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READING GAINS OF STUDENTS IN A COLLEGE READING LABORATORY

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Recent emphasis has been placed on the importance of relating reading instruction to content areas as it is hoped that the transfer of reading improvement will be automatic since the instruction is done in content materials. Reading instruction in the content areas at the college level has demonstrated significant gains in students' grade point averages (Martin and Blanc 1981, Santa and Truscott, 1979), however, in these GPA-related studies, there was no control exerted over reading achievement. Because of this and because of the pervasive emphases on reading instruction in the subject areas and on college student retention, there is a need to take another look at the reading gains of students instructed through non-content related college reading programs.

In non-content related reading instruction students are given reading materials of a general nature rather than specific areas. Content, of course, is included in general materials, but is presented in a random rather than a systematic fashion. Typically, the materials present content in a series of articles or stories which are relatively brief and are generally not related to one another. At the same time these articles or stories are controlled as to readability level and length.

In this study, non-content related reading instruction was provided in a laboratory setting through a semester-long course which met for three hours per week. Students receive grade points for the course, but the course does not count for graduation credit. Materials used are the generic types previously described. Emphases of the program are as follows:

1. Through small group and individual instruction, students work in different materials at different levels.
2. Students build an affection for reading through reading self-selected paperbacks.
3. Reading vocabulary is built through word study and dictionary use.
4. Students build comprehension by completing a series of developmental readings. Comprehension is also developed through specific comprehension subskill exercises such as main idea and inference.
5. Study reading ability is improved through use of organizing strategies such as SQ3R.
6. Reading rate is an artifact of the lab used primarily to increase attention to the task; although, a bit of emphasis is placed on varying rate, such as in skimming.

Design of the Study

Subjects

Subjects were traditional-aged entering freshmen and were full-time students. No institutional screening tests are used except for ACT scores, where available, and, student self-estimates of grade point averages in the high school subjects of mathematics, science, social science, and English. Students either selected the reading course or were advised to take it. In either case enrollment in the reading course was voluntary, taken along with other college courses. Control subjects were also enrolled as full-time students. There were 18 females and 14 males in each of the two groups. Mean, standard deviation, and range scores for ACT's and high school grade point averages are reported as follows— ACT: M = 15.72, S.D. = 3.69, R = 10 - 24; GPA: M = 2.92, S.D. = .46, R = 2.0 - 4.0. Experimental subjects were drawn equally from sections taught by five separate instructors.

Instrument

All 64 subjects were administered Forms E and F of The Nelson Denny Reading Test (Brown, Bennett, Hanna, 1981) as pre- and post-test measures. This test yields measures of vocabulary, comprehension, and total reading achievement, as well as reading rate. Two studies (Cummins 1981, Stetson, 1982) have shown that through short-term coaching students can be taught to speed up their answering on the post-test form and demonstrate substantial gains over the pre-test form. Two procedures were used to minimize the possible effects of students utilizing a rapid-fire guessing strategy on the pre- and post-tests. First the reading rate was omitted from the pre- and post-testing sessions. Second, students' raw scores were computed in the conventional fashion (total number answers which were correct), but, they were also adjusted for items which were missed and for items which went unanswered. The formula used to adjust the raw scores was taken from Gulliksen (1950, 252):

$$X_s = R - \frac{W}{C} - \frac{S}{D}$$

Gulliksen reasoned that in adjusting student scores, a larger penalty should be exacted for errors than for items skipped; therefore, while C and D are arbitrary values, Gulliksen stated that C should be smaller than D. Further, he noted that C should be smaller than the number of possible answers per question (minus 1), and that D should be larger than the number of possible answers per question. The final formula used is as follows:

$$\text{Adjusted Score} = \text{Right Answers} - \frac{\text{Wrong}}{3} - \frac{\text{Skips}}{6}$$

This formula was applied to each student's score for vocabulary and comprehension (and total) for both the pre- and post-test measures in both the experimental and control groups.

Procedure

Experimentals and controls were administered the pre-test at the beginning of the semester and the post-test at the end of the semester. Raw scores and adusted scores were computed for

Table 1
Mean, Standard Deviation, and Mean Difference Scores for Pre- and Post-test Reading Achievement Measures for Control and Experimental Groups

Measure	Controls n = 32	Experimentals n = 32
Vocabulary		
Pre-test means	41.97	41.44
Pre-test standard deviations	11.06	10.80
Post-test means	43.88	47.16
Post-test standard deviations	11.59	12.32
Mean differences	1.91	5.72
Comprehension		
Pre-test means	44.31	40.63
Pre-test standard deviations	7.06	9.83
Post-test means	50.81	50.38
Post-test standard deviations	9.03	7.42
Mean differences	6.50	9.75
Total		
Pre-test means	86.28	82.06
Pre-test standard deviations	16.45	18.01
Post-test means	94.69	97.53
Post-test standard deviations	17.82	16.83
Mean differences	8.41	15.47

each student on both tests. Comparison of reading gains for the two groups was done on both raw and adjusted scores by a repeated measures analysis of variance. The first hypothesis stated that there would be no significant differences between the control and experimental groups on each of three measures of reading achievement. Reading achievement was defined as vocabulary, comprehension, and total raw scores. The second hypothesis stated that there would be no significant differences between the control and experimental groups on each of three measures of adjusted reading achievement. Adjusted reading achievement was defined as vocabulary, comprehension, and total adjusted raw scores.

Results

Table 1 reports the results of mean, standard deviation, and mean difference scores on pre- and post-test measures in vocabulary, comprehension, and total reading achievement for the two groups. On the measure of vocabulary, the experimental group had a lower mean pre-test score than the control group; however,

this trend was reversed on the post-test mean vocabulary scores.

Table 2 reports the results of the repeated measures ANOVA's comparing the two groups on each of the three pre- and post-test measures of vocabulary, comprehension and total reading achievement.

Table 2

Repeated Measures ANOVA's Comparing Gains in Reading Achievement Measures for Control and Experimental Groups

Source (N = 64)	MS	F	p
Group			
Vocabulary	60.50	.25	.62
Comprehension	136.13	1.22	.27
Total	15.13	.03	.87
Pre-post-test			
Vocabulary	465.13	18.90	.001
Comprehension	2112.50	70.30	.001
Total	4560.13	73.90	.001
Group X pre-post-test			
Vocabulary	116.28	4.73	.03
Comprehension	84.50	2.81	.10
Total	399.03	6.47	.01

No significant differences were found in the group effect on measures of vocabulary, comprehension, and total reading achievement. On the time effect (pre-post-test), scores for all three dependent variables (vocabulary, comprehension, total reading achievement) reflected significant differences ($p < .001$). The results from the interaction of group and test (group X pre-post-test) revealed that the two groups differed significantly on the variables of vocabulary ($p < .03$) and total reading achievement ($p < .01$), but not on reading comprehension ($p < .10$). Because the experimental group yielded significant gains over the control group in vocabulary and total reading achievement (raw scores), the first hypothesis of no significant differences between experimental group and control group was rejected.

In testing the second hypothesis, the raw scores for each student were first adjusted according to the previously-described Gulliksen formula. Table 3 reports the adjustment mean, standard deviation, and mean difference scores for pre- and post-test measures in vocabulary, comprehension, and total reading achievement for the two groups. The mean adjusted vocabulary pre-test score for the experimental group was lower than that of the control group. By the post-test, however, the mean adjusted vocabulary

Table 3
Adjusted Mean, Standard Deviation, and Mean Difference Scores for Pre- and Post-test Reading Achievement Measures For Control and Experimental Groups

Measure	Controls n = 32	Experimentals n = 32
Vocabulary		
Pre-test means	28.44	27.38
Pre-test standard deviations	13.48	13.55
Post-test means	29.87	34.21
Post-test standard deviations	14.64	14.72
Mean differences	1.43	6.83
Comprehension		
Pre-test means	36.94	32.54
Pre-test standard deviations	8.35	12.09
Post-test means	44.57	44.03
Post-test standard deviations	11.45	9.61
Mean differences	7.63	11.94
Total		
Pre-test means	65.40	59.93
Pre-test standard deviations	19.77	22.10
Post-test means	74.45	78.22
Pre-test standard deviations	22.57	20.06
Mean differences	9.05	18.29

score of the experimental group exceeded that of the control group. In comprehension, the experimental subjects had a substantially lower pre-test mean score than the control subjects. At the time of the post-test, the controls maintained a slight advantage over the experimentals in reading comprehension. For the adjusted total reading achievement scores, the experimental group had a lower mean score on the pre-test and a higher mean score on the post-test.

Table 4 reports the results of the repeated measures ANOVA's comparing the two groups on each of the three pre- and post-test adjusted scores in vocabulary, comprehension, and total reading achievement. No significant differences were found in the group effect on adjusted scores for vocabulary, comprehension, and total reading achievement. For the time effect (pre-post-test), adjusted scores for all three dependent variables (vocabulary, comprehension and total reading achievement), showed significant differences

Table 4
Repeated Measures ANOVA's Comparing Gains
in Adjusted Reading Achievement Measures
for Control and Experimental Groups

Source (N = 64)	MS	F	p
Group			
Vocabulary	85.97	.24	.63
Comprehension	195.53	1.13	.29
Total	23.12	.03	.87
Pre-post-test			
Vocabulary	546.56	15.80	.001
Comprehension	2922.30	62.14	.001
Total	5975.98	66.98	.001
Group X pre-post-test			
Vocabulary	232.47	6.72	.01
Comprehension	118.97	2.53	.12
Total	681.37	7.64	.008

($p \leq .001$). Interaction of group and test (group X pre-post-test) showed that the two groups differed significantly in adjusted vocabulary ($p < .01$) and in adjusted total scores ($p < .008$), but not in adjusted comprehension ($p < .12$). Because the experimental group yielded significant gains over the control group in vocabulary and total reading achievement (adjusted raw scores), the second hypothesis of no significant differences between experimental and controls was rejected.

Discussion

In this study it was demonstrated that university freshmen, instructed in a non-content related reading laboratory, made significant gains over a matched control group in vocabulary and total reading achievement. Adjusting students' raw scores in both groups for errors and items skipped did not alter these findings. Further research in non-content related reading instruction should explore the comprehension question. Within the confines of this study four factors may have contributed to non-content related reading instruction's failure to make a substantial impact on reading comprehension.

The first factor is the reading comprehension subtest of The Nelson-Denny Reading Test. The authors report alternative-form test reliabilities for Forms E and F as follows:

vocabulary subtest	.92
comprehension subtest	.77
total test	.91

The fact that the alternative form reliability of the comprehension subtest is low relative to that of the vocabulary subtest and to that of the total test suggests that it may not be stable enough to capture distinct changes in reading comprehension across time.

The second factor to be considered is the non-content related materials. They possibly lack the continuity, relevance and sophistication of content materials. The third factor is the attitude of the lab instructors. They may not have moved the experimental subjects in the duration of the semester-long course, far enough into the more sophisticated and lengthy passages of the non-content related reading materials. Finally, there is the possibility that the comprehension subtest with relatively low alternative form reliability; relatively unsophisticated reading materials; and, a lack of intensity in comprehension instruction, together, thus resulting in the experimental group's failure to make gains in reading comprehension substantially greater than that of the control group.

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