this study papers are used from the tenth, eleventh, and twelfth grade students.

Frequency tables for gross words a minute and per cent of accuracy were set up for these groups and the various statistical formulae applied (see appendix).

The papers were then divided into four groups according to the size of the school. The division in this study is based upon the North Central Association division of schools, which divides schools according to the enrollment. These divisions are 0-199, 200-499, 500-999, and those over 1000. A repetition of the procedure outlined in the preceding paragraph was made.

Tables V, VI, VII, and VIII (pages 16, 17, 18, and 19) present the findings on this first test.

The mean, which is commonly called the average, is given below the total number of students in each division. The standard deviation, measure of spread or dispersion, in a normal curve, is the distance above and below the mean that includes 68.26 per cent of all cases. This is used because few students, if any, will have scores coinciding exactly with the mean.

When Table V is examined in detail it is evident that 367 students, classified as sophomores, participated in Test 1. The average gross words a minute for this group was 24.94. The standard deviation was found to be 7.23. It may then be said that approximately two-thirds of the 367 students wrote between 17.71 and 32.17 words a minute. All standard deviations throughout this chapter are to be interpreted in the same manner.

It appears that at the end of the thirteen weeks of typewriting the students classified as seniors wrote about two gross words a minute faster than the students classified as sophomores. It is necessary to test whether or not the difference in speed is a real one, or whether it was caused by chance factors. This test may be made by interpreting the difference in the speeds of the two groups in terms of the standard error and the probable error of the two means.

The ratio of the difference between the two original means to its standard error is known as the critical ratio.

In this case, it is large enough that the difference of the means is considered real or significant. When the critical ratio is more than three, it is practically certain that the difference is a real and true one.

Although the junior group wrote about one gross word faster than the sophomore group the difference is not considered significant as indicated by the critical ratio of 1.92. Similarly, seniors wrote faster than juniors by about one gross word a minute. This difference is not significant.

Table VI is based upon the per cent of accuracy and may be interpreted in the same way as Table V. The junior students had a higher per cent of accuracy than the sophomore students. The critical ratio indicates that this difference is not due to chance but is significant of a real difference between the junior and sophomore students during the thirteenth week of school. The apparent difference between sophomores and seniors is significant as borne out by the critical ratio of 4.51.

Table VII (page 18) shows the attainments for test one in terms of gross words a minute for students in the different size schools. It seems that there is little difference in speed in the four groups; however, there is a significant difference between the students from high schools with an enrollment of 200-499 and the students from the schools of over 1000. Similarly, the critical ratio indicates that there is a real difference in the speed of those from schools of 200-499 and the schools of 500-999.

## T A B L E V

## Test 1

ATTAINMENTS IN TERMS OF GROSS WORDS A MINUTE  
FOR 1,780 STUDENTS ON A STRAIGHT-COPY TEST DURING  
THE THIRTEENTH WEEK

Gross Words A Minute	GRADE LEVEL				TOTAL
	Sopho- more	Junior	Senior	Unclassi- fied	
7- 9		2	3		5
10-12	11	11	5	3	30
13-15	18	36	15	1	70
16-18	42	105	39	9	195
19-21	65	158	54	6	282
22-24	62	179	70	9	320
25-27	65	144	73	5	287
28-30	42	109	44	6	201
31-33	21	73	39	2	135
34-36	20	50	30	3	103
37-39	12	52	22	2	88
40-42	4	19	9	1	33
43-45	1	5	8	1	15
46-48	1	4	3	2	10
49-51	1	1			2
52-54		1			1
55-57	1	1			2
58-60	1				1
<b>TOTAL</b>	<b>367</b>	<b>950</b>	<b>414</b>	<b>49</b>	<b>1780</b>
Mean	24.94	25.78	26.62	25.70	
Standard Deviation	7.23	7.15	7.51	8.88	
Critical Ratio					
	Sopho- more	Sopho- more	Junior	Senior	
	more	....	1.89	3.18	
	Junior	1.89	....	1.92	
	Senior	3.18	1.92	....	

This table should be read as follows: No student from the sophomore group, two from the junior group, and three from the senior group wrote between seven and ten words a minute.

T A B L E V I

## Test 1

ATTAINMENTS IN TERMS OF PER CENT OF ACCURACY  
FOR 1,780 STUDENTS ON A STRAIGHT-COPY TEST DURING  
THE THIRTEENTH WEEK

Per Cent of Accuracy	GRADE LEVEL				TOTAL
	Sopho- more	Junior	Senior	Unclassi- fied	
0	73	104	45	7	239
1- 10	10	12	11		33
11- 20	11	41	9	3	64
21- 30	23	49	16	3	91
31- 40	21	72	24	3	120
41- 50	30	91	29	2	152
51- 60	41	106	53	6	206
61- 70	57	144	70	8	279
71- 80	48	150	59	7	264
81- 90	36	117	56	3	212
91-100	17	64	42	7	130
<b>TOTAL</b>	<b>367</b>	<b>950</b>	<b>414</b>	<b>49</b>	<b>1780</b>
Mean	46.19	57.36	56.92	53.55	
Standard Deviation	35.59	29.78	30.24	32.36	
Critical Ratio					
	Sopho- more	Sopho- more	Junior	Senior	
Sopho- more	....	....	5.32	4.51	
Junior	5.32	....	....	.25	
Senior	4.51	4.51	.25	....	

This table should be read as follows: 73 sophomores, 104 juniors, and 45 seniors wrote with 0 per cent accuracy.

## T A B L E V I I

## Test 1

ATTAINMENTS IN TERMS OF GROSS WORDS A MINUTE  
FOR 1,780 STUDENTS ON A STRAIGHT-COPY TEST DURING  
THE THIRTEENTH WEEK

Gross Words A Minute	SIZE OF SCHOOL				TOTAL
	(Enrollment)				
	0-199	200-499	500-999	Over 1000	
7- 9		2	1	2	5
10-12	3	6	8	13	30
13-15	2	19	17	32	70
16-18	10	36	61	89	195
19-21	8	57	90	127	282
22-24	8	67	93	152	320
25-27	13	53	91	151	288
28-30	11	42	51	97	201
31-33	7	44	32	62	135
34-36	5	41	25	32	103
37-39	8	29	23	28	88
40-42	2	17	3	11	33
43-45		8	2	5	15
46-48		3	4	2	9
49-51				2	2
52-54				1	1
55-57			1	1	2
58-60			1		1
<b>TOTAL</b>	<b>77</b>	<b>424</b>	<b>503</b>	<b>776</b>	<b>1780</b>
<b>Mean</b>	<b>26.69</b>	<b>27.34</b>	<b>25.24</b>	<b>25.22</b>	
<b>Standard Deviation</b>	<b>7.63</b>	<b>7.96</b>	<b>7.21</b>	<b>6.91</b>	
<b>Critical Ratio</b>					
	0-199	200-499	500-999	Over 1000	
0-199	....	.68	1.56	1.63	
200-499	.68	....	4.26	4.62	
500-999	1.56	4.26	....	.05	
Over 1000	1.63	4.62	.05	....	



TABLE VIII

## Test 1

ATTAINMENTS IN TERMS OF PER CENT OF ACCURACY  
FOR 1,780 STUDENTS ON A STRAIGHT-COPY TEST DURING  
THE THIRTEENTH WEEK

Per Cent of Accuracy	SIZE OF SCHOOL (Enrollment)				TOTAL
	0-199	200-499	500-999	Over 1000	
0	3	37	95	94	229
1- 10	1	4	13	15	33
11- 20	3	11	22	28	64
21- 30	1	22	36	32	91
31- 40	4	26	47	33	110
41- 50	4	34	45	69	152
51- 60	8	44	48	106	206
61- 70	21	72	69	127	289
71- 80	8	75	54	127	264
81- 90	12	55	54	91	212
91-100	12	44	20	54	130
<b>TOTAL</b>	<b>77</b>	<b>424</b>	<b>503</b>	<b>776</b>	<b>1780</b>
<b>Mean</b>	<b>65.22</b>	<b>58.95</b>	<b>45.05</b>	<b>54.63</b>	
<b>Standard Deviation</b>	<b>28.39</b>	<b>29.11</b>	<b>31.98</b>	<b>30.10</b>	

## Critical Ratio

	0-199	200-499	500-999	Over 1000
0-199	....	4.42	13.72	9.37
200-499	4.42	....	6.92	2.43
500-999	13.72	6.92	....	6.43
Over 1000	9.37	2.43	6.43	....

In Table VIII (page 19) it may be noted that those from the small schools had a higher per cent of accuracy than any of the other groups. The differences are significant. The critical ratios will bear out this statement.

Test 2 Given During the Eighteenth Week

Tables IX, X, XI, and XII (pages 21, 22, 23, and 24) present the results obtained from test two which was given during the eighteenth week of school. One hundred fifty-three sophomores, 694 juniors, and 286 seniors participated in this test. There was only a slight variation in the mean gross words a minute.

The small differences in per cent of accuracy of the students on various grade levels is not indicative of a significant difference.

Table XI includes 72 students from the high schools with an enrollment of 0-199, 277 from the schools of 200-499, 235 from the schools of 500-999, and 600 from the schools of over 1000.

The mean gross words a minute for the first group was 29.25, the second group 32.09, the third group 30.19, and the last group 20.12. The second group wrote significantly faster.

The per cent of accuracy attainments of students who took the test during the eighteenth week of school is found in Table XII. The students from the third size schools wrote with less accuracy and the differences are enough to be significant.

## T A B L E I X

## Test 2

ATTAINMENTS IN TERMS OF GROSS WORDS A MINUTE  
FOR 1,185 STUDENTS ON A STRAIGHT-COPY TEST DURING  
THE EIGHTEENTH WEEK

Gross Words A Minute	GRADE LEVEL				TOTAL
	Sopho- more	Junior	Senior	Unclassi- fied	
10-12	2	2			4
13-15	2	4	3		9
16-18	6	20	7		33
19-21	17	41	17	7	82
22-24	18	73	21	3	115
25-27	18	94	53	10	175
28-30	28	145	38	10	221
31-33	24	118	44	9	195
34-36	18	92	38	6	154
37-39	9	56	35	5	105
40-42	4	27	12	1	44
43-45	3	16	9	1	29
46-48	4	2	5		11
49-51		3	3		6
52-54		1	1		2
<b>TOTAL</b>	<b>153</b>	<b>694</b>	<b>286</b>	<b>52</b>	<b>1185</b>
<b>Mean</b>	<b>29.32</b>	<b>30.90</b>	<b>31.47</b>	<b>29.96</b>	
<b>Standard Deviation</b>	<b>7.36</b>	<b>6.23</b>	<b>7.25</b>	<b>5.92</b>	
Critical Ratio					
	Sopho- more	Sopho- more	Junior	Senior	
	more	....	2.47	2.95	
	Junior	2.47	....	1.16	
	Senior	2.95	1.16	....	

This table should be read as follows: Two students from the sophomore group, two from the junior group, and none from the senior group wrote between ten and thirteen words a minute.

## T A B L E X

## Test 2

ATTAINMENTS IN TERMS OF PER CENT OF ACCURACY  
FOR 1,185 STUDENTS ON A STRAIGHT-COPY TEST DURING  
THE EIGHTEENTH WEEK

Per Cent of Accuracy	GRADE LEVEL				TOTAL
	Sopho- more	Junior	Senior	Unclassi- fied	
0	14	47	12	4	77
1- 10	2	9	6	2	19
11- 20	3	26	2	2	33
21- 30	11	20	16	3	50
31- 40	13	43	16	2	74
41- 50	20	71	35	10	136
51- 60	16	90	36	4	146
61- 70	20	121	32	8	181
71- 80	32	113	49	7	201
81- 90	18	109	64	6	197
91-100	4	45	18	4	71
<b>TOTAL</b>	<b>153</b>	<b>694</b>	<b>286</b>	<b>52</b>	<b>1185</b>
Mean	53.97	58.97	59.81	53.50	
Standard Deviation	27.51	26.21	25.43	29.48	
Critical Ratio					
	Sopho- more	Sopho- more	Junior	Senior	
	more	....	2.07	2.19	
	Junior	2.07	....	.47	
	Senior	2.19	.47	....	

This table should be read as follows: Fourteen students from the sophomore group, forty-seven from the junior group, and twelve from the senior group wrote with 0 per cent accuracy.

TABLE XI

## Test 2

ATTAINMENTS IN TERMS OF GROSS WORDS A MINUTE  
FOR 1,185 STUDENTS ON A STRAIGHT-COPY TEST DURING  
THE EIGHTEENTH WEEK

Gross Words A Minute	SIZE OF SCHOOL (Enrollment)				TOTAL
	0-199	200-499	500-999	Over 1000	
	10-12	1	1		
13-15		4		5	9
16-18	2	10	5	16	33
19-21	10	17	19	36	82
22-24	11	15	31	58	115
25-27	6	35	36	98	175
28-30	9	42	40	130	221
31-33	15	38	32	110	195
34-36	12	45	34	65	154
37-39	4	30	29	42	105
40-42		15	6	23	44
43-45	3	15	1	10	29
46-48		4	1	6	11
49-51		4	1	1	6
52-54		2			2
<b>TOTAL</b>	<b>73</b>	<b>277</b>	<b>235</b>	<b>600</b>	<b>1185</b>
<b>Mean</b>	<b>29.25</b>	<b>32.09</b>	<b>30.19</b>	<b>30.12</b>	
<b>Standard Deviation</b>	<b>6.86</b>	<b>7.88</b>	<b>6.29</b>	<b>6.37</b>	

## Critical Ratio

	0-199	200-499	500-999	Over 1000
0-199	.....	7.47	2.61	2.42
200-499	7.47	.....	5.14	5.18
500-999	2.61	5.14	.....	.20
Over 1000	2.42	5.18	.20	.....

TABLE XII

## Test 2

ATTAINMENTS IN TERMS OF PER CENT OF ACCURACY  
FOR 1,185 STUDENTS ON A STRAIGHT-COPY TEST DURING  
THE EIGHTEENTH WEEK

Per Cent of Accuracy	SIZE OF SCHOOL (Enrollment)				TOTAL
	0-199	200-499	500-999	Over 1000	
0	4	15	19	39	77
1- 10		6	4	9	19
11- 20		10	9	14	33
21- 30	1	14	13	22	50
31- 40	4	21	16	33	74
41- 50	16	18	39	63	136
51- 60	6	27	42	71	146
61- 70	9	47	36	89	181
71- 80	10	47	31	113	201
81- 90	15	52	21	109	197
91-100	8	20	5	38	71
<b>TOTAL</b>	<b>73</b>	<b>277</b>	<b>235</b>	<b>600</b>	<b>1185</b>
<b>Mean</b>	<b>63.53</b>	<b>60.15</b>	<b>51.79</b>	<b>60.40</b>	
<b>Standard Deviation</b>	<b>24.98</b>	<b>27.23</b>	<b>25.56</b>	<b>26.65</b>	

## Critical Ratio

	0-199	200-499	500-999	Over 1000
0-199	....	2.49	8.39	2.19
200-499	2.49	....	5.93	.17
500-999	8.39	5.93	....	5.86
Over 1000	2.19	.17	5.86	....

### Test 3 Given During the Twenty-third Week

The third test was given during the twenty-third week of school and the number of papers received was small in comparison with the other tests. There were 72 papers from the sophomores, 406 from the juniors, and 167 from the seniors.

The average gross words a minute for the junior class was 37.21 and is significantly higher than the sophomores and seniors. Similarly, the mean per cent of accuracy of the junior group was higher than either of the others. The critical ratio indicates that the differences are significant of a real difference.

The test papers for test three which were used to comprise Table XV (page 28) included 32 papers from the schools with 0-199 students, 239 from the schools with 200-499 students, 113 from the schools with 500-999 students, and 286 from the schools of over 1000 students.

The students from the schools with an enrollment of 500-999 wrote faster. The differences are significant.

Table XVI (page 29) shows the attainments in terms of per cent of accuracy for test three. The students from the schools classified as second in size wrote with a higher per cent of accuracy than the students from the schools classified as third in size. However, the students from the schools fourth in size, or the largest schools, had a higher per cent of accuracy than did the second-size group.

Since fewer papers were received from this test the tables should be viewed with the understanding that they are probably not an adequate sample.

TABLE XIII

## Test 3

ATTAINMENTS IN TERMS OF GROSS WORDS A MINUTE  
FOR 670 STUDENTS ON A STRAIGHT-COPY TEST DURING  
THE TWENTY-THIRD WEEK

Gross Words A Minute	GRADE LEVEL				TOTAL
	Sopho- more	Junior	Senior	Unclasi- fied	
10-12	1			1	2
13-15	1	1	1		3
16-18	1	6	7		14
19-21	2	11	7	2	22
22-24	5	18	15	3	41
25-27	11	44	15	2	72
28-30	11	50	20	5	86
31-33	10	74	16	3	103
34-36	10	82	29	4	125
37-39	10	58	21	2	91
40-42	2	29	20	1	52
43-45	2	19	6	1	30
46-48	3	6	3		12
49-51		4	1		5
52-54		1	3		4
55-57		3	1	1	5
58-60			2		2
61-63					0
64-66	1				1
<b>TOTAL</b>	<b>72</b>	<b>406</b>	<b>167</b>	<b>25</b>	<b>670</b>
<b>Mean</b>	<b>32.67</b>	<b>37.21</b>	<b>34.56</b>	<b>31.30</b>	
<b>Standard Deviation</b>	<b>8.44</b>	<b>7.00</b>	<b>8.66</b>	<b>8.86</b>	

## Critical Ratio

	Sopho- more	Junior	Senior
Sopho- more	....	4.32	1.58
Junior	4.32	....	3.53
Senior	1.58	3.53	....

This table should be read as follows: One student from the sophomore group, none from the junior group, and none from the senior group wrote between ten and thirteen words a minute.



T A B L E X I V

Test 3

ATTAINMENTS IN TERMS OF PER CENT OF ACCURACY  
FOR 670 STUDENTS ON A STRAIGHT-COPY TEST DURING  
THE TWENTY-THIRD WEEK

Per Cent of Accuracy	GRADE LEVEL				TOTAL
	Sopho- more	Junior	Senior	Unclassi- fied	
0	6	7	4	1	18
1- 10	2	2	2	1	7
11- 20	3	5	5		13
21- 30	6	7	7	1	21
31- 40	7	17	11	1	36
41- 50	5	29	7	3	44
51- 60	8	47	19	2	76
61- 70	10	59	24	5	98
71- 80	16	64	41	3	124
81- 90	5	114	38	5	160
91-100	4	55	11	3	73
<b>TOTAL</b>	<b>72</b>	<b>406</b>	<b>167</b>	<b>25</b>	<b>670</b>
Mean	52.94	70.61	65.22	63.60	
Standard Deviation	28.32	21.61	23.61	26.21	

## Critical Ratio

	Sopho- more	Junior	Senior
Sopho- more	....	4.91	3.15
Junior	4.91	....	2.54
Senior	3.15	2.54	....

This table should be read as follows: Six students from the sophomore group, seven from the junior group, and four from the senior group wrote with 0 per cent accuracy.

TABLE XV

## Test 3

ATTAINMENTS IN TERMS OF GROSS WORDS A MINUTE  
FOR 670 STUDENTS ON A STRAIGHT-COPY TEST DURING  
THE TWENTY-THIRD WEEK

Gross Words A Minute	SIZE OF SCHOOL (Enrollment)				TOTAL
	0-199	200-499	500-999	Over 1000	
10-12				2	2
13-15	1	2			3
16-18	1	9		4	14
19-21	3	9	1	9	22
22-24	1	17	3	20	41
25-27	4	24	11	33	72
28-30	3	17	13	53	86
31-33	4	31	18	50	103
34-36	3	43	19	60	125
37-39	2	30	28	31	91
40-42	3	25	10	14	52
43-45	1	18	5	6	30
46-48	1	7	2	2	12
49-51	1	2	1	1	5
52-54		3	1		4
55-57	1	2	1	1	5
58-60	2				2
61-63					0
64-66	1				1
<b>TOTAL</b>	<b>32</b>	<b>239</b>	<b>113</b>	<b>286</b>	<b>670</b>
<b>Mean</b>	<b>35.41</b>	<b>31.24</b>	<b>35.37</b>	<b>32.11</b>	
<b>Standard Deviation</b>	<b>12.65</b>	<b>8.21</b>	<b>6.29</b>	<b>6.29</b>	
<b>Critical Ratio</b>					
	0-199	200-499	500-999	Over 1000	
0-199	....	1.79	.02	1.43	
200-499	1.79	....	5.16	1.34	
500-999	.02	5.16	....	4.66	
Over 1000	1.43	1.34	4.66	....	

## T A B L E X V I

## Test 3

ATTAINMENTS IN TERMS OF PER CENT OF ACCURACY  
FOR 670 STUDENTS ON A STRAIGHT-COPY TEST DURING  
THE TWENTY-THIRD WEEK

Per Cent of Accuracy	SIZE OF SCHOOL (Enrollment)				TOTAL
	0-199	200-499	500-999	Over 1000	
0		5	5	8	18
1- 10	1		4	2	7
11- 20	1	3	5	4	13
21- 30	1	7	10	3	21
31- 40	2	12	12	10	36
41- 50	2	17	12	13	44
51- 60	3	26	23	24	76
61- 70	6	36	17	39	98
71- 80	11	51	13	49	124
81- 90	2	54	8	96	160
91-100	3	28	4	38	73
<b>TOTAL</b>	<b>32</b>	<b>239</b>	<b>113</b>	<b>286</b>	<b>670</b>
<b>Mean</b>	<b>64.75</b>	<b>68.89</b>	<b>51.31</b>	<b>72.12</b>	
<b>Standard Deviation</b>	<b>21.76</b>	<b>19.30</b>	<b>24.71</b>	<b>22.48</b>	
<b>Critical Ratio</b>					
	0-199	200-499	500-999	Over 1000	
0-199	....	1.10	2.95	1.78	
200-499	1.10	....	6.68	1.77	
500-999	2.95	6.68	....	7.79	
Over 1000	1.78	1.77	7.79	....	

#### Test 4 Given During the Twenty-eighth Week

The concomitant tables, XVII, XVIII, XIX, and XX, show the results obtained from test four which was given during the twenty-eighth week of school.

There is slight apparent variation in the speed of sophomores, juniors, and seniors, and the differences are not significant as shown by the critical ratio. The juniors wrote with more accuracy than the sophomores and seniors. However, the differences in accuracy of the juniors and seniors is not significant.

The students in the second division, according to size of school, wrote faster than the students in the other divisions. Statistically there is no real difference in their speeds except for the second and fourth divisions. The smallest schools have the highest per cent of accuracy.

#### Test 5 Given During the Thirty-third Week

One hundred ninety-five sophomores, 707 juniors, and 312 seniors took the straight-copy test during the thirty-third week of school. This was the final test of the series and the results may be thought of as the attainments in gross words a minute and per cent of accuracy for one year of typewriting.

The average gross words a minute written by the sophomore students was 39.35, by the junior students 42.27, and by the senior students 40.72. There was little difference in the sophomore, junior and senior students in gross words a minute.

The average per cent of accuracy of the sophomore group was 68.61, the junior group 73.26, and the senior group 74.73.

TABLE XVII

## Test 4

ATTAINMENTS IN TERMS OF GROSS WORDS A MINUTE  
FOR 1,294 STUDENTS ON A STRAIGHT-COPY TEST DURING  
THE TWENTY-EIGHTH WEEK

Gross Words A Minute	GRADE LEVEL				TOTAL
	Sopho- more	Junior	Senior	Unclassi- fied	
10-12			1		1
13-15	1				1
16-18		2		1	3
19-21	5	7	6	2	18
22-24	6	9	8	3	26
25-27	13	38	16	1	68
28-30	26	60	36	8	130
31-33	29	102	32	16	179
34-36	38	141	49	14	242
37-39	26	138	42	11	217
40-42	15	81	43	10	149
43-45	21	53	35	4	113
46-48	9	36	20	5	70
49-51	4	25	10	3	42
52-54	4	9	7	1	21
55-57		2	5	1	8
58-60		2	2		4
61-63		2			2
<b>TOTAL</b>	<b>195</b>	<b>707</b>	<b>312</b>	<b>80</b>	<b>1294</b>
<b>Mean</b>	<b>36.01</b>	<b>37.02</b>	<b>37.75</b>	<b>36.55</b>	
<b>Standard Deviation</b>	<b>7.21</b>	<b>6.76</b>	<b>7.99</b>	<b>6.87</b>	

## Critical Ratio

	Sopho- more	Junior	Senior
Sopho- more	....	1.74	2.52
Junior	1.74	....	1.40
Senior	2.52	1.40	....

This table should be read as follows: None from the sopho-  
more group, none from the junior group and one from the  
senior group wrote between ten and thirteen words a minute.

TABLE XVIII

Test 4

ATTAINMENTS IN TERMS OF PER CENT OF ACCURACY  
FOR 1,294 STUDENTS ON A STRAIGHT-COPY TEST DURING  
THE TWENTY-EIGHTH WEEK

Per Cent of Accuracy	GRADE LEVEL				TOTAL
	Sopho- more	Junior	Senior	Unclassi- fied	
0	12	17	6		35
1- 10	8	11	3	1	23
11- 20	8	10	12		30
21- 30	6	23	9	2	42
31- 40	7	41	17	2	67
41- 50	15	40	24	5	84
51- 60	23	63	35	6	127
61- 70	33	103	61	7	204
71- 80	40	161	57	21	279
81- 90	29	181	64	25	299
91-100	12	57	24	11	104
<b>TOTAL</b>	<b>195</b>	<b>707</b>	<b>312</b>	<b>80</b>	<b>1294</b>
Mean	58.62	67.14	65.59	74.63	
Standard Deviation	27.92	23.25	23.09	18.08	

## Critical Ratio

	Sopho- more	Junior	Senior
Sopho- more	....	3.91	2.92
Junior	3.91	....	.99
Senior	2.92	.99	....

This table should be read as follows: Twelve students from the sophomore group, seventeen from the junior group, and six from the senior group wrote with 0 per cent accuracy.

TABLE XIX

Test 4

ATTAINMENTS IN TERMS OF GROSS WORDS A MINUTE  
 FOR 1,294 STUDENTS ON A STRAIGHT-COPY TEST DURING  
 THE TWENTY-EIGHTH WEEK

Gross Words A Minute	SIZE OF SCHOOL				TOTAL
	(Enrollment)				
	0-199	200-499	500-999	Over 1000	
10-12		1			1
13-15				1	1
16-18	1	1		1	3
19-21	1	5	2	10	18
22-24	2	6	7	11	26
25-27	2	14	17	35	68
28-30	10	35	17	68	130
31-33	7	32	37	103	179
34-36	14	44	35	149	242
37-39	10	52	38	117	217
40-42	13	29	32	75	149
43-45	7	36	18	52	113
46-48	8	30	7	25	70
49-51	2	14	6	20	42
52-54		11	1	9	21
55-57	2	2		4	8
58-60			1	3	4
61-63		2			2
<b>TOTAL</b>	<b>79</b>	<b>314</b>	<b>218</b>	<b>683</b>	<b>1249</b>
<b>Mean</b>	<b>37.82</b>	<b>38.36</b>	<b>36.44</b>	<b>36.72</b>	
<b>Standard Deviation</b>	<b>7.64</b>	<b>8.14</b>	<b>6.70</b>	<b>6.87</b>	

Critical Ratio

	0-199	200-499	500-999	Over 1000
0-199	....	.56	1.42	1.22
200-499	.56	.....	2.95	3.09
500-999	1.42	2.95	....	.52
Over 1000	1.22	3.09	.52	....

## T A B L E X X

## Test 4

ATTAINMENTS IN TERMS OF PER CENT OF ACCURACY  
FOR 1,294 STUDENTS ON A STRAIGHT-COPY TEST DURING  
THE TWENTY-EIGHTH WEEK

Per Cent of Accuracy	SIZE OF SCHOOL				TOTAL
	(Enrollment)				
	0-199	200-499	500-999	Over 1000	
0		6	4	25	36
1- 10		1	12	10	23
11- 20	1	12	7	10	30
21- 30	1	11	12	18	42
31- 40		19	18	30	67
41- 50	5	16	27	36	84
51- 60	6	31	26	64	127
61- 70	11	50	41	102	204
71- 80	20	77	37	145	279
81- 90	24	67	28	180	299
91-100	11	24	6	63	104
<b>TOTAL</b>	<b>79</b>	<b>314</b>	<b>218</b>	<b>683</b>	<b>1294</b>
<b>Mean</b>	<b>74.62</b>	<b>66.35</b>	<b>56.17</b>	<b>67.63</b>	
<b>Standard Deviation</b>	<b>16.26</b>	<b>22.80</b>	<b>24.41</b>	<b>24.25</b>	

## Critical Ratio

	0-199	200-499	500-999	Over 1000
0-199	....	3.69	7.50	3.41
200-499	3.69	....	4.87	.81
500-999	7.50	4.87	....	6.06
Over 1000	3.41	.81	6.06	....



There is no significant difference in the per cent of accuracy.

Statistically there is no difference in the gross words a minute written by the various groups, divided according to size of school. The second and fourth divisions wrote with a higher per cent of accuracy.

For a comparison of the results according to test periods see Figures I, II, III, and IV, and Tables XXV and XXVI.

T A B L E X X I

## Test 5

ATTAINMENTS IN TERMS OF GROSS WORDS A MINUTE  
FOR 1,076 STUDENTS ON A STRAIGHT-COPY TEST DURING  
THE THIRTY-THIRD WEEK

Gross Words A Minute	GRADE LEVEL				TOTAL
	Sopho- more	Junior	Senior	Unclassi- fied	
19-21	1		1		2
22-24	2	5	4	2	13
25-27	4	12	9	5	30
28-30	14	31	17	4	66
31-33	10	62	25	9	106
34-36	24	82	36	8	150
37-39	24	92	39	11	166
40-42	16	113	40	6	175
43-45	16	72	35	5	128
46-48	10	48	30	9	97
49-51	3	27	20	6	56
52-54	4	33	10	1	48
55-57	2	13	4		19
58-60	2	7	2		11
61-63	2	1	2	1	6
64-66		1	1		2
67-69			1		1
<b>TOTAL</b>	<b>134</b>	<b>599</b>	<b>276</b>	<b>67</b>	<b>1076</b>
<b>Mean</b>	<b>39.35</b>	<b>42.27</b>	<b>40.72</b>	<b>39.04</b>	
<b>Standard Deviation</b>	<b>7.98</b>	<b>7.40</b>	<b>8.05</b>	<b>8.19</b>	

## Critical Ratio

	Sopho- more	Junior	Senior
Sopho- more	....	3.89	1.63
Junior	3.89	....	2.72
Senior	1.63	2.72	....

This table should be read as follows: One student from the sophomore group, none from the junior group, and one from the senior group wrote between nineteen and twenty-two words a minute.

## TABLE XXII

## Test 5

ATTAINMENTS IN TERMS OF PER CENT OF ACCURACY  
FOR 1,076 STUDENTS ON A STRAIGHT-COPY TEST DURING  
THE THIRTY-THIRD WEEK

Per Cent of Accuracy	GRADE LEVEL				TOTAL
	Sopho- more	Junior	Senior	Unclassi- fied	
0	3	8	5	2	18
1- 10	2	13	3		18
11- 20		8	3		11
21- 30	3	9	4	1	17
31- 40	5	16	3	2	26
41- 50	13	28	9	5	55
51- 60	16	39	21	7	83
61- 70	19	65	32	10	126
71- 80	26	135	65	18	244
81- 90	30	181	83	18	312
91-100	17	97	48	4	166
<b>TOTAL</b>	<b>134</b>	<b>599</b>	<b>276</b>	<b>67</b>	<b>1076</b>
<b>Mean</b>	<b>68.61</b>	<b>73.26</b>	<b>74.73</b>	<b>69.73</b>	
<b>Standard Deviation</b>	<b>22.36</b>	<b>22.06</b>	<b>21.23</b>	<b>20.28</b>	

## Critical Ratio

	Sopho- more	Junior	Senior
Sopho- more	....	2.18	2.64
Junior	2.18	....	.94
Senior	2.64	.94	....

This table should be read as follows: Three students from the sophomore group, eight from the junior group, and five from the senior group wrote with 0 per cent accuracy.

TABLE XXIII

## Test 5

ATTAINMENTS IN TERMS OF GROSS WORDS A MINUTE  
FOR 1,076 STUDENTS ON A STRAIGHT-COPY TEST DURING  
THE THIRTY-THIRD WEEK

Gross Words A Minute	SIZE OF SCHOOL (Enrollment)				TOTAL
	0-199	200-499	500-999	Over 1000	
19-21				2	2
22-24	1	4	3	5	13
25-27	3	8	4	15	30
28-30	10	18	14	24	66
31-33	4	34	27	41	106
34-36	10	39	27	74	150
37-39	7	51	33	75	166
40-42	7	58	38	72	175
43-45	10	36	29	53	128
46-48	6	39	12	40	97
49-51	4	25	9	18	56
52-54	3	20	10	15	48
55-57		9	3	7	19
58-60		6	1	4	11
61-63		4		2	6
64-66		2			2
67-69			1		1
<b>TOTAL</b>	<b>65</b>	<b>353</b>	<b>211</b>	<b>447</b>	<b>1076</b>
<b>Mean</b>	<b>39.01</b>	<b>41.73</b>	<b>39.91</b>	<b>39.88</b>	
<b>Standard Deviation</b>	<b>7.69</b>	<b>8.21</b>	<b>7.35</b>	<b>7.34</b>	
<b>Critical Ratio</b>					
	0-199	200-499	500-999	Over 1000	
0-199	....	2.59	.83	.86	
200-499	2.59	....	2.72	3.30	
500-999	.83	2.72	....	.05	
Over 1000	.86	3.30	.05	....	

## TABLE XXIV

## Test 5

ATTAINMENTS IN TERMS OF PER CENT OF ACCURACY  
FOR 1,076 STUDENTS ON A STRAIGHT-COPY TEST DURING  
THE THIRTY-THIRD WEEK

Per Cent of Accuracy	SIZE OF SCHOOL (Enrollment)				TOTAL
	0-199	200-499	500-999	Over 1000	
0		7	9	2	18
1- 10	1	5	7	5	18
11- 20		2	8	2	12
21- 30	1	2	10	4	17
31- 40	3	5	11	6	25
41- 50	7	16	16	16	55
51- 60	5	20	19	31	75
61- 70	9	33	39	48	129
71- 80	16	75	47	109	247
81- 90	16	116	32	150	314
91-100	7	72	13	74	166
<b>TOTAL</b>	<b>65</b>	<b>353</b>	<b>211</b>	<b>447</b>	<b>1076</b>
<b>Mean</b>	<b>70.77</b>	<b>76.17</b>	<b>60.36</b>	<b>76.74</b>	
<b>Standard Deviation</b>	<b>19.22</b>	<b>20.99</b>	<b>26.30</b>	<b>18.20</b>	

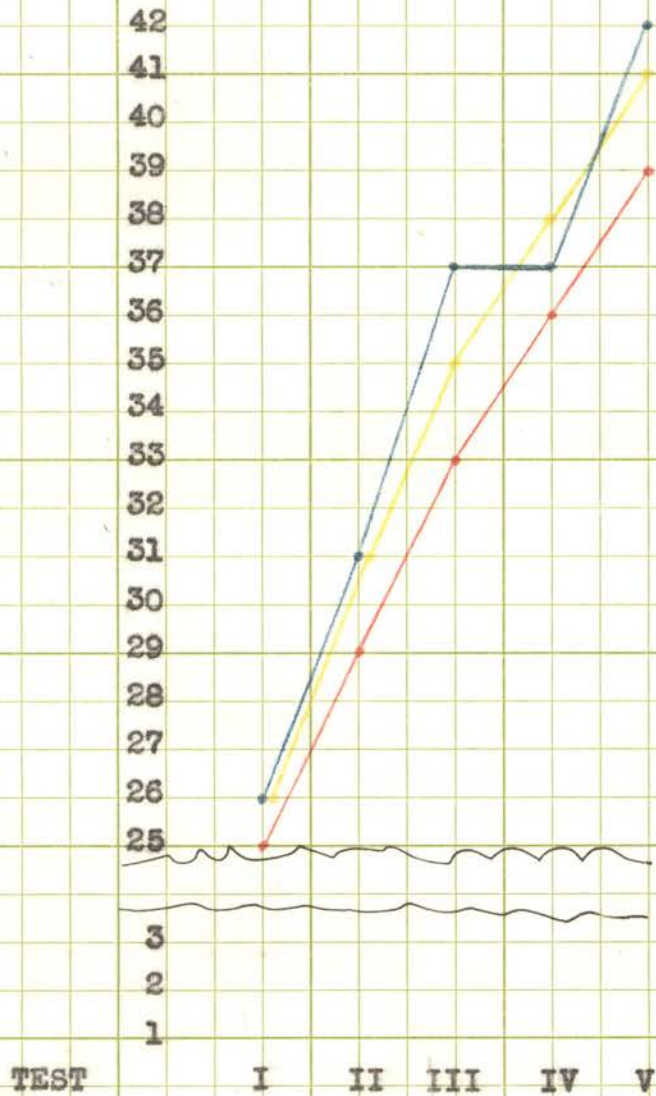
## Critical Ratio

	0-199	200-499	500-999	Over 1000
0-199	....	2.05	3.48	2.36
200-499	2.05	....	7.47	.41
500-999	3.48	7.47	....	8.19
Over 1000	2.36	.41	8.19	....

## FIGURE I

AVERAGE GROSS WORDS A MINUTE FOR ALL STUDENTS  
DIVIDED ACCORDING TO GRADE LEVEL  
ON EACH OF THE FIVE TESTS

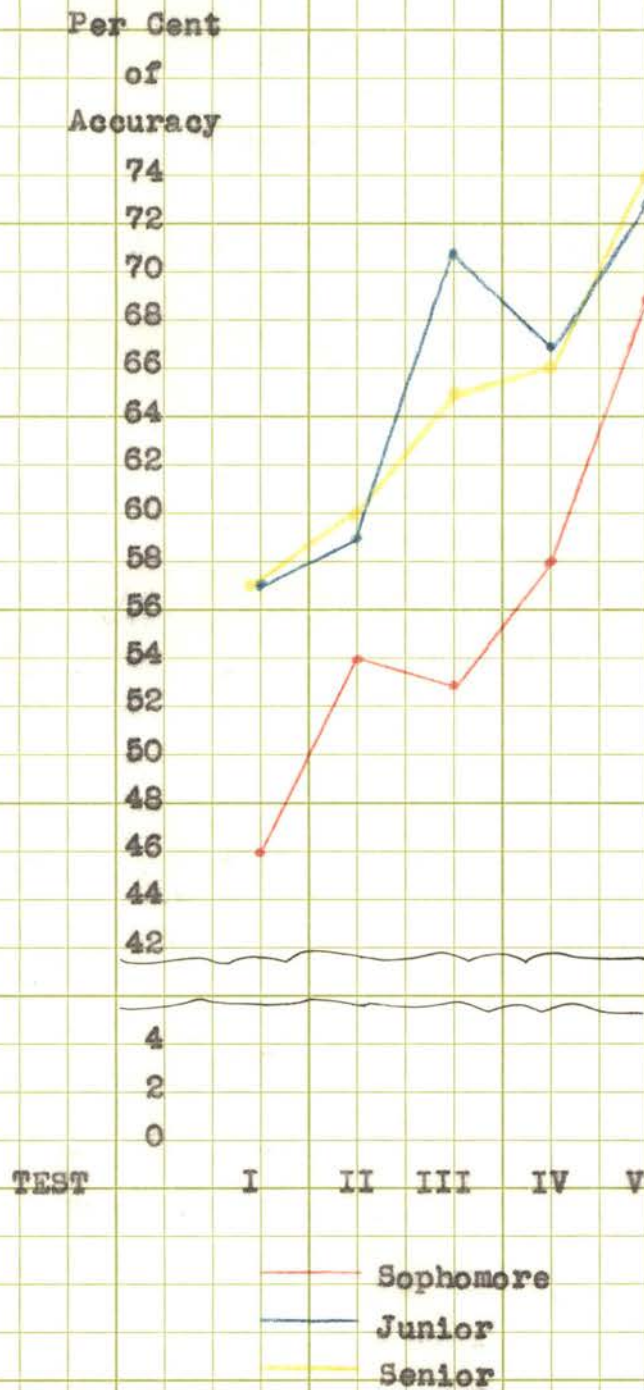
Gross  
Words  
A Minute



— Sophomore  
— Junior  
— Senior

## FIGURE I I

AVERAGE PER CENT OF ACCURACY FOR ALL STUDENTS  
DIVIDED ACCORDING TO GRADE LEVEL  
ON EACH OF THE FIVE TESTS



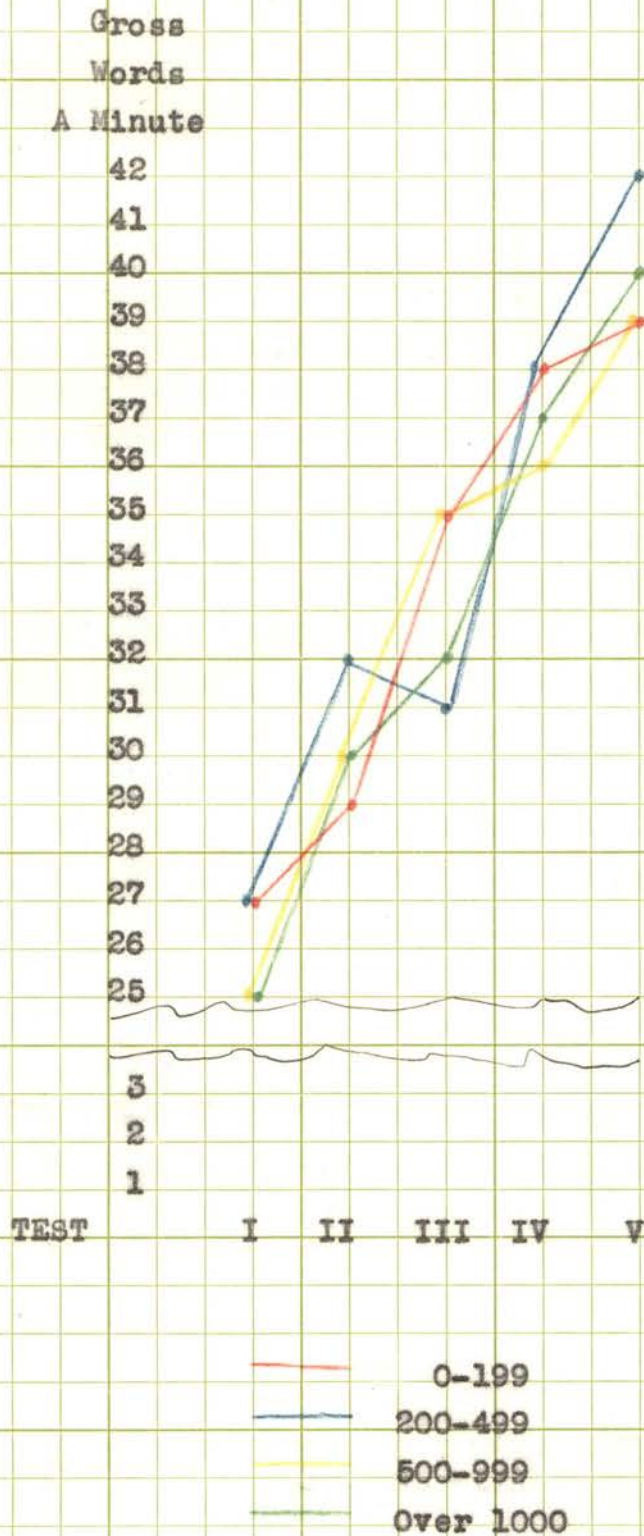
## T A B L E X X V

THE SIGNIFICANT DIFFERENCE IN GROSS WORDS A MINUTE  
AND PER CENT OF ACCURACY BETWEEN GROUPS  
CLASSIFIED ACCORDING TO GRADE LEVEL

T E S T	SOPHOMORE      JUNIOR      SENIOR	
	Gross Words A Minute	Per Cent of Accuracy
I	Seniors significantly higher than sophomores*	Juniors and seniors significantly higher than sophomores***
II	No significant difference	No significant difference
III	Juniors significantly higher	Juniors and seniors significantly higher than sophomores***
IV	No significant difference	Juniors significantly higher than sophomores**
V	Juniors significantly higher than sophomores**	No significant difference
	* Junior group between sophomores and seniors-- No significant differences	
	** Senior group between sophomores and juniors-- No significant difference	
	*** No significant difference in juniors and seniors	



AVERAGE GROSS WORDS A MINUTE FOR ALL STUDENTS  
 DIVIDED ACCORDING TO SIZE OF SCHOOL  
 ON EACH OF THE FIVE TESTS



## FIGURE IV

AVERAGE PER CENT OF ACCURACY FOR ALL STUDENTS  
DIVIDED ACCORDING TO SIZE OF SCHOOL  
ON EACH OF THE FIVE TESTS

Per Cent  
of  
accuracy



— 0-199  
— 200-499  
— 500-999  
— Over 1000

T A B L E X X V I

THE SIGNIFICANT DIFFERENCE IN GROSS WORDS A MINUTE  
AND PER CENT OF ACCURACY BETWEEN GROUPS  
CLASSIFIED ACCORDING TO SIZE OF SCHOOL

T E S T	0-199 200-499 500-999 Over 1000			
	Gross Words A Minute		Per Cent of Accuracy	
I	200-499 significantly higher than 500-999 and Over 1000		0-199 significantly higher	
II	200-499 significantly higher		500-999 significantly lower	
III	500-999 significantly higher than 200-499 and Over 1000		500-999 significantly lower	
IV	200-499 significantly higher than Over 1000		0-199 significantly higher	
V	200-499 significantly higher than Over 1000		200-499 and Over 1000 significantly higher	

## Chapter IV

### SUMMARY AND CONCLUSIONS

The introduction, purpose, need, scope and procedure of this study were given in Chapter I. Available material was determined in Chapter II. The findings were presented in Chapter III and this chapter will present a summary and the conclusions of the study.

A group of graduate students in business education belonging to Beta Chapter of Delta Pi Epsilon voted in June, 1940 to sponsor some worth-while project that would point out some significant facts in the field of business education. The first problem selected by this group was to determine the attainments of first-year high school type-writing students in the State of Oklahoma at five different periods during the year. This study was made during the school year 1940-1941, and attainments were measured in terms of gross words a minute and per cent of accuracy on straight-copy tests. Comparisons were made of the attainments between boys and girls and to some extent between those students with vocational and non-vocational objectives.

The first test was five minutes in length, while the other four were ten minutes in length. The first test was given during the thirteenth week of school and the remaining tests were given in succeeding five-week intervals.

After the papers were checked by the student or one of his classmates they were rechecked by various business

education groups and faculty members on the campus of the Oklahoma Agricultural and Mechanical College.

By using the material collected and checked at that time, this study was made to determine the attainments of first-year typewriting students on different grade levels and in different size schools.

Specifically this study was to determine and compare the attainments in the tenth, eleventh, and twelfth grades, and to determine and compare the attainments of first-year typewriting students in the different size schools. The division of schools was based upon the North Central Association division of schools, which has the following four groups according to enrollment: 0-199, 200-499, 500-999, and those over 1000.

The significant findings of this study will be summarized as follows:

Test 1 Given During the Thirteenth Week

The senior students wrote 26.62 mean gross words a minute which was significantly faster than the sophomores wrote, but the difference in the junior and senior speed was not a real difference. The sophomore students, also, wrote with less accuracy than did the juniors and seniors.

There was a significant difference in the speed of the students from high schools with an enrollment of 200-499 and the next two larger divisions of schools. The participants from the schools of 200-499 students wrote about two gross words a minute faster.

Those from the small schools had a significantly higher per cent of accuracy than any of the other groups.

#### Test 2 Given During the Eighteenth Week

There was only a slight variation in the mean gross words a minute written by the sophomores, juniors, and seniors. The differences were significant as shown by the critical ratio.

The small differences in per cent of accuracy of the students on various grade levels were not indicative of a significant difference.

The mean gross words a minute for the second group (200-499) was 32.09. This was significantly faster than the words written by any one of the other three divisions. Although there was little variation in the per cent of accuracy of the four groups the students from the schools third in size wrote with less accuracy and the differences were significant.

#### Test 3 Given During the Twenty-third Week

The juniors wrote significantly faster than the sophomores and seniors. Similarly, the mean per cent of accuracy of the junior group was higher than either of the others.

The students from the schools with an enrollment of 500-999 wrote faster than the other students. The group of over 1000 wrote with a higher per cent of accuracy.

#### Test 4 Given During the Twenty-eighth Week

There was no significant difference in either the gross words a minute or the per cent of accuracy written by the sophomores, juniors, or seniors.

Statistically there was no real difference in the speeds of the groups classified according to size of school except that the second group wrote faster than the fourth group. The smallest schools had the highest per cent of accuracy.

Test 5 Given During the Thirty-third Week

The differences in gross words a minute written by the sophomores, juniors, and seniors were small and were not indicative of a real difference. There was only a slight variation in the mean per cent of accuracy.

There was no significant difference in the mean gross words a minute written by the various groups divided according to size of school. The second and fourth divisions wrote with a higher per cent of accuracy.

The findings of this limited study cannot be considered as definite proof that the attainments of the sophomore group of students will be consistently lower than the attainments of the junior and senior groups. This study indicates that there is a difference, but further experiments are necessary for conclusive evidence.

Hypothetically this difference may be due to the fact that juniors and seniors realize the need of utilizing skill in typewriting more than do the sophomores.

The difference in the size of school appears to have little effect upon the attainments of first-year typewriting. A Larger representation from the very small schools might produce other results.

This study should give teachers an idea of what to expect of students on various grade levels. It should provide a measure by which teachers in different size schools may evaluate the attainments of their group in comparison with that of classes in other schools of the same size. It should, also, provide an indication by which administrators may plan their curricula more effectively.

These were the needs of the study, and if they are achieved, the original aim of Beta Chapter of Delta Pi Epsilon will have been fulfilled and the purpose of this study accomplished.



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INTERNATIONAL TYPEWRITING CONTEST RULES<sup>1</sup>

1. Line Spacing. Single space all paragraph and short timed practice unless otherwise directed. Double space all timed tests of 5 minutes or longer.

2. Length of Line. A line averaging 70 spaces in length (not less than 64 nor more than 76 spaces) is preferred; but a line averaging 60 spaces (not less than 54 nor more than 66 spaces) is allowable if you prefer it. The longer line will enable you to type more words in timed tests because the number of carriage returns is reduced.

3. Length of Page. Except for the last sheet of a timed test, at least 26 double-spaced lines must appear on a page 8½ by 11 inches. This rule applies only to timed tests of 5 minutes or longer. On other work, including short timed-test practice, fill the page with single-spaced copy to within approximately an inch of the bottom edge.

4. Paragraphing. Indent paragraphs 5 spaces, starting on the sixth space.

5. Spaces and Punctuation Marks. An error in spacing or in punctuation is considered an error in the preceding word unless that word has already been penalized.

6. Spacing after Punctuation. Except as noted below, space once after all punctuation marks within sentences or within word groups not forming sentences, and space twice after all punctuation marks that close sentences or groups of words not forming sentences.

There is good authority for following the above rule when spacing after the colon, but there is equally good authority for (a) always spacing twice after a colon, or (b) spacing twice when the colon is followed by a complete sentence beginning with a capital letter and once in all other cases. Charge an error for every failure to space consistently according to one of these three rules.

It is better form to omit the space in small-letter abbreviations, such as a.m., i.e., f.o.b., etc. Many authorities prefer no space in capital-letter abbreviations (except initials of personal names), such as O.K., M.D., P.M., PH.D., etc., but a space after the period following each letter in all abbreviations is quite acceptable in all school work. Failure to be consistent in a given test is an error.

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<sup>1</sup> Margaret Robertson Neece, op. cit., Appendix

7. The Dash. Two hyphens with no spaces before or after are commonly used, but either one or two hyphens with a space before and after may be used. Be consistent.
8. Cut Characters. Any word written so close to the top, bottom, or side of the sheet that any portion of a letter is cut off is an error. If the paper feed on your machine does not hold the paper securely at the top and bottom of the sheet, or if the line-space mechanism is out of adjustment, so that the level of the line shifts during typing, do not charge an error.
9. Incorrectly Divided Words. A word divided incorrectly at the end of any line constitutes an error. Follow any standard dictionary for correct division.
10. Faulty Shifting. A shifted character (capital) is acceptable only when the entire capital letter can be discerned and when no part of the lower-case character on that type bar is visible. If most of the shifted characters are raised or lowered, that is, out of line with the lower-case letters, an error should be charged for every failure to place a shifted character squarely on the writing line, until you form the habit of shifting correctly.
11. Lightly Struck Letters. If a character can be seen, even though it is very light, it is correct. If you habitually strike the keys too lightly, however, you should charge an error for every lightly struck character until you form the habit of striking all keys more forcefully.
12. Transposition. One error is charged for each transposition, either of letters or of words. Mistakes within transposed words must be marked as additional errors.
13. Rewritten Matter. Charge one error for the rewriting and an additional error for each mistake in both the first and the second writing.
14. Omitted Words. (See Rule No. 24).
15. Inserted Words. (See Rule No. 24).
16. Crowding. Any word occupying less than its proper number of spaces is an error. However, if your typewriter is poorly adjusted or the table on which it stands is subject to any vibration, "crowding" and "Piling" of letters may not be your fault. If possible, have your typewriter adjusted and placed on a solid table.
17. Piling. When two characters or a space and a character are so crowded that they are printed on top of one another, or if any portion of their bodies overlap or would overlap were a letter typed in the adjoining space, the machine is

said to have "piled". If piling occurs at the end of a line, make sure that your right margin stop is properly set and test the machine to see whether the keys lock when the carriage reaches the margin stop. If they do not, piled letters at the ends of lines should not be penalized until your machine is properly adjusted. (See Rule No16).

18. Left-Hand Margin. All characters at the beginning of lines, except at paragraph indentations, must be struck at the same point on the scale. Poorly adjusted machines will cause the margin to "jump over" to the left or to "bounce in" to the right. Do not charge these errors until your machine is properly adjusted.
19. X'ing. Work in which material is x'd will not be accepted.
20. Erasing. Erasing is not allowed.
21. Errors in Printed Copy. Errors in the printed copy may either be corrected or written as in the copy.
22. Last Word. Stop when time is up. An uncompleted last word, otherwise correct, is not an error.
23. One Error Per Word. Only one error may be charged in any one word.
24. General Rule. Every word omitted, inserted, misspelled, or in any manner changed from the printed copy (except in transposed and rewritten matter) must be penalized.
25. Penalty. If your instructor wishes you to calculate your "net words" or "net words a minute", use the following method:

Deduct ten words for each error from the gross number of words typed. The result will be your total "net words". Divide your total net words by the number of minutes (length of test) to find your "net words a minute" (net rate).

#### How to Calculate Net Rate

Example: Suppose you type 103 gross words in 5 minutes, making 6 errors.

$$\begin{aligned}
 &6 \text{ (total errors)} \times 10 \text{ (penalty)} = 60 \text{ (total penalty)} \\
 &103 \text{ (gross words)} - 60 \text{ (penalty)} = 43 \text{ (total net words)} \\
 &43 \text{ (net words)} \div 5 \text{ (the number of minutes typed)} = 8.6 \\
 &\text{your final net words a minute (net rate).}
 \end{aligned}$$

NOTE: The only accurate measure of a typist's speed on straight matter is his "gross words a minute" (total gross words divided by the number of minutes); and the only accurate measure of his accuracy is his "error rate" (total errors divided by the number of minutes).

26. Gross Words. Determine the gross number of strokes by referring to the printed copy. The stroke count is given at the end of each line. Divide the total gross strokes by 5 to find the number of gross words you type. (A "standard word" is defined as 5 strokes). Strokes in rewritten matter are not to be counted in the gross. Take credit for every stroke typed.

Strokes or spaces are counted as though the entire test were written in one continuous line, with no paragraphs, but with proper spacing after words and punctuation marks. This means that the gross strokes equal the number of spaces occupied by the typing at any given point. Shifted characters count as one stroke. No allowance is made for carriage returns and other similar operations. Hyphens inserted at the ends of lines to divide words, except when required for compound words, are not counted, because they would be unnecessary if the matter were typed in a continuous line.

## September Competent Typist Test

*Use double spacing in typing this test*

*(To find the gross number of words you write, divide gross number of strokes by 5; then deduct 10 words for each error to get net words written. The number of strokes is indicated at the end of each line in order to facilitate counting the gross number of strokes written.)*

	<i>Strokes</i>
Look upon the work you have to do as an object of	50
interest, and, if you can rise to it, an object of affection.	113
This simple act solves many of the problems encountered	169
on the job. What is more natural than that the things which	230
you esteem should linger in your mind after the day's work	289
is done, and, as you mull over them, ideas for better ways	348
of doing the work and for getting results form themselves.	408
Our interest is necessary in any subject if we are to con-	465
centrate on it. A student who fails in his examination	521
usually laments his bad memory, when what really happens	578
is that lack of thoroughness and interest in the preparation	639
of his studies caused temporary failure to recall. He forgot	701
because he never really knew. Not having given the matter	760
sufficient attention, the impressions were not made deeply	819
enough in his mind.	840
Suppose you read a review of a book dealing with	889
ghosts and seances. You come across the word "ectoplasm,"	948
used to describe the whitish substance said to emanate	1003
from the body of the medium in a state of trance. After-	1059
ward you wish to recall this word in speaking to a friend,	1118
but you fail to do so—not because your memory is poor,	1174
but because you did not give yourself time to master the	1231
word. You were too much interested in the narrative of	1287
what happened in the room. If you had spent enough time	1344
on that word you would have had no difficulty in recalling it.	1408
So it is with many things that we have to do. The pace	1464
of modern life is fast, and our knowledge of men and things	1524
more superficial than it ought to be. We attempt too much	1583
sometimes; and sometimes we do not attempt enough.	1635
Even in education the spirit of hustle is everywhere. Our	1694

## October Competent Typist Test

*Use double spacing in typing this test*

*(To find the gross number of words you write, divide gross number of strokes by 5; then deduct 10 words for each error to get net words written. The number of strokes is indicated at the end of each line in order to facilitate counting the gross number of strokes written.)*

	<i>Strokes</i>
With that, the things of the world shrank to nothing.	55
In the southern sky, opposite the waning sun, the night,	112
already settled over the pole, was pushing forth a bulging	171
shadow, blue-black and threatening as a storm sky. Could	229
one see in it the first nervous movements of the aurora	285
australis? One could not be sure. A frozen nose and cheeks	346
sent me below before I had time to find out. But while	402
sliding down the ladder, I was sure of something else,	457
which gave me a bad turn; and that was that in helping	512
the tractor men stow the sledges I had fallen and	562
wrenched my shoulder.	585
In the shack I stood for a long minute, rubbing the	637
shoulder. Bad business, I reproached myself. Here you	693
are starting the biggest job of your life, and yet you have	753
blundered and crippled yourself. For things were in an	809
awful mess. The tunnels were a jumble of boxes and fuel	866
drums, and it would probably take weeks to put them	918
straight. Well, I could not live that way even at an	972
advance base. Only one pair of shoulders was available	1028
for all the lifting and moving and shoveling; and they	1083
were fifty per cent out of commission.	1123
But there was no time just to sit and mope. Using one	1178
arm as best I could, the job of cleaning up my own Augean	1236
Stable began. Absorbed in the task, the ache in my	1288
shoulder was completely forgotten. The hours melted	1341
away; it was past midnight before I thought of stopping.	1399
I paused only long enough to brew a pot of tea and to	1453
munch a few crackers. Although there was little to show	1510
for the day's work, one could at last move around in the	1567
tunnels without tripping over duffel bags, food tins, and	1625



## November Competent Typist Test

*Use double spacing in typing this test*

*(To find the gross number of words you write, divide gross number of strokes by 5; then deduct 10 words for each error to get net words written. The number of strokes is indicated at the end of each line in order to facilitate counting the gross number of strokes written.)*

Breakfast did not count. I rarely took more than tea and a whole-wheat biscuit. Luncheon was habitually an out-of-the-can affair, consisting usually of tomato juice, Eskimo biscuits, and frequently a cold meat or fish—either corned beef, tongue, or sardines. These were prepared in masterly fashion. But supper, by rights the high spot in the day of an explorer and the one hot meal toward which a cold and hungry man looks with mounting anticipation, was a daily fiasco for a while.

I have only to close my eyes to witness again the succession of culinary disasters. Consider what my diary has to say about the incident of my making corn meal for the first time. I dumped what seemed a moderate quantity of meal into a boiler, added a little water, and stood it on the stove to boil. That simple formula gave birth to a hydra-headed monster. The stuff began to swell and dry up, swell and dry up, with fearful blowing and sucking noises. All innocently I added water, more water, and still more water. Whereupon the boiler erupted like Vesuvius. All the pots and pans within reach could not begin to contain the corn meal that overflowed. It oozed over the stove. It splattered the ceiling. It covered me from head to foot. If I had not acted resolutely, I might have been drowned in corn meal. Seizing the container in my mitted hands, I rushed it to the door and hurled it far into the food tunnel. There it continued to give off deadly golden lava until the cold finally stilled the crater.

There were other disasters of the same order. My diary reports soberly on the day I tried to cook dried lima beans. How much water lima beans can absorb, and how long it

*Strokes*

54

109

168

228

286

344

401

457

490

543

602

659

716

774

830

886

941

1002

1060

1114

1172

1231

1290

1344

1404

1460

1516

1572

1634

1688

## December Competent Typist Test

*Use double spacing in typing this test*

*(To find the gross number of words you write, divide gross number of strokes by 5; then deduct 10 words for each error to get net words written. The number of strokes is indicated at the end of each line in order to facilitate counting the gross number of strokes written.)*

	<i>Strokes</i>
Time sloughed off the last implication of urgency, and	55
the days moved imperceptibly one into the other. The few	113
world news items which were read to me from time to time	170
seemed almost as meaningless and blurred as they might	225
to a Martian. My world was insulated against the shocks	282
running through distant economies. My advance base was	338
geared to different laws. On getting up in the morning, it	398
was enough for me to say to myself: Today is the day to	455
change the barograph sheet or to fill the stove tank. The	514
night was settling down in earnest. Days when the wind	570
brooded in the north or east, the barrier became a vast	626
stagnant shadow surmounted by swollen masses of clouds,	682
one layer of darkness piled on top of the other.	732
Out of the deepening darkness came the cold. For the	786
first time the canvas boots failed to protect my feet. One	846
heel was nipped, and I was forced to return to the hut and	905
change to reindeer mukluks. That day I felt miserable;	961
my body was racked by shooting pains exactly as if I had	1018
been gassed. All day long I kept two primus stoves burning	1078
in the tunnel. My fingers agonized over the thermograph,	1136
and I was hours putting it to rights.	1175
Out of the cold and out of the east came the wind. It	1230
came on gradually, as if the sheer weight of the cold were	1289
almost too much to be moved. The night was as black as	1345
a thunderhead when I made my first trip topside, and a	1400
tension in the wind, a bulking of shadows in the night	1455
indicated that a new storm center was forming. Next morn-	1512
ing, glad of an excuse to stay underground, I worked a long	1572
time on the escape tunnel by the light of a red candle stand-	1632
ing in a snow recess. That day I pushed the emergency exit	1692

## April Competent Typist Test

Use double spacing in typing this ten-minute test

(To find the gross number of words you write, divide gross number of strokes by 5; then deduct ten words for each error to get net words written. The number of strokes is indicated at the end of each line in order to facilitate counting the gross number of strokes written.)

	<i>Strokes</i>
An employer can have little patience with a secretary	54
who is dilatory about responding to his summons. This	109
means that the secretary herself must have extra patience	167
at this point. He is not impatient with the secretary per-	227
sonally. He has something at the very front of his mind	284
which he must give over to her before he can turn his	338
attention to the next pressing matter. He may need a cer-	397
tain memorandum from her files before he can make some	452
vital decision. He may need the name and address of a	507
company from her card index before he can dismiss a	559
caller with whom he is conferring. Because of information	618
that he has just received he may need to catch a certain	675
letter before it goes out into the mails. When the buzzer	734
rings, you are in mystery as to his necessity, but you know	794
that there is a reason for his calling.	835
From your first day in an office you must learn to	886
take this buzzing as a matter of course, without a sense	943
of annoyance. It is, after all, the only sensible method.	1003
Your employer cannot very well shout your name; he can-	1059
not keep a messenger at his side to run to fetch you. There	1120
are many practical necessities in an office about which	1176
the secretary need have no false pride, no hurt feelings.	1235
The girl who is overdignified, who is looking for extraor-	1294
inary respect, has usually failed to understand the rea-	1352
son for her employer's ways and thus to accept them	1404
quietly in the run of the day. If you can interrupt your	1462
work graciously at the ring of a bell, you need not be	1517
afraid of your dignity; you then have dignity indeed.	1572
When you go away for the week end, there are cer-	1622
tain things that you know you will need. Experience has	1679
shown you what these are. When you go in to take dic-	1734

## STATISTICAL FORMULAE USED IN THIS STUDY

### Mean

$$\bar{X} = A + \frac{\sum f d' i}{N}$$

### Standard Deviation

$$\sigma = i \sqrt{\frac{\sum f d^2}{N} - \left(\frac{\sum f d}{N}\right)^2}$$

### Standard Error of the Mean

$$\sigma_M = \frac{\sigma}{\sqrt{N}}$$

### Standard Error of the Difference

$$\sigma_{diff} = \sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2}$$

### Critical Ratio

$$= \frac{\bar{X}_1 - \bar{X}_2}{\sigma_{diff}}$$

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