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The Effects of Review and No Review on Underlined Material with More or Less Able Subjects

Melvin Van Dyke

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THE EFFECTS OF REVIEW AND NO REVIEW
ON UNDERLINED MATERIAL WITH MORE AND LESS ABLE SUBJECTS

A Thesis
Presented to
the Faculty of the Department of Psychology
Western Kentucky University
Bowling Green, Kentucky

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts

by
Melvin R. Van Dyke
September 1977
THE EFFECTS OF REVIEW AND NO REVIEW
ON UNDERLINED MATERIAL WITH MORE AND LESS ABLE SUBJECTS

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THE EFFECTS OF REVIEW AND NO REVIEW
ON UNDERLINED MATERIAL WITH MORE AND LESS ABLE SUBJECTS

Melvin R. Van Dyke
September 1977

Directed by: David A. Shiek, C. Clifton Layne, and Richard C. Miller

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A sample of high school graduate, first year technical school students was measured for retention improvement of underlined textual material under the treatment condition of no review versus review. The sample of 61 students was divided into two groups, more able and less able, subsequent to the first treatment condition of no review to provide a within group measure in the final analysis. The reading material consisted of 14 brief typewritten passages of which the core content was underlined. The criterion measure consisted of 75 multiple choice questions derived from the core content. The experiment consisted of presenting the same experimental materials to the same students on two occasions separated by a five day interval. Students were allowed to review the material, prior to testing, only in the second presentation. Under the experimental conditions both groups of students were able to improve retention of the core content. Results indicate that significant gains were made from no review to review conditions for both more and less able subjects when practice effect was not controlled for.
Chapter 1
INTRODUCTION

Since the advent of formal education, instructor and student alike have strived to make the learning process as meaningful, effective, and enjoyable as possible. Of course the ultimate end for both is a lesson well taught and well learned. To this end numerous factors must be considered by both partners. The educator is concerned with content, quantity, teaching points, general value, students' motivation, level of understanding, and ability as well as many other factors. The student is also concerned with many of the same factors but overall concern is that of comprehension and retention of the material presented. If for no other reason, this is necessary in order to progress to self-determined goals or those others have set. For many students it is the retention of material that poses the most difficult problem. Many an educator has heard students' remark: "I read the material but I can't remember its lesson."

Educators and others have attempted to assist the student by recommending organizational study techniques that will have a beneficial effect on comprehension and retention. For example, one of the essential steps in the study technique developed by Robinson (1970) includes an overview of material prior to reading it. The point is that this gives the reader the opportunity to group main ideas and makes learning more efficient through an understanding of the materials' structure. Other methods of study have also been recommended with varying degrees of success. All of these have the common point of organization of main ideas (Christenson & Stordahl, 1955).
In the interest of expedience many techniques are available to organize material as it is read. Publishers often italicize or overtype important ideas, while other techniques include overlining in colored ink, type variation, parentheses, offset type, reduced type and others. Probably the most widely used student method is that of underlining main points during reading. This is a convenient technique which is often suggested by a student's peers and teachers as well.

Of the research that has been conducted on the effectiveness of organizational techniques, that done on underlining has shown promising results. However, most of the research has dealt with the retention of underlined material presented on a one time basis. It would be seldom that a student would read material once without further study. To do so would seem to negate the efficacy of the underlining. More likely a student is apt to review the main points that have been underlined in order to comprehend fully and retain them for further use (Christensen & Stordahl, 1955; Robinson, 1970).

Since reviewing underlined material continues to be widely recommended and used as an organizational aid, it seems that there should be continued investigation to determine its effect on retention. An attempt to explore the effect of underlining on retention when utilized as an organizational tool for review is called for.
Chapter 2
REVIEW OF LITERATURE

In general, studies concerning the effects of organizational aids upon retention have been presented in a terminology that is as varied as the variety of the techniques. The literature is rich with terms such as vividness, coding, patterning, cueing, peak stress, prompting, and others. Although the researchers undoubtedly had their own definitions they all refer to a method which stresses or emphasizes words in the context of printed material, serving to organize the material which is to be learned.

Emphasis in terms of vividness is found as early as the British Associationists (Klare, Mabry, and Gustafson, 1955). Calkins (1895) found that vivid items presented for learning in a list fashion were more readily recalled by subjects than non-vivid items. Her research findings were confirmed in later, similar studies by Jersild (1929) and Van Buskirk (1932). These early studies were concerned, however, only with simple word cueing. Although important, their results could not be generalized to word units in context.

Dearborn, Johnston, and Carnichael (1949) were among the first to apply vividness or stress techniques to prose. Their methods included emphasis by capitalizing in bold face type and underlining the word in a sentence which carried the "peak stress." In several studies they found increased comprehension and retention with college students. They concluded that the organization and structure of printed material relied upon key stress words within the material. Furthermore, these words served to break sentences into units of thought which could be more easily comprehended and retained (Dearborn et al., 1949).
In a similar study, Klare, et al. (1955) found that the underlining of selected words in the training manual of a group of airmen assisted retention for those of high mechanical aptitude, but hindered others with low mechanical aptitude. The method was to underline as many as possible of the words that were in the correct answers to a fifty item test. The airmen were given no rationale for the underlining. The results showed a high correlation between test scores and mechanical aptitude indices. This led the researchers to conclude that while more able airmen may respond well to this type presentation, less able airmen may not. As in the Dearborn et al. (1949) study with college students, it seemed that the lack of explanation of the cueing technique was not a limiting factor to the more able students. It appeared to the researchers that less able students were not able to comprehend the meaning of the underlining and thus were not able to take advantage of it. This conclusion is supported in research by Fischer (1973), who found that in subjects with upper reading ability, knowledge of cue-synthesis was no advantage but significantly assisted subjects with lower reading ability. Knowledge of the interval information is to be retained also seems important. Hinricks and Grunke (1975) found that students' retention of material increased significantly when the length of retention was known.

Almost simultaneous with the Klare et al. (1955) study, similar research was conducted by Christensen and Stordahl (1955) with quite different findings. The latter study concerned itself with four methods of indicating the organization of material with reference on immediate and delayed retention. The four methods (cutline, underlining, summary, and headings) were employed
conjointly. The subjects consisted of Air Force basic trainees; and other than the use of multiple techniques, the experimental materials and criterion measures were much the same as those in the Klare et al. (1955) study. In fact, both studies were conducted at the same Air Force Base. The results of the latter, however, indicated no significant effect of the organizational aids upon retention. Although several explanations were given by the author, including the lack of appraising the airmen of the cueing scheme, none seemed to fully explain the disparity that was evident between the two studies.

Some rationale for the incongruous findings of the previous two studies is delineated by Hershberger (1964). His study with 236 fifth-graders, using five variations of typography simultaneously, indicated that complex cueing fails "to facilitate learning of the important core content" (p. 295). These findings were further confirmed by subsequent research which demonstrated that a simple cueing technique resulted in a significant amount of core content learned (Hershberger & Terry, 1965). His studies (Hershberger, 1963a, 1963b, 1964) and the Hershberger and Terry studies (1963, 1965) represent the most extensive research of this subject to date and have produced the clearest findings.

The reason for the difficulty of retention with mixed cueing techniques seems to result from the confusion it produces. Tinker and Paterson (1946), in a study of readability of mixed forms of type, found that complex typography disorganized the reader enough to offset any advantages that may be obtained from the cueing technique. Although they were measuring readability rather than retention, Hershberger's (1964) findings are consistent and clearly demonstrate the reliance of retention upon simplicity of technique. The type of technique used does not seem critical. Hershberger (1964) used
underlining, capitalization, lower case letters, variations of ink color, and combinations of these all of which were effective to some degree when used separately or in nonconfusing combinations. The critical factor is that they be used discriminately.

Later findings (Anderson & Faust 1967; Faust & Anderson, 1967; Holland, 1965; Rothkopf, 1965, 1966) confirmed that although learning is facilitated by judicious use of "prompts," students are hindered when these cueing techniques become overly used. Anderson and Faust (1967) stated, "Repetitious use of strong prompts of this nature may have a detrimental effect on the performance of some students" (p. 351).

The variable of explaining the cueing system to subjects was also studied by Hershberger and Terry (1965). Contrary to the proposition of the Christensen & Stordahl (1955), Fischer (1973), and Klare et al. (1955) studies, they found "no differences in results between the students for whom the cueing scheme was explained and those for whom it was not explained, this difference in procedure may be ignored" (p. 57). Zechmeister, McKillip, Pasko and Bespalec (1975) also found, in their experiments with spatial memory encoding, that informing students of the nature of the test did not significantly increase scores on a test of recall. However, these latter two studies were not a replication of procedures, students were from a significantly different population and the cueing techniques were more complex. In addition, the lessons were carefully matched by grade level to the rated grade level of the students further eliminating a variance in ability. Therefore, it may be questionable to accept these findings as an explanation for the variance found in the previous studies.

Christensen and Stordahl (1955) and Robinson (1970) suggest that learning varies with respect to reading and study habits. That is, many students
attempt to read and store as much information as possible in the first
reading, while others require review of the material several times in order
to retain the core content. Since all of the previous studies based their
results upon a one-time presentation of the material, it would be expected
that those students who rely upon review would be at a disadvantage. To
determine whether underlining or any other technique is effective, it would
seen necessary to present it in a fashion that would allow subjects to incorporate
it into their learning process. This review approach would more likely be
representative of that experienced by most students in normal study practices.

The subject of review and recall has been recently approached from two
directions, one using written presentations and the other verbal presentations.
In a study with 30 college students Hoon (1974) found no increase in comprehension
with any of three study methods (reading, reading with underlining and reading
with note taking) when students were allowed two minutes for review. The under-
lining and notetaking was performed by the students while reading. His conclu-
sion was that the assumed value of underlining and note taking was questionable.
Research conducted by Fisher and Harris (1974) and Howe (1970a) indicates that
much the same holds true when students are allowed to take and review their notes
of verbally presented material. In these studies college students were presented
with passages of prose in an oral fashion, given time to review any notes made
and then tested. The results demonstrated no significant increase in compre-
hension. Some explanation for these findings is presented in another study by
Howe (1970b), who determined that "subjects who are required to attend to, and
later recall, meaningful prose material appear to encode the materials in ways
that have stability and permanence to an extent which may interfere with subse-
quent efforts to increase the accuracy of learning" (p. 218). This latter
study consisted of repeated oral presentation of prose material to college students who were required to recall the material in answer to test questions. Although the repeated material remained the same, giving students an opportunity for self-correction, the responses to consecutive testing remained essentially unchanged. Howe's contention was that initial encoding of the material has a permanence which resists change even though the encoding may be incorrect. Thus, repetition as a form of review will have little if any effect upon increasing comprehension when initial encoding is faulty. If this also holds true for visually encoded material then the inability of review to increase comprehension in the Hoon (1974) study may be attributed to inaccurate encoding on the part of the students. The relationship of this encoding error to the conflicting results of previously mentioned studies is also obvious.

In other encoding research, Zechmeister et al. (1975) found that textual material is encoded in a spatial fashion. That is, written material is visually committed to memory by its location on a page. In this research many subjects were able to recall material by remembering its location on a page in reference to other material. Other students could not give the correct answer but could "see" where the answer was located. The author's conclusion was that "Visually mediated spatial memory is a fundamental attribute when text material is encoded and may be of mnemonic worth when retention of information is required" (Zechmeister et al., 1975, p. 51).

A relationship between visual cueing, visual memory, and review is apparent. If visually cued material is correctly encoded during visual imagery, and reviewed, then organization of and direct access to information would be aided.
In summary, it is evident that organizational cueing techniques have a positive effect upon comprehension and retention when presented visually in a non-confusing fashion. Results seem to favor those subjects with high ability and there is some evidence which indicates that knowledge of the cueing technique and interval of retention increase recall. Also the ability of an individual to correctly encode visually cued material via spatial memory is of mnemonic value in the retention of information. It appears that from several experiments the practice of review has no effect on increasing comprehension or retention. However, in these studies subjects were allowed to perform the cueing and encoding on their own. Following Howe's (1970b) and Zechmeister's et al. (1975) results on encoding it may be that the incorrect encoding of material was responsible for the inefficacy of the review approach. Also, as pointed out by the "review method" researchers, Fisher and Harris (1974), the experimental conditions did not achieve the degree of reality that is present with normal review practices. This is true of the other research as well, which either presented the material for review on a one time basis (Hoon 1974) or where the material was unstructured (Howe, 1970a).

Although high ability subjects seem to profit it has not been clearly demonstrated that other subjects will not also benefit from organizational cueing aids if the presentation is such that the aids can be taken advantage of. None of the research attempted to determine the effects of organizational aids upon retention when correctly cued material is presented on more than one occasion. Thus, none actually simulated the actual learning process utilized by most students. This may well account for the discrepancy between some of the various studies.
Chapter 3

PROBLEM

The general purpose of this study was to determine the effects of an organizational tool (cueing) on retention in review and no review conditions. In addition, the effects upon retention were investigated to determine if the review and no review conditions had differential effects across more able and less able subjects. Taking into account the observations of previous studies, the subjects received an explanation of the cueing scheme and interval of required retention. They were also allowed to act as a self-control for length of reading and review time. All of these factors are representative of what an individual knows during routine study. To avoid inappropriate encoding, material for study was correctly cued before presentation. Under these conditions the experimenter expected to find a higher mean score for all subjects for review versus no review conditions regardless of the ability of the subjects.
Chapter 4

METHOD

Subjects

As suggested by Christensen et al. (1955) and as practiced in recent studies (Fisher & Harris, 1974; Hoon, 1974; Howe, 1970) the sample of subjects was representative of freshman level college students. The students were high school graduates who had met entrance requirements for admission to the Muscle Shoals Technical Institute, Muscle Shoals, Alabama. The premise is that college level ability subjects may respond more favorably to organizational aids. The original sample consisted of 75 randomly selected students attending their first year at the school. A table of random numbers (Freund, 1972) was used to select the students from current enrollment. Attrition, due to absence, incompleteness of materials and incorrect completion of the test instrument resulted in a final sample of 61 students, 41 females and 20 males with a mean age of 20 in a range of 16-30 years of age.

Experimental Materials

The printed material consisted of Form 2A of the Davis Reading Test (Davis & Davis, 1962). This instrument was chosen because of development from an experimental study which demonstrated that reading comprehension relies upon nine operational skills, all of which are dependent upon the basic ability to understand word meanings and main points, "the questions constitute a representative sample of those called into play during the process of understanding material of a defined type" (p. 22). The standardization was based on a broad sample of students from many geographical regions and is applicable to all segments of student populations. In addition to the content lending
itself well to the purpose of this study, the test has high correlations (.926 average) with major test batteries of scholastic aptitude and reading comprehension (Davis & Davis 1962).

Form 2A of this instrument was designed to be used with eighth-, ninth-, tenth-, and eleventh-grade students with level of comprehension reliability coefficients of .85, .85, .81, and .78, respectively. This form was selected over the college level Series I form to avoid the possibility of exceeding the reading ability of the subjects. An unnecessarily high level of difficulty of reading material may introduce factors such as discouragement of the subject which would confound the data, giving spurious results. Conversely, over simplification would also be inappropriate since the material must be sufficiently complex to maintain interest and require delineation and organization of main points. The selected instrument achieved both criteria and required the use of reading, comprehension, and retention skills representative of those normally used by students in study.

The material of the instrument represents a wide range of interests and subject matter. The fourteen passages are representative of scientific reports, humorous writings, text books, and other types of reading material. Since it is common for a student to read and study several different subjects in a short amount of time, this presentation resembled what a student might encounter in any given study session.

The main points in the core content of each passage were identified and cued by underlining in black ink. Main points were defined as a word or group of words the understanding of which is essential to the comprehension of the passage. Core content was defined as the sum of the main points, that is,
the essence of the passage (Christenson & Stordahl, 1955). The correct answer
to each test item of the instrument was taken from the scoring key and the
 Corresponding main points of the passage were underlined. The underlining
was performed by the author and reviewed by a committee familiar with the
instrument. Where questions arose concerning whether or not to underline,
they were resolved jointly. (See Appendix C for the reading material.)

Criterion Measure

The multiple-choice test for Form A of the Davis Reading Test was used
for both presentations. However, the passages did not appear with the ques-
tions as in the original form. Although the test-retest reliability of Form A
was not reported, the alternate-form reliability of Form A and Form B was .78
for level of comprehension of eleventh-grade students, with Form A taken first,
and .80 with Form B taken first (Davis & Davis, 1962). Therefore, successive
testing of Form A on the same students should result in stable reliability
coefficients. The practice of having test items correspond to main points is
in several studies and has resulted in high test-retest and split-half reliability
(Christensen & Stordahl, 1955; Hershberger & Terry, 1965; and Klare, et al.
1955).

A trial run, involving fifteen subjects, was conducted to determine the
time needed to complete the exercise. This resulted in a total completion
time of 1 hour and 5 minutes, which was considered too long since most class
periods are 55 minutes. Therefore, the last passage consisting of nine test
questions was eliminated from the criterion measure which brought the average
completion time down to a reasonable 49 minutes. This final version then
consisted of all of the original reading passages but with only 71 test items
(see Appendix D for test instrument).
Procedures

All participants were told that:

1. The material is part of an experiment on reading and in no way affects any grade or course evaluation, other than receiving credit for participation.

2. The experiment will consist of a second session and that everyone who initially participates will be expected to attend the second session.

3. The reading material consists of various passages taken from different types of material.

4. Although not difficult, some portions of each passage are underlined to assist with reading, but to read each passage in its entirety as a test will be given afterwards.

5. The results of the test will be confidential and the tests will not be evaluated individually.

For the first session students were explicitly told to read each passage completely but only once, not to review, and to raise their hand when finished (see Appendices A & B for verbatim instructions). Reading materials were distributed and, at the time of hand raising, the passages were collected and the test instrument administered. Students printed their name and marked answers on a separate IBM type answer sheet. Scoring of the completed tests consisted of tabulating the number of correct items obtained on the 71 item test. The scores of all students were obtained and those with a score one standard deviation below the mean were identified as less able students, all other students were identified as more able students. Five days later the students returned for the second session. The same general procedures were followed as in the first session using the same passages and test instrument.
However, in this session the students were explicitly told that they could review the passages as many times as they liked before being tested. Using the same procedures as before, tests were scored, means computed, and students were reclassified as more able and less able.

Statistical Analysis

The results of the two test sessions were examined by applying a t-test for correlated means to the data, using the procedures as given by McNemar (1962) and Dixon (1969). From the previously stated problem, three specific null hypotheses were developed and tested using these procedures and accepted or rejected at the .05 level of significance. They are presented as follows:

(1) There will be no significant differences between the means for all subjects (more able and less able) when cued material is reviewed versus no review.

(2) There will be no significant increase of retention of more able subjects when cued material is reviewed versus no review.

(3) There will be no significant increase of retention of less able subjects when cued material is reviewed versus no review.

It should be noted that no effort was made to control for practice effect between no review and review conditions. This was also the case in similar research by Hoon (1974), Fisher and Harris (1974), and Howe (1970b). These studies resulted in little or no retention improvement after the review treatment condition indicating that not only was the treatment effect insignificant but also the effect of practice was non-existent or minimal. Since the general purpose of the study is primarily concerned with the retention improvement of less able versus more able subjects, it was felt that if practice effect was operating it would do so for all subjects; thus a comparison between both groups would remain meaningful.
Chapter 5

RESULTS

Of a maximum possible score of 71, the range of scores for the more able group was 25 to 59 for an average of 37.60 under the no review condition and 26 to 64 for an average of 44.20 under the review condition. Of the same maximum possible score the range for the less able group was 13 to 22 for an average of 18.53 under the no review condition and 17 to 58 for an average of 30.60 under the review condition. These scores are sufficiently below the maximum attainable to conclude that the results are not an effect of ceiling restriction; i.e., there was sufficient room for score improvement, thus measured performance was not artificially limited. Neither do the results seem to be a function of race or sex since both groups had proportionate numbers of individuals in reference to these factors.

The results obtained from the statistical tests performed on the data revealed the review of cued material had a significant positive effect upon the retention of material for the total sample. The results are summarized in Table 1. The null hypothesis of no significant difference was rejected, \( t (60) = 8.74, p < .05 \), for the total sample. The analysis indicated that both more able and less able groups had significantly improved under the review condition, \( t (45) = 8.43, p < .05 \) and \( t (14) = 4.66, p < .05 \), respectively. Null hypotheses two and three were also rejected.
TABLE I

Means and Average Gains of More Able, Less Able and Total Sample Under No Review and Review Conditions

<table>
<thead>
<tr>
<th>Source</th>
<th>No Review</th>
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<th></th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>n</td>
<td>X</td>
<td>SD</td>
<td>X</td>
<td>SD</td>
</tr>
<tr>
<td>More Able</td>
<td>46</td>
<td>37.60</td>
<td>9.33</td>
<td>44.20</td>
<td>9.70</td>
</tr>
<tr>
<td>Less Able</td>
<td>15</td>
<td>18.53</td>
<td>3.04</td>
<td>30.60</td>
<td>9.52</td>
</tr>
<tr>
<td>Total</td>
<td>61</td>
<td>32.91</td>
<td>11.64</td>
<td>40.83</td>
<td>11.34</td>
</tr>
</tbody>
</table>
Chapter 6
DISCUSSION

It is evident from the results that when students such as those in this study are provided with appropriately cued material and are allowed to review that material, they are able to improve retention of the core content of textual material. These findings are consistent with those of Hershberger & Terry (1965) and Klare, et al. (1955).

The suggestion by Christensen and Stordahl (1955) and Robinson (1970) that learning varies with respect to reading and study habits was supported by the results. This implies that retention of main content material for less able readers is facilitated by a subsequent presentation of cued material while it may not be as important to more able readers. A precise explanation as to why a second presentation greatly improves retention ability is not available from the data obtained in this study. Klare et al. (1955) seemed to think that an individual's aptitude for the nature of the material presented had a direct, positive relationship to their retention ability. To some degree this may be supported by the present data wherein all more able students were able to improve significantly upon their scores under the review condition. However, as shown in Table I, the average gain for less able students was almost five points greater than the average gain for the more able students. This suggests that factors other than aptitude for the treatment material may be responsible.

Some of these other factors may well lie in the encoding process investigated by Howe (1970). Although he concluded from his research that initial faulty encoding was prohibitive to improvement of retention, when subjects
had an opportunity for correction, this may just be the surface of the encoding problem. In this research, even though the material presented was correctly cued, less able students may have remained in that category due to subtle defects in interpretation and encoding. Certainly the process of interpretation, encoding, and retention should receive consideration in future, relevant research, since it is obvious from this study that the majority of the sample was able to improve upon retention with repeated exposure to correctly cued material. Further research should also concern itself with investigation of the effect of practice in regard to review of identical material by the same subjects. Previous research by Hoon (1974), Fisher and Harris (1974), and Howe (1970b) showed no significant retention improvement as an effect of either the controlled review treatment condition or the non-controlled practice effect. The degree of significance of this study's results should be interpreted with the assumption that practice may have had some effect on retention improvement, especially in regard to within group measures. However, considering the degree of significance of the statistical tests, it would seem unreasonable to assume that the total effect was dependent upon practice alone. Even if the t values were halved, they would remain significant beyond the .05 level. In any event the results are interesting enough upon which to base further research wherein practice effect could be isolated. This may be done by administering an alternate form instrument without underlining or review to a control group with subjects similar in characteristics to those in the experimental group. Another less stringent method might be to administer an alternate form of the instrument or other appropriate reading material to the experimental subjects prior to the experimental conditions.
The results of the present research are in conflict with the results obtained by Hoon (1974) in similar research and this point deserves some explanation. Hoon's study found absolutely no benefit upon retention when underlining and review were employed by his subjects. Several major reasons for the lack of retention improvement are apparent. First, the subjects were required to identify and underline "important" material on their own. This again brings up the problem of faulty encoding. Hoon's subjects, or at least a majority of them, may have failed to identify, interpret, and store correct main content. Secondly, their inappropriate underlining may also have aggravated recall attempts as a result of the visual, spatial imagery phenomenon reported by Zechmeister et al. (1975). Finally, the subjects were allowed only two minutes for review. The amount of time required by an individual to review material for optimal storage is a self-determined factor, learned by the individual through practice (Robinson, 1970). Of course it would be possible to determine an average amount of time required by a given sample of subjects but this was not the case in Hoon's study. In any event, two minutes seems exceedingly short when many students spend hours for review of a single subject. Other variables accounted for in this study that were absent in others were subject knowledge of retention time, subject knowledge of the cueing scheme, subject knowledge of testing, simple cueing technique and an experimental procedure similar to an actual study session.

Realism in presentation would seem especially important in this area of research. If, as Christensen and Stordahl (1955) and Robinson (1970) state, learning varies with respect to reading and study habits and if these are learned through individual practice, then accurate investigation is dependent upon a presentation that allows each individual to take advantage of his skills.
This research attempted to do so by creating an experimental environment that simulated normal studying habits with one exception, correctly cued experimental material. In normal practice, students must rely upon their own ability to pick out and cue the material under study. In light of the past research, the results obtained here may have been to the contrary had the students underlined the material on their own. An implication for educators and text publishers would be to provide to "less able students" textual material that had been correctly cued. The results of this study indicate that reviewing this type of material is advantageous to retention improvement.

Perhaps it is improving students' interpretative and discriminative abilities, as related to retention of core content, that researchers and educators should emphasize.
REFERENCES


APPENDIX A

Verbatim Instructions and Procedures for Test 1

Preface: Thank all participants for their attendance

1. The material you will be given is part of an experimentation on reading. You will receive credit for participation as a portion of your course work. Any evaluation made as a result of this experiment will not be on an individual basis. All results will be confidential and in no way will affect any grade or other course evaluations.

2. This experiment consists of a second session and everyone who initially participates will be expected to attend the second session. Failure to attend the second session may result in a retraction of participation credit.

3. The reading material consists of various passages taken from different types of material. Some passages are from textbooks, stories, humorous writings, scientific reports, and others. Read the passage just as you would any other textbook material.

4. Although none of the material is difficult, some portions of each passage are underlined to assist with reading. Read the entire passage carefully as you will be tested afterwards but read it only once. This is important, do not go back and re-read any passage, even though you may not have understood it.

5. When you have finished reading all of the passages once please turn over the booklet and raise your hand. When you receive the test, print your name on the answer sheet in the space provided. Darken in pencil the space on the
separate answer sheet which you feel best answers the question. If you want to change an answer, erase any other marks completely. If you have any questions about the test raise your hand. When you have finished the test bring it to me and you may leave. Results of the test and experiment will be available to you upon request.

6. Pass out reading materials reminding students to read each passage only once.

7. As each student's hand is raised pick up the reading materials and give the test and pencil. Remind students to print their name on the answer sheet.

8. Note total time of the session.
APPENDIX B

Verbatim Instructions and Procedures for Test 2

Preface: Thank all participants for their attendance

1. This is the conclusion of the experiment on reading.

2. The material you will be given consists of the same material you read last week. However, you should study it as carefully as any other material about which you would be tested.

3. In this session you may reread and study the material as much as you would like, there is no time limit.

4. When you are satisfied that you know the material as well as you can please raise your hand.

5. When you receive the test, print your name on the answer sheet in the space provided. Darken in pencil the space on the separate answer sheet which you think best answers the question. If you want to change an answer erase any other marks completely. If you have any questions about the test raise your hand. When you have finished the test bring it to me and you may leave. Results of the test and experiment will be available to you upon request.

6. Pass out reading materials reminding students they may read and study the material as much as they would like.

7. As each student's hand is raised pick up the reading material and give the test and pencil. Be sure that the number on the test booklet corresponds to the student's name.

8. Note total time of the session.
Bonnie's Letter

Ommen, Holland
December 3

Dear Daddy and Mommy,

I'm so worried! Everyone has gotten an invitation to one of the St. Nicholas parties except me. Nobody knows where I am to go -- and, of course, I don't know either. Maybe it's better that I don't go, because not knowing it was expected, I have no presents for anyone. I don't want just to sit alone in my room, but I guess I shall. Maybe at home, Bayville High was cliquey, but at least I was in a clique. Here it's as though I didn't exist.

I don't want to stay here but I don't want to go to school in England either, because if it's worse, you are too far away to visit often. All I want is to go home.

It's raining and so cold here you can see your breath. I wish I'd get the flu. All I had for breakfast was some yogurt. I hate the stuff! Three hours till lunch and then we'll have potatoes and those salty sausages. Ugh!

I hate my hair! Wish I hadn't had it cut. It looks horrible!

I thought I understood the geometry when Mr. Smitt explained it, but when I try to do it on my own, I don't know --. Oh, I wish I were so smart that I didn't have to go to school over here. What's the use if I may be put back when we get home anyway?

If you go to England next week, I want to go with you. Please!
Salmon Story

Most people consider red salmon better than pink salmon, and it usually sells for more. A canner of pink salmon printed on his labels, "Guaranteed not to turn red in the can."

Mitten Crab Story

At the time the Japanese beetle was spreading in America, other invasions were going on in Europe. The vine phylloxera and the potato beetle were ravaging France, and the mitten crab was becoming a German problem. Although German newspapers were full of thunder against the "intruder," it actually did little harm. It did fill the nets of fishermen who hoped for fish and got crabs. Though the mitten crab is eaten in China, white men who have tasted it once always stress the "once." The fishermen believed the crabs ate their fish, but mitten crabs cannot catch a live fish of any size. What the German fishermen actually got for their work was 10 tons of fertilizer per day -- an amount that a chemical plant can produce at far less expense.
An ingenious monk named Gerbet is credited with making the first clock, in 996 A.D. This was probably a contrivance in which bells were struck by hammers held in the hands of little figures called "jacks-o-the-clock." The first record of a clock driven by weights is in 1336 when Peter Lightfoot built one for the Abbot of Glastonbury. Equipped with new works, it may be seen today at Wells Cathedral, England.

Early in the sixteenth century, portable clocks were made possible when a locksmith of Nuremberg, Peter Henlein, invented the mainspring. This was a long, flexible steel ribbon tightly coiled around a spindle to maintain the motion of the wheels. As a result, small clocks that could hang from a girdle became popular and were known as "Huremberg eggs."

There was difficulty, however, in making the mainspring deliver constant power. Jacob Zeck of Prague, corrected this in 1525 by inventing the fusee. This is a cone-shaped device placed between the mainspring barrel and the movement. The mainspring exercises its force by means of a chain on the small end of the cone, where leverage is smallest, at full winding and on larger sections as the spring runs down. The leverage is thus increased as the mainspring becomes in effect weaker, and so a constant flow of power is maintained. This device, formerly widely used in watches, is now restricted to the chronometer and some fine spring-driven clocks. Refinements in the hairspring and the escapement of modern watches enable them to keep excellent time without it.

The discovery of the pendulum by Galileo in 1581 marked the real beginning of measuring time accurately. Some years after his death, a Dutch scientist named Huygens presented the first pendulum clock to the Dutch government. A too-sudden check on the pendulum prevented maximum accuracy. An English mathematician, Robert Hooke, remedied this by introducing an anchor escapement. Another Englishman, George Graham, came along later with his dead-beat escapement and mercury-compensation pendulum.
Lone Prairie Poem

"Oh, bury me out on the lone prairie,
In a narrow grave, just six by three."
The words come low and mournfully
From a young boy's lips, so cold and pale.
He was singing and jesting just
Yesterday,
Ruddy and ready and ripe for a spree.
But his song was stayed by a bullet stray.
And now he is nearing the end of his
Trail.
"Oh, bury me out on the lone prairie,
Where the grass grows green and the
Wild winds play."

Greek Orators passage

An ancient Greek writer described two
Orators as follows:

When Aeschines addresses the people,
They say, "How well he talks!" When
Demosthenes speaks, they say, "Let us
March against Philip!"

English Tourists

An English couple named Holtby and three
Women friends were visiting the palace of the
French kings at Versailles. As they were walk-
ing down one of the great halls, they saw ad-
vancing upon them from the far end another
Party of five.

"Look," said Holtby, "here comes the British
Tourist with a vengeance, and his ladies with
him. I ask you -- did you ever see such tweeds
And such a cap?" (This was in the days when an
Englishman always wore a cap to the con-
inent.) "Arry in Parry if I ever saw him."

And behold, the end of the room was all mir-
or, and it was he and his party who were re-
flected in it.
On my tenth birthday I became page boy at the Hotel Martin. They dressed me in a blue suit with a wide collar of white linen. On my yellow hair was a blue cap with a glossy visor. I remember so well how I looked because never until that day had I seen all of myself as one piece. In the mirror at home in Contes there would be reflected an ear, a nose, or one blue eye -- never a complete face. But in the Hotel Martin as I trod on Oriental carpets I was surrounded by mirrors, and nothing they reflected gave me so much joy as myself costumed for work.

At lunchtime that first day I had my second memorable experience. The cook forked onto my plate a piece of roast veal nearly as big as my head. From it rose an intoxicating aroma. Innocently I asked, "For how many is this piece?"

"For you, Henri."

I think now that cook was having fun with me; but then I took him seriously. I carried that beautiful piece of roast veal to my place. There was more meat on my plate than would be eaten in a week by Papa and Mama, by Celestin and Badou and even some others, all put together. Suddenly I began to cry; I could not eat that veal. Even today -- and I am now fifty-four years old -- when I think of the poverty of Contes and the richness at the hotel, I can cry afresh.

I have no use for those parents who are forever talking about how virtuous they were when young. It reminds me of the father who got after his boy for not being more saving.

"Why, son, when I was your age I worked in a grocery store for five dollars a week, and in five years I owned the store," he said.

"Well, that may be, Dad," retorted the boy, "but you couldn't do it now. They have cash registers."
Jellyfish Passage

The Velella jellyfish, like the Portuguese man-of-war, is not an individual organism but a colony of hydroid animals, each with its allotted duties and all joined together to form a composite entity. It is supported by a broad, flat float, dazzling blue with an iridescent sheen. Diagonally across this float is a triangular fin or "sail"; the interior of the float is divided into watertight compartments that make it unsinkable. Beneath the float are short, threadlike tentacles, each form of which has a specific duty. Some do nothing but eat; some capture food; others sting severely; others are feelers or rudders.

No one knows for sure what a baby Velella is like. In the same seas where these animals abound are two other strange jellyfish, one called Porpita, which has no sail on its float, and another called Rataria. The latter may be the young form of either Velella or Porpita.

Housekeeper Passage

It wasn't enough for Mrs. Gunn, our housekeeper, that, having devised a schedule, she should maintain it. She had to be ahead of herself. ("I can't abide things hanging over me," she used to say.)

Monday being washday, she did the table linen on Sunday night. Since Wednesday morning was set aside for churning, she did it Tuesday afternoon. It was the same with everything. She never went to bed without laying out all the food that wasn't actually perishable so that it would be ready for the next day.
Cowboy Passage

Cowboys were not always known by that name. In Texas they were vaqueros; in Oregon this became buckaroos. In the North they were more often called riders. They were later known nearly everywhere as cowpunchers or simply punchers, though these terms at first applied only to the men who herded cattle into the cars of the trains that took them to Omaha or Chicago. The puncher pushed a long pole between the car bars to load the right number of steers into each. He was sometimes called a cowpoke. A cowboy always rode for a boss; if he acquired a ranch of his own, he became a cowman or a cattleman or a rancher.

Wallpaper Passage

The origin of wallpaper, claimed by many countries, cannot be ascribed to any particular one. The Chinese used paper decoratively at an early date, but there is no record that it was attached to their walls. In fact, it was used in Europe as a temporary, movable decoration long before the idea of applying it to walls was thought of. In 1431, Louis XI of France had a design of angels painted on sheets of paper, known as "the Terrible" and credited with the secret murder of thousands of persons, he may have found the sight of angels around him comforting.

The oldest known fragment of wallpaper was discovered in 1911 during restoration of the entrance hall of Christ's College, Cambridge, England. Its black-and-white design had been printed on the back of a royal proclamation issued in 1509. In 1568, a Dutch printer, Schinkel, was taken to court for producing a book that conflicted with the teachings of the church. It was stated that he had also printed stripes and roses on the back of ballad paper to be used on attic walls. By the end of the sixteenth century, France had both a wallpaper makers' union and a paperhangers' guild.
About 1620. Le Francois of Rouen began to make paper imitations of velvet hangings. The patterns were printed with an adhesive, upon which finely clipped silk was sprinkled. In 1688, Papillon of Paris started his great wallpaper printing house. He was the first to use continuous repeating designs.

During the eighteenth century, there were many developments, including the invention by Jackson of Battersea, England, of a process for reproducing paintings on paper panels and the establishment by Reveillon of his famous factory.
APPENDIX D
Bonnie's Letter

1. Bonnie, the writer of this letter, is
   A on a long journey.
   B visiting strangers.
   C in a hospital.
   D in a reform school.
   E at a boarding school.

2. What does she approve of in her present circumstances?
   A The weather
   B The food
   C Her looks
   D Her progress in geometry
   E Nothing

3. She wants most of all to
   A return to Bayville.
   B go to a party.
   C go to England.
   D have her parents visit her.
   E be finished with school forever.

4. She complains that she has been
   A ignored.
   B taken into a clique.
   C given too much to do.
   D left alone in her room.
   E misinformed as to where she is to go.

5. She is writing this letter
   A before getting up in the morning.
   B just after getting up.
   C during breakfast.
   D just after breakfast.
   E just before lunch.

6. In this letter, Bonnie expresses herself very
   A disrespectfully.
   B respectfully.
   C hesitantly.
   D carefully and accurately.
   E emphatically.

7. "It" in the phrase "it was expected" (first paragraph) means
   A getting an invitation.
   B accepting an invitation.
   C giving a party.
   D bringing presents.
   E receiving presents.
Salmon Story

8. What word is understood after "more" in the sentence ending "sells for more"?

A People
B Uses
C Money
D Stores
E Customers

9. The canner wanted to make readers of the label think that

A the salmon in the can was red.
B the salmon in the can would turn pink.
C salmon should not be red.
D salmon should not be pink.
E the color of salmon does not matter.

10. It is clear that the guarantee

A would hold under all normal circumstances.
B was likely but not sure to hold.
C was about as likely to hold as not.
D was not likely to hold.
E would definitely not hold.
Mitten Crab Story

11. The mitten crab in Germany can best be described as a

A source of food.
B fish eater.
C nuisance.
D dangerous pest.
E cheap source of fertilizer.

12. The German fishermen were mistaken in thinking that the mitten crabs

A were very numerous.
B got into their nets.
C had any value as fertilizer.
D ate quantities of live fish.
E ate dead fish.

13. This passage appears to be taken from a discussion of

A German eating habits.
B Chinese eating habits.
C sources of fertilizer.
D animal and insect pests.
E fishing in Germany.

14. The paragraph just before this passage in the article from which it was taken probably concerns the

A vine phylloxera and the potato beetle.
B Japanese beetle in Europe.
C other invasions in Europe.
D Japanese beetle in America.
E mitten crab in America.

15. What was the "thunder"?

A Loud noises intended to scare off the pests
B Merely printed words
C Mutterings from the fishermen
D Warnings of stormy weather ahead
E Threats from readers

16. What was the "intruder"?

A The Japanese beetle
B The vine phylloxera
C The potato beetle
D The mitten crab
E The passage does not indicate.

17. White men ...

A are unwilling to taste the mitten crab.
B like the taste of the mitten crab.
C dislike the taste of the mitten crab.
D eat the mitten crab in China.
E are poisoned by the mitten crab.
Passage about Clocks

18. Which of the following is the best title for this passage?
A Early Methods of Telling Time
B Nuremberg Eggs -- the First Watches
C Predecessors of the Watch
D The First Clock
E The Development of the Clock

19. The writer indicates that least is known about the work of
A Gerbet.
B Lightfoot.
C Henlein.
D Zeck.
E Huygens.

20. A device still used in chronometers but no longer in watches is the
A anchor escapement.
B dead-beat escapement.
C fusee.
D hairspring.
E mainspring.

21. With which discovery or invention is the accurate measurement of time said to have begun?
A The mainspring
B The pendulum
C The fusee
D The anchor escapement
E The dead-beat escapement

22. Mentioned in the passage as still in existence is a clock built by
A Gerbet.
B Lightfoot.
C Huygens.
Dooke.
E Graham.

23. The anchor escapement improved the accuracy of the
A mainspring.
B hairspring.
C pendulum.
D weights.
E fusee.

24. Nuremberg eggs made use of
A bells and hammers.
B jacks-o-the-clock.
C weights.
D a mainspring.
E a pendulum.

25. The first pendulum clock was presented to the government of
A Glastonbury.
B Nuremberg.
C Prague.
D Holland.
E England.

26. The first mainsprings tended to
A deliver less power as they ran down.
B wear out quickly.
C take up too much space.
D be hard to wind tightly.
E have least leverage at full winding.

27. In discussing his subject, the writer
A follows a chronological order.
B takes up one country at a time.
C presents the most important events first.
D presents the most important events last.
E follows no apparent order.
Lone Prairie Poem

28. The young boy is
   A joking.
   B pretending.
   C weary.
   D sick.
   E dying.

29. "Lone" means most nearly
   A only.
   B deserted.
   C treeless.
   D flat.
   E single.

30. "Stayed" means
   A lingered.
   B struck.
   C ended.
   D kept.
   E held.

31. "His trail" means his
   A life.
   B path.
   C road.
   D hopes.
   E death.

32. The poem indicates that the wounding of the boy was
   A faked.
   B expected.
   C planned.
   D accidental.
   E not serious.

33. The tone of the poem is rather
   A frivolous.
   B sentimental.
   C hard-hearted.
   D formal.
   E sarcastic.
Greek Orators Passage

34. This comment meant that Aeschines
   A aroused love, Demosthenes hatred.
   B aroused admiration, Demosthenes action.
   C prepared the way for Demosthenes.
   D and Demosthenes spoke on different subjects.
   E was really a better orator than Demosthenes.

English Tourists

35. The point of this story is that people
   A should keep quiet in public.
   B who travel should dress suitably.
   C who visit France should do as the French do.
   D who are alike flock together.
   E seldom see themselves as others see them.

36. The climax of the story occurs when
   A the party entered a great hall.
   B Holtby noticed the people coming toward him.
   C the friends noticed the people coming toward them.
   D Holtby made his remarks.
   E the visitors realized they were looking into a mirror.

37. "Arry in Parry" turned out to be
   A one of the guards.
   B a total stranger.
   C an old friend of Holtby's.
   D Mrs. Holtby.
   E Holtby himself.

38. At the close of the story Holtby probably felt both
   A annoyed and unhappy.
   B embarrassed and amused.
   C regretful and depressed.
   D surprised and puzzled.
   E delighted and apologetic.

39. The writer implies that nowadays Englishmen traveling on the continent
   A do not always wear caps.
   B go bareheaded.
   C seldom wear tweeds.
   D seldom visit Versailles.
   E do not look like tourists.

40. "It" (last word in the story) refers specifically to
   A "end."
   B "room."
   C "mirror."
   D "it" (next-to-last line).
   E "party."
41. Henri is portrayed as rather
A greedy.
B ungrateful.
C emotional.
D homesick.
E stupid.

42. It is clear that his family
A were small eaters.
B were poor.
C ate meat every day.
D liked roast veal better than any other kind of meat.
E never ate meat.

43. Henri especially admired
A his own appearance.
B his relatives and friends in Contes.
C the Oriental carpets.
D the beautiful mirrors.
E the skill of the cook.

44. The mirror at his home was
A broken.
B distorted.
C dirty.
D tiny.
E hard to find.

45. On his tenth birthday, Henri experienced both
A mockery and consolation.
B happiness and sorrow.
C starvation and plenty.
D admiration and disapproval.
E selfishness and unselfishness.

46. The first memorable experience of his tenth birthday that he describes was
A securing a job.
B leaving home for the first time.
C arriving at the hotel.
D seeing the luxuries of the hotel.
E seeing himself in the mirrors.

47. His second memorable experience was
A having fun with the cook.
B being treated kindly by the cook.
C realizing his own unimportance.
D realizing the contrast between rich and poor.
E resolving to improve the fortunes of his family.

48. The passage does not mention the writer's
A name.
B age when this incident occurred.
C age when he wrote the passage.
D nationality.
E looks when a boy.
Virtuous Parents

49. The writer condemns parents who
A were overly virtuous when young.
B talk too much.
C expect their children to be perfect.
D set a poor example to their children.
E present themselves as having been model youths.

50. The son implied that his father
A was a good businessman.
B saved his money.
C stole from his employer.
D was careless with his money.
E was not worth five dollars a week.

51. What virtue was the father particularly concerned about?
A Shrewdness
B Thrift
C Honesty
D Truthfulness
E Industriousness

52. The son's attitude toward his father's statement was
A flippant.
B unnatural.
C admiring.
D respectful.
E apologetic.
Jellyfish Passage

53. The best heading for this passage is
   A Strange Fish.
   B The Velella Jellyfish.
   C Baby Jellyfish.
   D Hydroid Animals, Including the Jellyfish.
   E Velella, Porpita, and Rataria.

54. The Velella is
   A buoyant.
   B stationary.
   C fast moving.
   D harmless.
   E colorless.

55. The Velella's float
   A consists of one watertight compartment.
   B is detached from the tentacles.
   C shines.
   D is small and inconspicuous.
   E is triangular.

56. The Velella's tentacles are
   A very long.
   B round and thick.
   C broad and flat.
   D all alike.
   E specialized.

57. A difference mentioned in the passage between Velella and Porpita is that Porpita has no
   A float.
   B tentacles.
   C sail fin.
   D sting.
   E watertight compartments.

58. What does the writer indicate for sure about Rataria?
   A That it has a sail
   B That it has no sail
   C That it is a young Vella
   D That it is a young Porpita
   E That it is a jellyfish

59. "These animals" are
   A baby Velellas.
   B adult Velellas.
   C baby Porpitas.
   D adult Porpitas.
   E Ratarlas.
Housekeeper Passage

60. Which of the following proverbs best expresses Mrs. Gunn's attitude toward her work?

A He who hesitates is lost.
B A stitch in time saves nine.
C The early bird catches the worm.
D Never put off till tomorrow what you can do today.
E Time is a good servant, but a poor master.

61. "Abide" means

A stay with.
B bear.
C excuse.
D ignore.
E approve of.

62. "Did" in the sentence beginning "Monday being washday ..." means specifically

A folded.
B ironed.
C sprinkled.
D washed.
E mended.

63. As a housekeeper, Mrs. Gunn must have been

A economical.
B efficient.
C lacking in thoroughness.
D thorough but extremely slow.
E disorganized.

64. The household schedule was set by

A the writer.
B Mrs. Gunn's employer.
C Mrs. Gunn.
D local custom.
E the needs of the moment.

65. The writer draws his portrait of Mrs. Gunn by

A giving specific examples of her ways.
B using vivid figurative language.
C contrasting her with other women.
D subtly hinting at her peculiarities.
E showing her effect on other people.
Cowboy Passage

66. The main thought of this paragraph is that cowboys
A were once known as punchers.
B were found in many states.
C have had many names.
D were tough, skillful men.
E did not own property.

67. There is a difference in status between a cowboy and a
A cowman.
B vaquero.
C cowpoke.
D rider.
E cowpuncher.

68. "Them" in the sentence that ends "... the train that took them to Omaha or Chicago," means
A "cowpunchers"
B "men"
C "cali-le"
D "cars"
E "trains"

69. "Each" in the sentence that ends "... right number of steers into each," means
A car.
B pole.
C train.
D bar.
E steer.

70. The writer explains the origin of the term
A vaquero.
B rider.
C puncher.
D boss.
E rancher.

71. The writer suggests that the cowboy
A is more widely used now than formerly.
B is not longer used.
C should be replaced by other terms.
D has changed its meaning.
E has come into existence very recently.