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ABSTRACT

A study was conducted to determine the effects of exposure to the topics included on the comprehension subtest of the Nelson-Denny Reading Test (ND), Form F, on college freshmen's performance on the test. In addition, the study investigated whether those students with background information would indicate their awareness of this knowledge on a teacher-made inventory. Students in one section of an introductory college reading course served as the experimental group, and those in another section served as the control. Both groups received supplementary readings, with the experimental group using articles based on topics found in the ND. At the end of the semester, immediately before administration of the ND, students in both groups completed a teacher-made Prior Knowledge Inventory (PKI) designed to measure their perceived knowledge of the topics included in the test. Students were asked to check one of four categories--"great deal," "moderate," "minimum," or "none"--to describe the amount of knowledge they had about each of 12 topics. Posttest ND results suggest that if students are provided with background information about topics included on the comprehension section of a standardized test, those students will score higher on the test than will those not exposed to the material. PKI results showed that students' awareness of their knowledge was not as important to test performance as the knowledge itself. (A list of materials used in the study is appended). (FL)

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**The Effects of Background Information
on Standardized Test Scores**

College Reading Association

October 26, 1984

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The Effects of Background Information on Standardized Test Scores

Abstract

This study assessed how background knowledge affected college students' performance on the Nelson-Denny Reading Test. One freshmen section served as the experimental group, another served as the control. Both groups received supplementary readings with the experimental group using articles based on topics found in the Nelson-Denny Form F. An analysis of variance repeated measures design (Sex x Treatment x Trials) found a significant interaction between treatment and trials, indicating better performance for the experimental group.

The Effects of Background Information on Standardized Test Scores

Recent literature (Cooper and Petrosky, 1976; Crafton, 1983; Langer and Smith-Burke, 1983; Stevens, 1982; Weaver, 1980; Wilson, 1983) on the nature of the reading process indicates reading to be an interaction between the reader and the text. Information already available in the brain (hereinafter referred to as background information or prior knowledge) is an important factor in determining how we process the information available in the written text.

A reader, therefore, needs to bring sufficient information to any written text in order to comprehend adequately. The more prior knowledge a reader has about a topic, the easier it is to respond to questions and interpret the text's meaning. For example, Lipson (1982) found that when students from Catholic or Jewish backgrounds were presented with religious passages, they were able to recall more information from those passages which were related to their cultural framework than from those which were unrelated.

Langer (1984), working with sixth-graders from a middle class suburban school district, found that specific background knowledge based on a free association pre-reading activity stimulated by key content words and measured by categorization levels, was a reliable prediction of passage-specific comprehension. This schema-activating task called PReP significantly raised the quality of knowledge children brought to the reading and, consequently, helped raise the comprehension scores of the average and above average readers.

Prior knowledge can also be a factor affecting performance on reading comprehension sections of standardized tests. While many standardized tests purport to measure a reader's ability to comprehend, or more accurately, answer questions about passages from different content areas, they probably are also

measuring the student's prior knowledge and ability to relate this knowledge to information presented. The more a student knows about a topic, the easier it is to answer the questions correctly and, henceforth, receive a high score on the test.

Likewise, a student with a paucity of background information about topics on a standardized test might do poorly because of this factor rather than because of a lack of generalized reading ability. Since standardized reading tests for high school/college students are usually curriculum-specific reflecting the components of a comprehensive high school education, they may be measuring prior knowledge along with reading comprehension.

Johnston (1983) has pointed out that current ways of assessing reading comprehension need to be reexamined in the light of recent research on schema theory. In his study (1984) of eighth-graders from rural and urban populations, he found that prior knowledge influences comprehension and can be responsible for biasing the information gained from reading comprehension tests.

The purpose of this study was to determine the effects of exposure to the topics included in the comprehension subtest of The Nelson-Denny Reading Test (N-D), Form F, on college students' N-D test performance. This exposure was meant to provide specific background information to supplement whatever the students brought to the testing situation. A second purpose was to investigate whether those students with background information would indicate their awareness of this knowledge on a teacher-made inventory.

The Study

The subjects were 35 college freshmen, 19 from one section and 16 from another section of Introduction to College Reading, a basic skills course. The two sections were randomly designated as the experimental or control group. These 35 students had raw scores below the minimum standards on the reading comprehension

section of the New Jersey College Basic Skills Placement Test (NJCBSPT) and a raw score of 42 or below on the comprehension subtest of the N-D, Form E. To be sure that the two sections were equal on a generalized measure of comprehension, their reading comprehension subtest scores on the NJCBSPT were subjected to t-test procedures. There was no significant difference (Control: \bar{X} = 30.93, SD = 3.55; Experimental: \bar{X} = 32.61, SD = 3.0; $t(34) = 1.09$ NS).

During the first class session, students from both sections received the same syllabus with the same required texts and quizzes by the same instructor. Students were told that these assigned materials would be used to develop vocabulary, literal/inferential/critical comprehension, reading versatility, test-taking strategies and notetaking techniques.

All students took The N-D test, Form E, as a pretest. Students receiving a comprehension score at or above the 5th stanine were exempted from the course. The comprehension section of the test includes eight passages selected from high school and college level materials representing the humanities, social sciences, natural and physical sciences. Once the experimental and control groups were determined, students were not told of the experiment so as to control for the Hawthorne effect. To further control for Hawthorne, the control group was exposed to selected outside readings, though different from those used with the experimental group.

Student assignments for both groups were based on the organizational framework of the text, Bridging the Gap, (Smith, 1981). Each week, students read one assigned chapter dealing with a specific study skill and supplemental reading material to reinforce that skill. The supplemental reading material for the experimental group included articles dealing generally with each of the passage topics on the N-D, Form F. These articles were not at all similar to the passages

presented in the N-D test. They did, though, contain generalized information about the N-D passage topics. For instance, to deal with the topic of King Arthur, an article about the Arthurian legend was used. (See Appendix A for topic sources). Consideration was given to the general reading level, content, and physical appearance of each article. The articles were presented to the students in an order different from the sequence of passages in the N-D test. The supplemental material for the control group included a variety of unrelated articles from an equal number of different sources. Since the content of these articles could be varied, attention was given to their overall appeal; for example, one on the life of the popular author, Alex Haley, was used. (See Appendix A).

Discussion and activities were facilitated similarly for both groups. Each week, at the end of the first of two class sessions, the experimental and control groups were given their respective articles and accompanying assignment to do outside of class. This followed the completion of the same reading assignment in Bridging the Gap. The instructor introduced the topic and discussed how the following assignment would help to reinforce the skills presented in the text. Specifically, with the article on the Arthurian legend, the experimental students defined specific vocabulary words presented in the article. This assignment was directly related to the chapter on vocabulary in the reading text. Similarly, the control students had to do a comparable assignment for their Alex Haley article.

During the second class session, the instructor and students discussed the topic and related assignments at length. Whenever appropriate, supplementary activities, (for example, semantic mapping) were provided to organize the information and enhance the discussion. This instructional pattern was followed during the first three-quarters of the semester.

At the close of the semester, immediately before the administration of the N-D test, Form F, both groups were asked to complete the Prior Knowledge Inventory (PKI). This was a 12-item teacher-constructed survey designed to measure student's perceived knowledge of the topics included in the N-D test. Students were asked to check one of four categories, "great deal", "moderate", "minimum" or "none", to describe the amount of knowledge they thought they had about each topic (for example, the legend of King Arthur, the architect, Buckminster Fuller). Categories were assigned the numerical weights of 4-3-2-1 respectively. A high score indicated that students thought they knew a great deal about the topics. Distractors also were included to control for indeterminate responses (for example, the fictitious person, Sociologist William Harlow).

Results

To see if there were any significant differences related to the experimental treatment, the post-test scores on the comprehension subtest of the N-D were subjected to analysis of variance, repeated measures, procedures (Sex x Treatment x Trials).

The analysis of variance showed an expected significant F-ratio between trial one and trial two ($p < .001$) and an interaction effect between condition and trials ($p < .02$). Sex was not a factor.

Figure 1 illustrates the degree of change between trials for the total group and for the two treatment groups. While the total group went from a mean of 32.28 to a mean of 48.78 and the control group went from a mean of 35.27 to a mean of 43.56, the experimental group went from a mean of 29.29 to a mean of 54.00. Although all students in the course gained in reading comprehension, as measured by comprehension subtest scores of the N-D, the experimental group did significantly better, reflecting the interaction between treatment and trials.

Figure 1

Key:

Experimental x ——— x

Control ● ——— ●

Total - - - - -

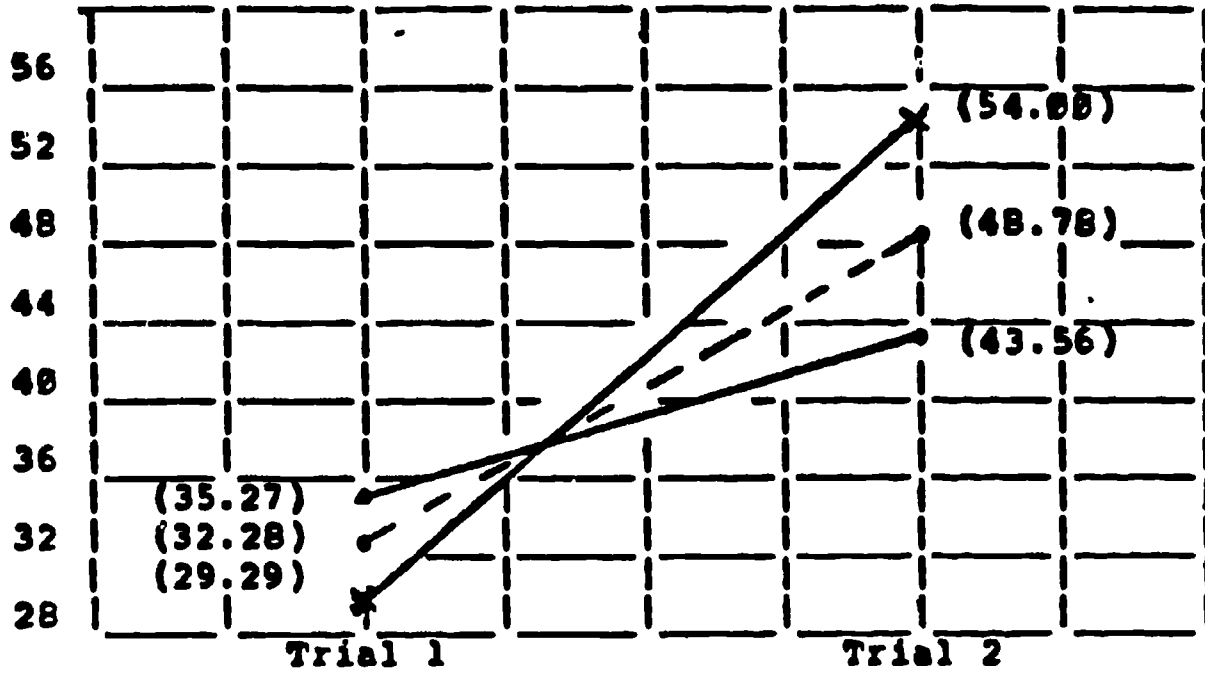


Figure 1: Pre and post test means on the Nelson - Denny Comprehension Scores: Total Group, Experimental Group, Control Group.

The total quantitative scores on the PKI were subjected to a two-way analysis of variance (Sex x Treatment). While the total mean for the experimental group was higher ($X = 27.50$) than that of the control group ($X = 22.18$), the difference was not significant. The widely dispersed scores for the male control group ($SD = 23.73$) may have affected the results.

Discussion

This study can best be described as teacher-initiated action research, and therefore the results are not widely generalizable. The sample was small, and since it was drawn from an atypical population (students requiring a college reading course), the testing threat of regression toward the mean has to be considered. Also, unlike Johnston's well-controlled 1984 study in which prior knowledge was estimated by means of a content-specific vocabulary test, there was no attempt to measure prior knowledge at the start.

Nevertheless, despite these limitations, results suggest that if students are provided with background information about topics included on the comprehension section of a standardized reading test, these students will score higher on this test than those not exposed to the information. Students with prior knowledge were able to use this information to interact with the text and to respond accurately to more of the test questions. This supports the notion that a reader's prior knowledge about a topic has a powerful influence on the reader's comprehension of the material concerning that topic.

As indicated by the PKI results, students' awareness of their knowledge was not as important as the knowledge itself. While students exposed to background information indicated slightly higher levels of awareness about test topics, they did not perceive themselves as knowing significantly more information than those

without such exposure. However, while taking the N-D, Form F, the experimental students indicated that they knew they had read about these topics during class sessions. Comments were made such as, "It is so much easier to take the test" and "I feel less anxious because I know something about these topics." Once students interacted with the text, they activated existing schemata to construct meaning about the topic and to understand it more accurately (Goetz, et al., 1983).

Another notion supported in this study is that prior knowledge can be acquired directly from instructional situations and, ultimately, be used in comprehending text. While supported for classroom instruction (Langer, 1984; Pearson, Hansen and Gordon, 1979), it seems to challenge the *raison d'être* of certain standardized reading tests. If prior knowledge helps one to score highly on tests such as the N-D, do low scores indicate lack of such knowledge or lack of reading skills? What are these tests trying to measure?

Johnston also raised this question and began to answer it in his 1984 study. He said that standardized reading comprehension tests "provide a fairly good proxy for IQ, just as do standardized vocabulary tests" (Johnston, 1984, p.236). High scorers will do well in school whereas low scorers will have trouble. A low score may mean the student cannot read, does not have appropriate prior knowledge, or has meager processing skills.

The findings of this study have implications for the way test results are used, especially at the college level. Since performance on standardized tests like the N-D seems to be related to one's exposure to topic information presented in the passages, this type of test may discriminate against those without the necessary background experience. Therefore, tests such as these can be used as only one indicator of reading ability. Other measures are needed to balance the results of these curriculum-specific tests. One example might be the NJCBSPT

which assesses students' ability to answer questions about passages on common, everyday topics.

Johnston (1984) says that all reading comprehension tests are influenced by prior knowledge. While this may be true, the NJCBSPT would seem to have less bias related to prior knowledge than the N-D which, according to its manual, was developed by sampling secondary level content area texts. It is therefore important to assess performance on several different indicators of reading ability including teacher informal assessment, so that a balanced student profile emerges.

It is specifically not recommended that teachers set out to raise students' scores on tests like the N-D by replicating the procedures used in this study. These procedures were used solely to answer the question raised in this study; that is, will exposure to background information on test passages improve students' performance on that test?

If teachers did use procedures like these, they would lose valuable information that the test results may supply; namely, information on students' background knowledge indicated by their ability to read curriculum-specific passages.

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APPENDIX A

	Articles for Experimental Group	Articles for Control Group
Topics in Bridging the Gap	Topic on N-D: The legend of King Arthur	
Vocabulary	The Arthurian legend, <u>Content Inventories: English, Social Studies, and Social Science.</u> Kendall Hunt Publishing Company, 1979, 75-77.	Alex Haley: From the brink of suicide to the Best Seller List, <u>Improving college reading</u> (3rd edition). Harcourt Brace Jovanovich, 1978, 35-38.
	Topic on N-D: The concept of economics	
Textbook Organization	What is economics? Free enter- prise - <u>The American Economic System.</u> Laidlaw Brothers Publish- ing, 1981, 11-16.	The Peter Principle, <u>Write to read, read to write.</u> Little, Brown & Company, 1983, 263-268.
	New directions in the economy. <u>Learning skills for college success.</u> Kendall Hunt Publishing Company, 1982, 112-116.	An overdose of problems (September 1983) <u>Sports Illustrated</u>, 59, 16, 20, 22.
	Topics on N-D: The life of Buckminster Fuller	
Sentence Comprehension	Fuller, R(ichard) Buckminster (Jr.) The H.W. Wilson Company, 1976, 146-150.	Soap operas, <u>Write to read, read to write.</u> Little, Brown & Coampny, 1983, 358-361.

	<u>Illustrations from wizard of the dome.</u> Little, Brown & Company, 1969.	<u>Changes in the sex mores, Pathways: A guide to reading and study skills.</u> Houghton-Mifflin, 1976.
	Topic on N-D: The life of Shelley	
Underscoring	Percy Bysshe Shelley, <u>Beacon Heights of literature (Book 11).</u> Iroquois Publishing Company, Inc. 1947, 445-453.	<u>Sharks: The silent savages, Skimming and scanning (Advanced Level).</u> Jamestown Publishers, 1983, 47-51.
	Spirit, <u>Poems of Percy Bysshe Shelley,</u> Thomas B. Crowell, 1968, 1-17.	Mate selection, <u>Write to read, read to write.</u> Little, Brown & Company, 1983, 65-68.
	Topic on N-D: The costs of government	
Comprehension: Main Idea	<u>American Government in action.</u> Charles E. Merrill Publishing Company, 1973, 524-549.	<u>Euphemism, Write to read, read to write.</u> Little, Brown & Company, 1983, 269-272.
	Topic on N-D: The past and present uses of water	
Outlining	Water, the liquid vital to all life. <u>Compton's Encyclopedia.</u> F.E. Compton Company, 1977, 66-68.	<u>I'm 5 feet 17 ½ Inches: He lives with tall tales that are no lies, College reading.</u> Wadsworth Publishing Company, 1982, 157-165.
	The water squeeze, <u>Ginn Science Program (Advanced Level B).</u> Ginn and Company, 1975. 373-375.	<u>What's in what's out, Reading and other college survival skills (2nd edition),</u> 1982, 210-212.