THE EFFECTS OF A STRUCTURE CONVEYING INTRODUCTION TO WRITTEN MATERIALS ON THE LEARNING EFFICIENCY OF ADULT LEARNERS

Dissertation for the Degree of Ph. D.
MICHIGAN STATE UNIVERSITY
WILMA EILEEN BENNETT
1976

This is to certify that the

thesis entitled

THE EFFECTS OF A STRUCTURE CONVEYING
INTRODUCTION TO WRITTEN MATERIALS
ON THE LEARNING EFFICIENCY OF ADULT LEARNERS

presented by

Wilma Eileen Bennett

has been accepted towards fulfillment
of the requirements for

Ph. D. degree in Education

Allan J. Abela
Major professor

Date 8/6/76

O-7639

ABSTRACT

THE EFFECTS OF A STRUCTURE CONVEYING
INTRODUCTION TO WRITTEN MATERIALS
ON THE LEARNING EFFICIENCY OF ADULT LEARNERS

By

Wilma Eileen Bennett

Community college students spend a large portion of their study time interacting with written materials. It was hypothesized that if they were given pre-reading information on how a written selection was constructed, they would not need to figure out this information as they read and would therefore have more time to devote to subject matter content itself. The suggested pre-information included four things: the author's purpose for writing the selection, the main point or main topic of the selection, the order in which subtopics were arranged (eg. hierarchical, chronological, unidentifiable), and the types of details to expect.

The hypothesis was tested by determining whether community college students could recall more details from what they read if they received a preface containing the suggested information. Three treatment groups read articles for specified lengths of time and then answered fill-in-the-blank type quizzes. One treatment group received construction prefaces containing the

suggested information on article construction. A second group received placebo prefaces and a final group received no pre-reading information at all.

Results of the study supported the main hypothesis: subjects who received pre-information on article construction recalled significantly more details from what they read than other subjects. One auxiliary finding indicated that receiving construction prefaces did not make the articles seem any easier than they seemed to other subjects. Another finding suggested that a placebo preface was as effective as a construction preface and significantly more effective than no preface in enabling subjects to determine the purpose of what they were reading.

THE EFFECTS OF A STRUCTURE CONVEYING INTRODUCTION TO WRITTEN MATERIALS ON THE LEARNING EFFICIENCY OF ADULT LEARNERS

By

Wilma Eileen Bennett

A DISSERTATION

Submitted to

Michigan State University

in partial fulfillment of the requirements

for the degree of

DOCTOR OF PHILOSOPHY

Department of Secondary Education and Curriculum

1976

ACKNOWLEDGEMENTS

If it weren't for the encouragement, assistance, and positive suggestions of a number of people, this study would never have been completed. I want them all to know how very appreciative I have been of their help.

Dr. Allan J. Abedor not only chaired the dissertation committee, with all the extra duties that implies, he also provided guidance throughout my doctoral program. He was conscientious about giving the feedback necessary for this learner to improve her abilities, and I am grateful to him.

I could not have asked for more breadth and depth of knowledge than that exhibited by the other members of my committee, Dr. Paul W. F. Witt, Dr. Stephen Yelon, and Dr. James Goff. I feel very fortunate to have had their assistance.

Others who deserve special thanks include Richard Baldauf and Esther Eddy for allowing me to use their classes as subjects, and Dr. Henry Goodstein for helping in the design of the study and analysis of the data.

There is not enough room to list all the acts of kindness that moved this project along. But I would like to recognize the following gentlefolk by name so they will know that I saw and

appreciated their help: Sister Elizabeth Flynn, Dr. Elwood Miller, Dr. John Gibson, Dr. Vincent Palacino Jr., Deborah Uzell, Robert Leonard, Irena Stepanczak, and my mother, Eileen Reynolds.

TABLE OF CONTENTS

Acknowledgements	iii
List of Tables	vii
List of Figures	ix
CHAPTER ONE - INTRODUCTION	1
Purpose of the Study	1
Nature of the Problem	1
Background of the Problem	3
Need for the Construction Preface	5
Description of the Construction Preface	7
Importance of the Study	8
Limitations of the Study	10
Differentiation of Terms	11
CHAPTER TWO - REVIEW OF RELATED LITERATURE	12
Introduction	12
Advance Organizers	14
Introductions	15
Directions	15
Questions	16
Objectives	18
Summary	20
CHAPTER THREE - DESIGN OF THE STUDY	23
Population and Sample	23
Treatment	23
Construction Prefaces	24
Non-Construction Prefaces	26
Articles	27
Test Instruments	28
Scoring the Instruments	29
Research Hypotheses	30
Experimental Design and Data Analysis	32

CHAPTER FOUR - ANALYSIS OF THE DATA 34

Preliminary Analyses 34
Method of Analysis 35
Testing Hypotheses 1 and 2 37
Testing Hypotheses 3 and 4 38
Testing Hypotheses 5 and 6 39
Testing Hypotheses 7 and 8 41
Testing Hypotheses 9 and 10 43
Testing Hypotheses 11 and 12 45
Testing Hypotheses 13 and 14 47
Summary of Significant Findings 49

CHAPTER FIVE - SUMMARY AND DISCUSSION 50

Summary of Results 50
Discussion of Major Hypothesis 51
Discussion of Minor Hypotheses 53
Suggestions for Future Research 55
Contributions of the Study 57

APPENDICES

Appendix A - Procedures 59
Appendix B - Construction Prefaces 61
Appendix C - Placebo Prefaces 65
Appendix D - Articles 69
Appendix E - Tests 84
Appendix F - Table of Means and Deviations 95

BIBLIOGRAPHY 97

LIST OF TABLES

Table		Page
1	Analysis of Variance for Reading Ability	35
2	Analysis of Covariance for Recall of Detail	37
3	Comparison of Group 1 and Group 2 on Recall of Detail	38
4	Comparison of Group 2 and Group 3 on Recall of Detail	38
5	Analysis of Covariance for Perceived Difficulty	39
6	Analysis of Covariance for Recognition of Article Construction	40
7	Comparison of Group 1 and Group 2 on Recognition of Article Construction	40
8	Comparison of Group 2 and Group 3 on Recognition of Article Construction	41
9	Analysis of Covariance for Recognition of Article Main Point	42
10	Comparison of Group 1 and Group 2 on Recognition of Article Main Point	42
11	Comparison of Group 2 and Group 3 on Recognition of Article Main Point	43
12	Analysis of Covariance for Recognition of Article Order	44
13	Comparison of Group 1 and Group 2 on Recognition of Article Order	44
14	Comparison of Group 2 and Group 3 on Recognition of Article Order	45

Table		Page
15	Analysis of Covariance for Recognition of Article Purpose	46
16	Comparison of Group 1 and Group 2 on Recognition of Article Purpose	46
17	Comparison of Group 2 and Group 3 on Recognition of Article Purpose	47
18	Analysis of Covariance for Recognition of Subpoint Usage	48
19	Comparison of Group 1 and Group 2 on Recognition of Subpoint Usage	48
20	Comparison of Group 2 and Group 3 on Recognition of Subpoint Usage	48
21	Comparison of Group 1 and Group 3 on Recognition of Subpoint Usage	49
22	Means and Deviations	96

LIST OF FIGURES

Figure		Page
1	Experimental Design	33

CHAPTER ONE

INTRODUCTION

Purpose of the Study

The purpose of this study was to investigate the effectiveness of a device designed to improve the learnability of written materials used by community college students. The device studied was a carefully prepared one-page preface called a construction preface (CP). This preface gave the adult learner certain prescribed information about the written materials that it preceded.

Nature of the Problem

A problem that exists in the field of education gave rise to the creation of the construction preface. This problem is the neglect suffered by written prose as a learning medium. The printed page is the most common instructional tool used in schools today, yet not as much research is conducted in this area as in less commonly used media such as films and television. One can thumb through an entire card catalog drawer of books on how to write and find not one book on how to write a textbook!

The size of this neglect is a scandal for education. Books are the second largest item, after teacher salaries, in most school budgets (Tickton, 1970). Yet textbooks seem to be written by people who do not know how to make educational use of the printed word. People do not assume they can produce a television lesson because they know how to operate a television camera. Yet anyone who can operate a pencil assumes the automatic ability to produce textbooks.

Any person who takes the time to page through the written materials used in classrooms today will find evidence of inadequate use of the medium: inconsistent organization, passive sentences, negative sentences, inadequate (or non-existent) subtitles, inane captions, practice exercises without answers.

There appears to be no field of written instruction per se, even though fine research is being conducted on various written materials. Frase (1967) and Rothkopf (1966) are doing excellent work with embedding questions in continuous prose. Programmed instruction has been developed to a professional degree. Much related and highly specialized research is conducted in reading. Yet there seems to be nothing that pulls all research on written materials together under one rubric.

This lack of a theoretical structure has permitted gaps to remain in the research that has been conducted on written instruction. While it is beyond the scope of this study to suggest a theoretical structure for a field of written instruction, it is not beyond its scope to attend to a suspected gap in the research already completed in this

field. Chapter Two, which is a review of the literature, is the appropriate place to show that a gap does exist. The following rationale explains what the gap is and how a construction preface might fill it.

Background of the Problem

Dr. Robbie Case suggests that "adults differ from each other, not only in the experience they bring to a learning task ... but also in the number of subskills which they are capable of coordinating at one time, and in the extent to which they are able to avoid applying incorrect subskills or concepts" (Case, 1975). This capacity to coordinate subskills is known as information coordination and the ability to avoid applying concepts incorrectly is called field independence.

Information coordination, Case suggests, can be increased in the design of instruction by utilizing Gagne's hierarchies and by breaking information into the narrowest hierarchical span possible when teaching.

Field independence, like information coordination, is best increased by attending to the design of instruction. Although there have been many attempts to increase field independence via intensive instruction, even the longest (two years) and most successful have reported relatively small gains or gains that were unique to one task (Case, 1975). Teaching field independence, or the ability to ignore distracting clues from the environment or from previous learning, has not been

very productive. Even if it had been productive, there is a limit to the amount of efficiency this could add to learning. The student with field independence capabilities would still have to take time to sort the relevant from the irrelevant.

This is because applying field independence skills falls at Bloom's Application level rather than his Knowledge level (Bloom, 1956). Application requires time. It does not happen instantaneously. One might know instantaneously that a problem can be solved by 3-digit multiplication, but performing that multiplication takes time. In the same manner, one might recognize instantaneously that there is field interference in the information being studied, but it still takes time to figure out what that interference is. If, for example, the difficulty is a sentence that can be interpreted in two ways, the student has to pause and reflect on which is the better interpretation in the given context.

Since applying field independence takes time, the instructional designer can make learning more efficient by removing the need to exercise this skill. He can remove interferences and he can present information in such a manner as to direct the learner immediately and unambiguously to the desired interpretation.

One can design field independence into new materials by using research-proven devices such as visuals, subtitles, decision tables, and active rather than passive sentences. (For an excellent summary of the research findings on continuous prose, see Davies, 1973.) But field independence cannot be designed into already existing materials.

For existing continuous prose, the instructor or designer must provide some type of advance information to the student that will enhance his ability to ignore irrelevant details.

Presenting objectives in advance does this. So does providing the student with questions prior to reading a piece of prose. Both have been studied in detail, as Chapter Two will show. One method of enhancing field independence that has not been tested is giving the student advance information on how the material to be read is formatted. (This is not to be confused with giving the student advance information on how the subject matter content is inherently structured. That would enhance information coordination, not field independence. Field independence concerns itself with how the subject matter is presented to the learner.) The following section explains why it is felt that giving the student advance information on how written prose is organized would increase the speed at which the student could learn from that material.

Need for the Construction Preface

Studies on perception have shown that organization facilitates learning (Fleming, 1970). When a student begins to read an unfamiliar piece of prose he/she has no idea how that prose is constructed. If the student is aware of the help organization can give to memory, then the first reading(s) of an article must be devoted to looking for organization and relationships, reducing the amount of time that can be spent on understanding and committing to memory the concepts presented. If a

student is not aware of the need for understanding the organization of what is being read, or not trained in searching for organization, the entire learning process must rely on rote memorization of unrelated concepts. Rote memory is an inefficient method of learning (DeCecco, 1968).

It was hypothesized that giving the learner advance information on how an article is constructed would help both the student who searches for relationships in what he is reading and the student who doesn't. It would save the former student from having to spend time figuring out what those relationships are. It would save the latter student the extra time required to learn unrelated concepts. When the amount of time a reader must spend searching for relationships is decreased, more time becomes available to devote to learning concepts and principles, thereby increasing the amount of information a student can learn in a given amount of time.

Knowing in advance how written material is organized is critical to efficient use of that material. Imagine trying to find a number in the telephone book if one didn't know that the book is arranged alphabetically by last name. One would have to skim through the book hoping to figure out a pattern of organization before one could look up the number desired. The first five or ten pages of a phone book are the hardest to use precisely because their organization varies from city to city. One has to figure out the beginning organization every time one looks for the number of "Information" or "Time" in a different

city. Sometimes this organization pattern is easy to determine. Sometimes it is not. The same is true for other written materials. This study, therefore, suggests that a device is needed which makes the organization of an article immediately clear so the student can concentrate on his real purpose: understanding content.

Description of the Construction Preface

What type of information would this device contain? Four main kinds were hypothesized. In order to present information on relationships, the device would have to tell something about the subtopics of the written material. This is where most of the relationships in written prose are found. The subtopics, for instance, may be related hierarchically, chronologically, or not at all.

Another important relationship that would be conveyed as advance information is the main topic or main point to which all subtopics relate. This is especially important when an author dwells on a subtopic to such an extent that the student could mistake it for the main topic.

It was hypothesized that another piece of advance information the student should have is the purpose of the article. Why was it written? If it were written to convince the reader of something, then the article has a main point. If it were written to present information, then it has a main topic. Knowing why an article was written gives the student an idea of what to expect as he reads the article.

Finally, the efficacy of this device would be measured by testing to see how many details the student could remember. The fourth piece of advance information must give the student some idea of what is meant by details. It is intended to enable the student to distinguish more readily between details and subpoints.

Since this device precedes the main body of textual material, it is called a preface. It is not called an introduction because an introduction is a more common part of written materials. To distinguish it from other prefaces, it is known as a construction preface. This is because it gives information on how the written material is arranged or constructed.

To forestall claims that the construction preface is time-consuming to read and therefore no more efficient than having the student spend extra time reading the article itself, the CP is limited to under one page in length. To permit replication, it has a prescribed format. Its four parts are arranged and subtitled in the specific order detailed in Chapter Three.

Importance of the Study

One reason this study is important is the apparent disparity between the amount of reading community college students must do and the

ease with which they can accomplish that reading. In a recent study, community college instructors estimated that 75% of student preparation time for their courses is spent reading (Kolzow, 1972). Yet the materials college students must read are frequently too difficult for them.

Major and Collette (1961), in a national study of college general biology textbooks, concluded that the most frequently used and preferred textbooks in this category are written beyond the reading comprehension level of college freshmen. In a study conducted at a rural community college, Creamer (1968) found that the average student at the institution was reading at approximately eighth grade level, while textbooks used at the institution were written, on an average, between grade levels fourteen and sixteen. Cline (1972) also compared the readability of community college textbooks with the reading ability of the students who use them. The average reading ability of the freshmen students in his study was grade level 12.6. He found that fifty-two percent of these students were using textbooks above their reading ability.

In other words, the materials that community college students spend most of their time studying are frequently beyond their ability to comprehend easily. It is, of course, not always possible for instructors to find a good textbook at the appropriate level of difficulty. That is why devices are needed which make it easier for students to use difficult text materials. It is hypothesized that the construction preface is one such device.

Limitations of the Study

This study asked one basic question: By providing the student with a construction preface, could we increase the amount of information that a student could learn from written material in a given length of time? It did not ask whether or not a CP would enable a student to reach a criterion level after reading for a given length of time. Setting a criterion level could have created a ceiling effect when testing subjects, thereby reducing the information gained about the efficiency of the device being tested.

In addition, this study tested recall of details, not recognition of details, thereby requiring fill-in-the-blank or short answer type questions. Multiple-choice questions would have permitted more objective scoring but would have contaminated recall with recognition. Details of how scorer bias was controlled in grading the tests are discussed in Chapter Three.

Finally, this study concerned expository materials. It did not concern other written materials, such as poetry, even though they are used for educational purposes. Additionally, if instruction is aimed at teaching a student to identify the main point of a story, obviously one does not tell the student the main point in advance. The construction preface under consideration is not intended for use in such instances.

Differentiation of terms

Since information coordination and field independence have certain commonalities, it is important that terminology for these similar concepts be rigidly divided between them to avoid misinterpretations:

1. Whenever the words structure and chunking appear, they refer to the ordering of ideas or concepts that is inherent in the subject matter content itself. They are restricted to the domain of information coordination.
2. Whenever the words arrangement, construction, anatomy, framework, and format appear, they refer to the manner in which content is presented, not to the inherent organization of subject matter content. They are used only in reference to field independence concepts.
3. The words order and organization are used with both information coordination and field independence concepts.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Introduction

Research has been conducted on a number of types of information that can be provided to a student prior to studying written materials. These include advance organizers, objectives, questions, and directions.

The twin concepts of field independence and information coordination provide useful categories for sorting these pre-reading aids to instruction. Those preliminary devices which facilitate learning by helping the student relate subject matter to already known concepts or structures fall into the information coordination category. This group is comprised mainly of the various types of advance organizers.

Those devices which help the student pinpoint the relevant, avoid the irrelevant, and avoid misinterpretations belong to the domain of field independence. This group includes introductions, directions, and the pre-reading use of objectives and questions.

Field independence in written materials may be compared to the quality of the vehicle that carries the learner to an archeological dig. Typographical errors, ambiguous directions, and misleading formats

are comparable to automobile breakdowns, poor shock absorbers, incorrect maps and inadequate roads: they make the trip to the dig longer and more frustrating.

By doing so, they rob the learner of valuable time that could be spent at the dig (subject matter content) itself. If the trip is too exhausting, the student's ability to profit from the material at hand is impaired. Postlethwait's book The Audio-Tutorial Approach to Learning says it well:

> "A small item out of sequence or not clearly explained as to its purpose in an exercise, or lack of a simple definition of a term, can cause a great waste of time to the student. It is often these kinds of things which cause a student more trouble than understanding some concept like electron flow in photosynthesis." (Postlethwait, Novak, and Murray, 1972.)

Since advance organizers are designed to precede written material, they will be discussed briefly in this review. This discussion will focus on what they are and why they do not merit a lengthy treatment in relation to this study.

Construction prefaces fall into the realm of field independence. Therefore the greater part of this chapter will concern research conducted on those preliminary devices that enhance field independence: introductions, directions, questions, and objectives.

Advance Organizers

Advance organizers were conceived by Ausubel (1960) in order to facilitate the learning and retention of unfamiliar materials. They are concepts that are already known to the student and that can serve as a structure under which the unfamiliar material can be subsumed. Ausubel's work with advance organizers is based on the assumption that cognitive structure is hierarchically organized in terms of highly inclusive concepts under which are subsumed less inclusive subconcepts and informational data. "In short, the principal function of the organizer is to bridge the gap between what the learner already knows and what he needs to know before he can successfully learn the task at hand" (Ausubel, 1970).

In view of the fact that advance organizers fall in the realm of information coordination whereas construction prefaces belong to the domain of field independence, findings of research on advance organizers would not be germane to this study. In addition, research on advance organizers has turned up such conflicting results (Wong, 1974; Barnes and Clawson, 1975) that a discussion of them here could possibly confuse rather than clear the waters of this study.

The value of advance organizers is likely to remain unsettled until researchers adopt the habit of publishing the actual organizers used in their studies. A description is not the thing itself and it is likely that some of the devices being tested are not advance organizers at all.

Introductions

Introductions have been strangely neglected by educational researchers. Most literature available on them comes from message design in communications and how-to books by speech-writers. Their role is seen as two-fold: to attract attention and to motivate. A quote from Effective Communication is typical: "The introduction attracts the attention of readers or listeners and focuses that attention on the subject matter to be communicated." How to design introductions purposefully so they do attract attention and do motivate does not appear to have been researched.

Directions

Little attention has also been focused on the role played by directions that are presented before written materials is studied. The research that has been done finds that instructions to read carefully can enhance learning.

For example, Postman and Senders (1946) found that students who were given directions to learn specific materials did better than students who received no directions to learn. Rothkopf (1966) reported that a group which had received only general instructions to read carefully performed better than a control group. When specific search

directions were combined with text characteristics in Frase's study (1969), predictable forms of incidental learning were produced.

Romberg and Wilson(1973) explain this phenomenon in terms of "cognitive set." They define cognitive set as "information given to students prior to instruction that informs them of anticipated associations they can expect to acquire in the instruction." A cognitive set main effect was created in their experiment by using the following one sentence direction:

> "Upon completion of the study of the following materials you are expected to know the general law of radioactive decay and be able to solve simple problems based upon the application of this law."

The use of cognitive set to channel student expectation parallels rather closely the purpose of the device studied in this experiment. The construction prefaces that were tested (see Appendix B) contained a similar statement as to what the student could expect to be tested on.

It is also interesting to note that Romberg and Wilson's one-sentence direction reads very much like an objective. It may be that the facilitative effect of objectives are due to the way in which they create a cognitive set through directing student attention.

Questions

Studies on the effects of giving students a list of questions before instruction, or before reading a passage, go back to Distad

in 1927. He found that the use of questions in such a manner may sometimes enhance learning. Similar reports noting the general positive effects of pre-questions have continued to the present. A summary statement of these positive, yet vague, findings comes from Warr, et al (1970) who observed that pre-tests can have a teaching as well as a testing function.

Beginning with Washburne in 1929, researchers began looking at the specific conditions under which pre-questions serve a teaching function. Washburne found that not only does a pre-test sometimes increase scores obtained on the same or similar questions asked in the post-test, but that scores on post-test question not given in the pre-test are also increased.

Rothkopf (1966) concluded that test-like questions which were presented before the relevant text passage was read produced question-specific facilitative effects. These question-specific effects were greatest when the correct answer was given to the student after he made his response, but even without knowledge of results, specific training effects were very marked.

Frase (1967) reported that questions had the most facilitative effect upon retention of incidental information when they followed the reading passage.

Hartley (1973) observed that those studies which found no pre-test effects involved lengthy instruction or completely unfamiliar subject matter. For example, both the Welch and Walberg (1970) and the

Gustafson and Toole (1970) studies reported no pre-test effects. The former involved seven months of instruction; the latter used a 23,000 word text. Obviously, so many other variables could intervene in a seven month period that finding a pre-test effect would be surprising.

Apter's study (1971) tested Welsh children on their knowledge of Afghanistan and reported no pre-test effects. Hartley suggests that pre-tests have positive effects only on familiar material because they alert students to their own deficiencies.

Pre-questions, then, seem to facilitate learning under the following conditions: 1.) The instruction is short. 2.) The material to be studied is not totally unfamiliar. 3.) Specific, rather than general, learning is desired.

Objectives

Asking a student to enter a new learning activity without knowing objectives in advance is like asking that student to race in a car rally rather than on a speedway. The participant in a rally does not know where he/she is headed and is therefore unable to tell when a wrong turn has been made. The student without objectives does not know what to pay particular attention to in a learning activity. A number of studies have, in fact, found that pre-objectives boost relevant learning (Dalis, 1970; Rothkopf and Kaplan, 1972; Morse and Tillman, 1972; Doty, 1968; Engel, 1968; Hastings, 1972; Long and Huck, 1972).

However, the research on pre-instructional use of objectives has turned up conflicting results. A number of studies have reported no significant advantage for pre-objectives. Examination of those studies which report no significant advantages reveals an interesting pattern: the instructional materials used tend to be based on the objectives and systematically designed!

For example, Smith (1967) investigated the effect of providing objectives to slow eighth-grade learners who were studying elementary probability. The results did not reveal any significant differences between treatment groups. His instructional unit was semi-programmed. Etter (1969) concentrated on individual differences of adult learners, as they related to achievement, with prior knowledge of objectives. The instructional task was a 135-frame programmed text on the stock market. Again, no main effect for objectives was found. An investigation of the effects of presenting varying specificity of course objectives to students learning motor skills and associated cognitive material was conducted by Weinberg (1970). The statistical analyses of the data revealed no significant differences between groups. It was suggested that this finding may be due to the fact that the behavioral objectives were used as the formative basis for the design of all phases of the instruction.

Jenkins and Deno (1971) made a similar suggestion about their lack of a significant result for pre-instruction objectives: the explicitly stated objectives were superfluous in that the instructional unit was

designed and validated to facilitate the attainment of identified tasks representing intentional learning.

Zimmerman (1972), Merrill and Towle (1972), and Stedman (1970) all used programmed instructional materials and reported no significant effects for pre-objectives.

The lack of benefit derived from pre-objectives paired with carefully designed instruction appears so consistent and so striking that such a result may eventually be used as a measure of the adequacy of the instructional design.

This is not intended to suggest that objectives should not be presented to students when the instruction has been systematically developed. They can have a positive effect on student attitude and thus have a contributory role to play. Tiemann (1968) found that a more favorable attitude, as measured by a course evaluation questionnaire, was associated with the provision of behavioral objectives. The availability of objectives decreased the level of subjects' anxiety for the first three units of the six-unit Merrill and Towle (1972) study. Weinberg's 1970 study found no significant advantages for objectives but an attitudinal measure indicated a positive preference for receiving objectives.

Summary

This review has explored the pre-instructional use of various learning devices. It has suggested that advance organizers, which

are commonly mentioned in the same sense as objectives and pre-questions (Papay, 1971; Duchastel and Merrill, 1973), actually serve a different fundamental purpose. Advance organizers are intended to facilitate the understanding of content structure (information coordination) whereas objectives and pre-questions are designed to make it easier for the student to ignore information irrelevant to purposeful content (field independence).

Introductions, directions, questions, and objectives fall in the same domain as construction prefaces and were therefore the main focus of this review. It was felt that little research attention had been paid to introductions and directions.

Pre-questions were shown to be most facilitative for familiar subject matter (again in contrast to advance organizers which were devised to assist in the learning of unfamiliar material). It was also recommended that questions be used when the instruction is short and when specific rather than general learning effects are desired.

It was suggested that pre-instructional objectives are generally advantageous to learning except in cases where the instruction has been carefully designed. It was also suggested that they have a positive effect on student attitude and therfore merit consideration even in cases where instruction has been carefully designed.

In Chapter One it was hypothesized that students would benefit from receiving advance information on how written prose is constructed. It was suggested that this advance information should include statements about the purpose, mainpoint, subpoints and details of the prose

to be read. This review of the literature has examined pre-reading devices which enhance field independence, and which have been the focus of research studies. None of these devices give advance information on article construction. None of them specifically state the purpose, main point (although objectives and pre-questions may conceivably ask the student to be prepared to state the main point), subpoints, or characteristics of the details of a written passage. Therefore a research study was designed to test the efficacy of a construction preface containing these four types of information. The methodology of this study is described in Chapter Three.

CHAPTER THREE

DESIGN OF THE STUDY

Population and Sample

The population of interest was first year community college students. This population was chosen because of a desire to work with adults and because of the availability of subjects. The particular sample consisted of students from two English classes and one study skills class. One of the English classes was at Tunxis Community College. The other two classes were at Greater Hartford Community College. Each class included students of both sexes and of the wide range of ages typical of community college students.

Treatment

Subjects in all three groups were first tested for reading level using the short form of the Nelson-Denny Reading Test. Then they were asked to read three timed articles and complete a quiz immediately after each reading. One group received a Construction Preface to read before each article. Another group received a placebo preface, and the third group received no preface at all.

The varying lengths of time that the classes met made it impossible to run all tests in one sitting. To hold testing conditions constant, sessions were broken in identical places: between the test of reading level and the first reading selection and between the second and third reading selections.

Since it was impossible to prevent student discussion (between reading the second and thire selection) of the materials they had seen, treatment could not be randomly assigned within classes. Each of the three classes therefore served as one treatment group.

A set of procedures was prepared in advance and the same instructions were read to all groups as the experiment was run (Appendix A). None of the groups was told the purpose of the experiment ahead of time.

The length of time students were exposed to each article was controlled. Based on pre-reading by non-subjects, an appropriate time of 15 minutes was set for the first and third articles and 10 minutes was set for the second one. Since the study was not interested in the efficiency of test taking, subjects were allowed all the time they needed to complete the quizzes. No student took more than twenty minutes to complete a test.

Construction Prefaces

The object of interest in this study was a construction preface which communicated to subjects the anatomy of the article they were

about to read. Three construction prefaces (Appendix B) were used with Experimental Group #1, one for each article they read.

In order to permit replication, the construction preface followed a highly prescribed format. The format calls for four parts, with part labels on the left and narratives on the right. The four parts are arranged and labeled in the following order: Purpose, Main Point (or Main Topic), Subpoints (or Subtopics), and Details.

Purpose	This paragraph tells the reader why the article was written. The purpose is usually one of these three things: to convince the reader of something, to describe something, or to present new information. The reader is also reminded about what he/she will be tested on. In this case it was detail and construction.
Main Point (or Main Topic)	This paragraph states whether there is a main point to (or main topic of) the article, and, if so, what it is. If it is possible for the reader to misinterpret the main point, he/she is also cautioned how <u>not</u> to interpret it.
Subpoints (or Subtopics)	Enough information about subtopics is given so the reader can recognize one when he/she comes across it. This is accomplished by giving a brief description and a few examples. Typical descriptions might tell the reader that subtopics in the article are examples supporting the author's main point or are stages in someone's life. The reader is also told whether the subtopics are related and how they are arranged: hierarchically, chronologically, etc. If there is no particluar relationship or arrangement, this is pointed out to the student.

Details	Just enough information is provided to enable the reader to differentiate between details and sub-points.

This format was chosen for the construction preface because it presents information to the reader quickly and clearly. To enhance this efficiency, all prefaces were no longer than one page in length.

Non-Construction Prefaces

Experimental Group #2 received a placebo preface (Appendix C) before reading each of the three articles. These, too, were no longer than one page. Placebo prefaces were added to the research design to gain control over the possible facilitative effects of providing the student any advance information related to material that is to be read. Thus it was felt that any true benefit derived from a construction preface would be reflected in the differences between Group 1 scores and Group 2 scores, not in the differences between Group 1 scores and Group 3 (control group) scores.

The placebo prefaces contained information, such as the author's background, that did not duplicate any content of the article and did not relate to article construction. These prefaces, too, contained a brief statement of what the student would be tested on.

Articles

Since most written materials that students use are in the form of textbooks, it would have been appropriate to use textbooks for this study. Due to practical limitations, this was not possible. Asking students to read an entire book would have been too time consuming and would have been difficult to carry out under controlled conditions. Chapters of textbooks were investigated, but they too did not meet the needs of this study. Either they required knowledge of other information in the text in order to be understood or they did not contain enough details to permit designing a "ceilingless" test. Articles were settled on as the source of continuous prose because they most readily met the constraints of this study and they are common sources of information for college students.

The three articles used in this experiment (Appendix D) concerned widely varying topics that were unlikely to be familiar to the students: "Mondrian," "It Don't Hurt Much, Ma'am" (gunslingers in the Old West), and "Conservation in a World of Rising Expectations." They were chosen for inclusiveness (understanding the article did not require previous knowledge of the topic), brevity, mass of detail, and differing internal organization.

They were retyped in identical format using identical type. All subtitles and illustrations were removed to avoid contaminating effects from such aids to comprehension.

Test Instruments

The short form of the Nelson-Denny Reading Test, Form A was used to determine reading level. This test encompasses reading levels from grade 7 to 14 and is commonly used with adults. Subjects were not told their reading levels until they had completed all experimental activities.

A short answer and multiple-choice test was administered immediately after each article was read (Appendix E). All questions relating to detail were of the short answer type. To avoid a ceiling effect, the tests were designed to (and, in fact, did) ask for more details than students were likely to recall.

Four multiple-choice items on article construction also formed part of each test. These questions were designed to determine whether subjects could recognize how the articles were put together. The four questions concerned main point, orgainzation, purpose, and how subtopics were used. Multiple-choice format was used so that question by question comparisons could be made across groups.

Each test also contained one question on perceived difficulty of the article. Identical multiple-choice formats (easy, somewhat easy, medium, somewhat hard, hard) were used to permit comparisons across groups.

Scoring the Instruments

The Nelson-Denny reading tests were scored according to standardized procedures provided by the publisher.

To prevent scorer bias in correcting the three quizzes, tests from all groups were shuffled together and corrected at one time. Subject identification appeared only on the back of the last page of each quiz so that it could not be accidentally seen while correcting the tests. The points given were verified by a second person, Sister Elizabeth Flynn. Whenever differences in scoring occurred, the points awarded by the second scorer were used.

Scores from all three tests were added together and treated as one to negate any effect that the order of presentation might have caused. (Articles were always read and tested in this order: "Mondrian," "It Don't Hurt Much, Ma'am," "Conservation in a World of Rising Expectations.") Since the interest was whether students could recall more information, not whether they could recall more information in a particular subject area, this totaling did not detract from the purpose of the study. Each subject thus ended up with one score in each of three areas: detail, perceived difficulty, and article construction. In addition to these three scores, the article construction score was broken into its four components (main point, purpose, organization, subpoints) to provide an additional four scores. Thus seven test scores plus a reading level were analyzed for each subject.

Research Hypotheses

The first set of hypotheses tests whether or not receiving a construction preface enables a student to recall more details from continuous prose:

H_1: Students who receive a construction preface will recall more details than students who receive a placebo preface.

$H_1: \bar{X}_1 > \bar{X}_2$ $\qquad$ $H_0: \bar{X}_1 = \bar{X}_2$

H_2: Students who receive a placebo preface will recall more details than students who receive no preface at all.

$H_2: \bar{X}_2 > \bar{X}_3$ $\qquad$ $H_0: \bar{X}_2 = \bar{X}_3$

The next set of hypotheses tested the assumption that receiving pre-reading information would make an article seem easier:

H_3: Students who receive a construction preface will perceive the articles to be easier than students who receive a placebo preface.

$H_3: \bar{X}_1 < \bar{X}_2$ $\qquad$ $H_0: \bar{X}_1 = \bar{X}_2$

H_4: Students who receive a placebo preface will perceive the articles to be easier than students who receive no preface at all.

$H_4: \bar{X}_2 < \bar{X}_3$ $\qquad$ $H_0: \bar{X}_2 = \bar{X}_3$

If the hypothesis of main interest in this study (H_1) is supported, it will serve as evidence that students learn more from an article if they know how that article is constructed. This raises the question of whether or not students determine article construction on their own. The final group of hypotheses explores this question.

H_5: Students who receive a construction preface will achieve higher total scores on article construction than students who receive a placebo preface.

$H_5: \bar{X}_1 > \bar{X}_2$ $\qquad$ $H_0: \bar{X}_1 = \bar{X}_2$

H_6: Students who receive a placebo preface will achieve higher total scores on article construction than students who receive no preface.

$H_6: \bar{X}_2 > \bar{X}_3$ $\qquad$ $H_0: \bar{X}_2 = \bar{X}_3$

H_7: Students who receive a construction preface will achieve higher scores on article main point than students who receive a placebo preface.

$H_7: \bar{X}_1 > \bar{X}_2$ $\qquad$ $H_0: \bar{X}_1 = \bar{X}_2$

H_8: Students who receive a placebo preface will achieve higher scores on article main point than students who receive no preface.

$H_8: \bar{X}_2 > \bar{X}_3$ $\qquad$ $H_0: \bar{X}_2 = \bar{X}_3$

H_9: Students who receive a construction preface will achieve higher scores on article order than students who receive a placebo preface.

$H_9: \bar{X}_1 > \bar{X}_2$ $\qquad$ $H_0: \bar{X}_1 = \bar{X}_2$

H_{10}: Students who receive a placebo preface will achieve higher scores on article order than students who receive no preface.

$H_{10}: \bar{X}_2 > \bar{X}_3$ $\qquad$ $H_0: \bar{X}_2 = \bar{X}_3$

H_{11}: Students who receive a construction preface will achieve higher scores on article purpose than students who receive a placebo preface.

$H_{11}: \bar{X}_1 > \bar{X}_2$ $\qquad$ $H_0: \bar{X}_1 = \bar{X}_2$

H_{12}: Students who receive a placebo preface will achieve higher scores on article purpose than students who receive no preface.

$H_{12}: \bar{X}_2 > \bar{X}_3$ $\qquad$ $H_0: \bar{X}_2 = \bar{X}_3$

H_{13}: Students who receive a construction preface will achieve higher scores on article subpoints than students who receive a placebo preface.

$H_{13}: \bar{X}_1 > \bar{X}_2$ $\qquad$ $H_0: \bar{X}_1 = \bar{X}_2$

H_{14}: Students who receive a placebo preface will achieve higher scores on article subpoints than students who receive no preface.

$H_{14}: \bar{X}_2 > \bar{X}_3$ $\qquad$ $H_0: \bar{X}_2 = \bar{X}_3$

Experimental Design and Data Analysis

The hypotheses formed a series of one-factor experiments with the same three treatment groups used in each. Cell sizes of the treatment groups were unequal. Since the types of treatment to be studied were not chosen at random (although treatments were assigned randomly to groups), these were fixed effects models. In each experiment, the dependent variable involved equal interval data. The treatment groups had no contact with each other; therefore, the assumption of independence between groups was met. There is no reason to believe that assumptions of normality and equality were not met. The one-factor designs are shown in Figure 1.

The hypotheses were tested via a series of one-way analyses of covariance, using reading level as a covariate. Since ANCOVA indicates whether or not differences are present, but does not specify what those differences are, a series of post hoc analyses were performed using planned comparisons. Planned comparisons are appropriate for data based on

assumptions of independence and normality and for unequal cell sizes. A detailed explanation of statistical procedures and results is presented in the next chapter.

	CP	Non-CP	Control
Details	n=21	n=12	n=15
Difficulty	n=21	n=12	n=15
Construction	n=21	n=12	n=15
Main Point	n=21	n=12	n=15
Order	n=21	n=12	n=15
Purpose	n=21	n=12	n=15
Subpoints	n=21	n=12	n=15

Figure 1: Experimental Design

CHAPTER FOUR

ANALYSIS OF THE DATA

Preliminary Analyses

Two preliminary computer analyses were performed to determine whether or not reading ability would contaminate the results of the experiment if it were not held constant. The computer programs used for this evaluation, ANOVA and PEARSON, were from the Statistical Package for the Social Sciences (Nie, 1970).

First an analysis of variance (Table 1) was performed to see if there were significant reading differences between treatment groups. This analysis showed no significant differences in reading ability among the three groups (Construction Preface, Non-Construction Preface, and Control). Since the calculated F was less than the Table F, the null hypothesis could not be rejected. This was an indication that there was no need to hold reading ability constant by using it as a covariate.

Before a final decision was made, however, a second computer analysis was done to determine whether there was any correlation between a subject's reading ability and his

performance on the dependent variable of main interest (ability to recall detail). The Pearson Correlation Coefficient for these two variables turned out to be quite high (0.7608) and positive. Therefore, it was decided that reading ability must be held constant and the appropriate statistical procedure would be an analysis of covariance with reading level as the covariate.

Table 1: Analysis of Variance for Reading Ability

Source	D.F	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	17.3984	8.6992	1.286	0.286
Within Groups	45	304.5195	6.7671		
Total	47	321.9180			

F = 3.23 at Alpha .05 Not Significant

Method of Analysis

Analysis of covariance was performed by computer (using Subprogram ANOVA with appropriate options for covariance, from Statistical Package for the Social Sciences) on each of the seven dependent variables shown in the research design. These variables were Detail, Difficulty, Construction, Main Point, Order, Purpose, and Subpoints. Those variables that were shown to have significant differences were subjected to post hoc

analysis via planned comparisons to isolate the differences.

The formula used for post hoc analysis is from Statistical Analysis in Psychology and Education (Ferguson, 1966). This formula allows one to use a standard F table to determine whether the comparison made is significant.

$$F = \frac{(\bar{X}_1 - \bar{X}_2)^2}{S_w^2/n_1 + S_w^2/n_2}$$

where

$$S_w^2 = \text{within group variance estimate} = \frac{SS_w}{df}$$

In the results that are reported on the following pages, the treatment group which received a construction preface is referred to as Group 1. Group 2 received the placebo (non-construction) preface, and Group 3 served as the control. In each set of tables, the first one was computer generated and the other two were hand calculated using the above formula. Since the computer-generated tables include an F probability (labeled Significance of F) an Alpha level is not shown for the first table in each set.

Testing Hypotheses 1 and 2

H_1: Students who receive a construction preface will recall more details than students who receive a placebo preface.

H_2: Students who receive a placebo preface will recall more details than students who receive no preface at all.

Analysis of covariance indicated that significant differences existed among the three treatment groups (Table 2). Post hoc analysis located a significant difference between treatment Groups 1 and 2 (Table 3), supporting Hypothesis 1. No significant difference was found between Groups 2 and 3 (Table 4). Therefore, Hypothesis 2 was not supported. Subjects who received a construction preface were able to retain more details from what they read in a given amount of time. They learned more efficiently.

Table 2: Analysis of Covariance for Recall of Detail

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif of F
Covariates	6388.504	1	6388.504	82.285	0.001
Main Effects	1231.270	2	615.635	7.930	0.001
Residual	3416.090	44	77.638		
Total	11035.863	47	234.806		

Significant

Table 3: Comparison of Group 1 and Group 2 on Recall of Detail

Source	Adjusted Mean	F
Group 1	39.27	5.71
Group 2	31.65	
F = 4.08 at Alpha .05		Significant

Table 4: Comparison of Group 2 and Group 3 on Recall of Detail

Source	Adjusted Mean	F
Group 2	31.65	1.43
Group 3	27.57	
F = 4.08 at Alpha .05		Not Significant

Testing Hypotheses 3 and 4

H_3: Students who receive a construction preface will perceive the articles to be easier than students who receive a placebo preface.

H_4: Students who receive a placebo preface will perceive the articles to be easier than students who receive no preface at all.

As Table 5 indicates, no significant differences were shown to exist by analysis of covariance of this variable. There was, therefore, no need to perform post hoc analyses. Subjects who received a construction preface did not think the readings were any harder or easier than subjects in the other two groups.

Table 5: Analysis of Covariance for Perceived Difficulty

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif of F
Covariates	0.860	1	0.860	0.098	0.999
Main Effects	21.502	2	10.751	1.227	0.303
Residual	385.507	44	8.762		
Total	407.869	47	8.678		

Not Significant

Testing Hypotheses 5 and 6

H_5: Students who receive a construction preface will achieve higher total scores on article construction than students who receive a placebo preface.

H_6: Students who receive a placebo preface will achieve higher total scores on article construction than students who receive no preface at all.

Since analysis of covariance indicated that one or more significant differences existed between the three treatment groups (Table 6),

appropriate post hocs were performed. Hypothesis 5 was supported by these analyses and Hypothesis 6 was not (Tables 7 and 8). Subjects who did not receive a construction preface did not figure out by themselves how the articles were constructed.

Table 6: Analysis of Covariance for Recognition of Article Construction

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif of F
Covariates	32.364	1	32.364	9.766	0.003
Main Effects	104.630	2	52.315	15.786	0.001
Residual	145.818	44	3.314		
Total	282.812	47	6.017		

Significant

Table 7: Comparison of Group 1 and Group 2 on Recognition of Article Construction

Source	Adjusted Mean	F
Group 1	7.59	13.52
Group 2	5.15	

F = 4.08 at Alpha .05 Significant

Table 8: Comparison of Group 2 and Group 3 on Recognition of Article Construction

Source	Adjusted Mean	F
Group 2	5.15	1.58
Group 3	4.26	
F = 4.08 at Alpha .05		Not Significant

Testing Hypotheses 7 and 8

H_7: Students who receive a construction preface will achieve higher scores on article main point than students who receive a placebo preface.

H_8: Students who receive a placebo preface will achieve higher scores on article main point than students who receive no preface.

Covariate analysis indicated that significant differences existed among the three groups on recognizing the main point of an article (Table 9). Post hoc analysis revealed that Group 1 performed significantly better than Group 2, supporting Hypothesis 7 (Table 10). There was no signivicant difference in the performances of Groups 2 and 3 on this variable, causing the rejection of Hypothesis 8 (Table 11). Subjects who were not told the main point of an article did not figure it out for themselves.

Table 9: Analysis of Covariance for Recognition of Article Main Point

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif of F
Covariates	1.615	1	1.615	4.206	0.044
Main Effects	5.402	2	2.701	7.033	0.003
Residual	16.899	44	0.384		
Total	23.917	47	0.509		

Significant

Table 10: Comparison of Group 1 and Group 2 on Recognition of Article Main Point

Source	Adjusted Mean	F
Group 1	1.84	7.4
Group 2	1.23	

F = 4.08 at Alpha .05 — Significant

Table 11: Comparison of Group 2 and Group 3 on Recognition of Article Main Point

Source	Adjusted Mean	F
Group 2	1.23	0.18
Group 3	1.11	
F = 4.08 at Alpha .05		Not Significant

Testing Hypotheses 9 and 10

H_9: Students who receive a construction preface will achieve higher scores on article order than students who receive a placebo preface.

H_{10}: Students who receive a placebo preface will achieve higher scores on article order than students who receive no preface.

Analysis of covariance indicated the presence of significant differences in the performance of the three groups on recognition of order (Table 12). Post hoc analysis found significant differences between Groups 1 and 2 and no significant differences between Groups 2 and 3 (Tables 13 and 14). Hypothesis 9 was accepted and Hypothesis 10 was rejected. Subjects did not recognize the order of an article (such as chronological or hierarchical) if they were not told it.

Table 12: Analysis of Covariance for Recognition of Article Order

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif of F
Covariates	0.084	1	0.084	0.189	0.999
Main Effects	11.244	2	5.622	12.588	0.001
Residual	19.651	44	0.447		
Total	30.979	47	0.659		

Significant

Table 13: Comparison of Group 1 and Group 2 on Recognition of Article Order

Source	Adjusted Mean	F
Group 1	1.9	16.33
Group 2	0.91	

F = 4.08 at Alpha .05 Significant

Table 14: Comparison of Group 2 and Group 3 on Recognition of Article Order

Source	Adjusted Mean	F
Group 2	0.91	.001
Group 3	0.92	
F = 4.08 at Alpha .05		Not Significant

Testing Hypotheses 11 and 12

H_{11}: Students who receive a construction preface will achieve higher scores on article purpose than students who receive a placebo preface.

H_{12}: Students who receive a placebo preface will achieve higher scores on article purpose than students who receive no preface.

The existence of significant differences in recognition of the purpose of an article was found by analysis of covariance (Table 15). On the basis of post hoc analysis, Hypothesis 11 was rejected and Hypothesis 12 was accepted (Tables 16 and 17). Subjects who received a placebo preface recognized the purpose of an article as well as subjects who received a construction preface. Both of these groups performed significantly better on this variable than the control group.

Table 15: Analysis of Covariance for Recognition of Article Purpose

Source Variation	Sum of Squares	DF	Mean Square	F	Signif of F
Covariates	1.172	1	1.172	1.830	0.180
Main Effects	6.453	2	3.226	5.036	0.011
Residual	28.187	44	0.641		
Total	35.812	47	0.762		

Significant

Table 16: Comparison of Group 1 and Group 2 on Recognition of Article Purpose

Source	Adjusted Mean	F
Group 1	1.89	.75
Group 2	1.65	

F = 4.08 at Alpha .05 — Significant

Table 17: Comparison of Group 2 and Group 3 on Recognition of Article Purpose

Source	Adjusted Mean	F
Group 2	1.65	4.44
Group 3	1.02	
F = 4.08 at Alpha .05		Significant

Testing Hypotheses 13 and 14

H_{13}: Students who receive a construction preface will achieve higher scores on article subpoints than students who receive a placebo preface.

H_{14}: Students who receive a placebo preface will achieve higher scores on article subpoints than students who received no preface.

Analysis of covariance indicated that significant differences existed among the three groups (Table 18). However, post hoc analyses related directly to Hypotheses 13 and 14 did not turn up those differences (Tables 19 and 20). Both Hypotheses 13 and 14 were rejected. Although significant differences were found neither between Groups 1 and 2 nor between Groups 2 and 3, a final analysis did show a significant difference in performance between Groups 1 and 3 (Table 21). Students who received a construction preface had a better grasp of how subpoints were used in the articles than students who received no preface at all.

Table 18: Analysis of Covariance for Recognition of Subpoint Usage

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif of F
Covariates	9.271	1	9.271	11.683	0.002
Main Effects	5.625	2	2.813	3.544	0.036
Residual	34.916	44	0.794		
Total	49.812	47	1.060		

Significant

Table 19: Comparison of Group 1 and Group 2 on Recognition of Subpoint Usage

Source	Adjusted Mean	F
Group 1	1.95	3.53
Group 2	1.35	

F = 4.08 at Alpha .05 Not Significant

Table 20: Comparison of Group 2 and Group 3 on Recognition of Subpoint Usage

Source	Adjusted Mean	F
Group 2	1.35	0.21
Group 3	1.19	

F = 4.08 at Alpha .05 Not Significant

Table 21: Comparison of Group 1 and Group 3 on Recognition of Subpoint Usage

Source	Adjusted Mean	F
Group 1	1.95	6.44
Group 3	1.19	
F = 4.08 at Alpha .05		Significant

Summary of Significant Findings

In summary, data analysis showed that Hypotheses 1, 5, 7, 9, and 12 were significant. For reference ease, they are repeated here:

H_1: Students who receive a construction preface will recall more details than students who receive a placebo preface.

H_5: Students who receive a construction preface will achieve higher total scores on article construction than students who receive a placebo preface.

H_7: Students who receive a construction preface will achieve higher scores on article main point than students who receive a placebo preface.

H_9: Students who receive a construction preface will achieve higher scores on article order than students who receive a placebo preface.

H_{12}: Students who receive a placebo preface will achieve higher scores on article purpose than students who receive no preface.

CHAPTER FIVE

SUMMARY AND DISCUSSION

Summary of Results

This study was conducted to test the effects of a construction preface on the learnability of written materials. Specifically, community college students were tested to see if receiving a preface on article construction in advance of reading the article enabled them to recall more details from it.

The main finding of this study indicated that:

- Subjects who received a construction preface were able to extract more information in a given amount of time from what they read than subjects who did not receive a construction preface.

Auxiliary findings of the study showed that:

- Subjects who received a construction preface performed significantly better than subjects who received a placebo preface and than the control group in recognizing these areas of article construction: mainpoint, order, and subpoints. They also received significantly higher total construction scores.

- Subjects who received a placebo preface performed as well as the main treatment group (construction preface) and better than the control group in only one area: recognizing the purpose of the article.

- Neither a construction preface nor a placebo preface made an article seem easier to read.

Discussion of Major Hypothesis

Just as a good carpenter knows which tool will do the job best, a good educator knows which learning aid is most appropriate under given conditions. This study has indicated the usefulness of one new learning aid that the educator may add to his tool kit, the construction preface.

It was hypothesized that a construction preface would save learner time because the reader would not have to spend time figuring out the author's purpose and main point while reading an article. Knowing the author's main point, it was suggested, would enable the reader to understand content more quickly and therefore enable him to assimilate more of that content in a given period of time. The results of this study have provided one instance of support for that hypothesis.

It is very possible that the same results could be achieved if an author clearly stated his purpose and main point in the first few paragraphs of his article. However, in searching for articles to use in this study, it was remarked that few articles explicitly provided this information. In any case, for the instructor who sees himself as manager of the learning environment, the main finding of this study has several implications.

First, it implies that he has it within his power to save student time. There are many instances when it can be important for instructors to do this. If, for example, students have to share certain written materials because they are in short supply, a construction preface would

mean more students could use the same materials in a given amount of time. When students have access to references only for limited amounts of time, such as those on two-hour reserve in the library, a construction preface would allow them to retain more information from their short interface with the materials.

Secondly, the results of this study imply that the instructor has it within his power to make learning easier for students. Although subjects using a construction preface didn't perceive the articles as any easier or harder than other subjects found them, they learned more. The instructor who knows the written materials he must use are too difficult for his students, due possibly to state law or to lack of anything better, can make the materials more "learnable" by preceding them with a construction preface.

Since a great amount of student reading involves the use of textbooks, an important question to raise is how useful construction prefaces would be with textbooks. It is possible that a construction preface would prove facilitative for the first chapter of a text. But, since textbook chapters build on each other, the format for a construction preface suggested in this study might not be as effective as it is for articles. It is felt, however, that some type of preface on chapter construction would definitely be useful.

The most important characteristic of a construction preface is that it tells how an article is constructed (not how the subject matter of that article is structured). Any adaptation of construction prefaces to

textbooks must retain this characteristic. A descriptive overview such as the following would do this. "This chapter suggests three advantages and five disadvantages of _____, and recommends conditions under which it can be used to predict _____." "Chapter Four traces the broad causes leading to the Civil War. Each cause will be explored individually in depth in later chapters."

Note that the latter example not only tells the reader what to expect but also tells him what not to expect. Helping the learner avoid possible misconceptions is an important raison d'etre of the construction preface.

Another possible adaptation of construction prefaces to textbooks would be to recap information presented earlier in the text: "This chapter shows how _____ theory, discussed in Chapter Two, can be amended by _____ concept, presented in Chapter Five, to result in a completely different set of characteristics."

Discussion of Minor Hypotheses

One assumption that led to the creation of a construction preface was that students would need to read an article once to determine its main point. This assumption in turn was based on another assumption: that students are capable of recognizing the main point of an article. The first auxiliary result of this study calls the latter assumption into question. Unless they were told the main point of the article in

a construction preface, students did not recognize the main point when it was presented as part of a test question. This implies that students need instruction in determining an author's main point.

The objection is frequently raised that telling students the main point of an article, as a construction preface does, means that students will not learn to identify it on their own. This assumes that students who are not told the main point of an article will learn to figure it out by themselves. The results of this study suggest that this is just not so. In addition, this assumption is constradicted by the dictates of good instructional design. If it is desired that students learn to identify main points, then this should be stated in an objective, and demonstrations and active appropriate practice with feedback must be provided to the student. An instructor who avoids using a construction preface cannot make the claim that by doing so he is teaching students to recognize the main point of what they are reading.

The second auxiliary finding in this study was that any advance information, whether explicit or placebo, enabled students to do a significantly better job of recognizing the purpose for which an article was written. It is difficult to speculate why this may be so. Perhaps an analogy would help. Plunging into an article may be something like plunging into an unknown environment. It is as though a group of people bodily picked up a student and threw him through an unknown, unlit doorway. The student doesn't know if he will land on a sandpile, on a trampoline, or in an ice-cold body of water. If it turns out to be the

water, the student will be too busy fighting his way to the surface to pay attention to the purpose of the water, whether it be filling a pond, emptying a pool, or purposeless.

It's very possible that more descriptive titles could enable students to become aware of the purpose of what they are reading. "Gunslingers of the Old West" would be a more accurate title than "It Don't Hurt Much, Ma'am."

The third auxiliary finding is also difficult to explain. Neither type of advance information made the articles seem easier (or harder) than the control group found them. It could be that de facto difficulty is not related to perceived difficulty.

Suggestions for Future Research

A number of possibilities for further research in this area come to mind. It would be useful to know if the positive effect of a construction preface could be enhanced by coupling it with objectives. Could the specific facilitative effects of pre-questions be broadened by linking them to a construction preface? Would a CP work as well for a textbook chapter as for a stand-alone article?

In the search for treatment materials, very few articles seemed to include specific statements related to their construction. Since the results of this study imply that knowing construction facilitates

learning, it would be worth knowing exactly what percentage of the written materials used in classrooms contains such statements.

This study was conducted with community college students. Another possible topic for research would be to find out whether a construction preface could be used with equal success at other grade levels.

A number of investigative possibilities surfaced during the review of the literature. Advance organizers appear to be the only type of pre-information that is designed to enhance information coordination. There is a lack in this area which needs to be filled by innovative research. What other types of pre-information could be provided that would enable the student to more readily comprehend the structure of the subject matter? Perhaps a list of pertinent definitions would prove facilitative. Another possibility would be a review quiz on previously taught subcomponents of the structure.

Large gaps also exist in the research conducted on field independence. The lack of attention paid to directions, instructions, and introductions is evidence of this. Much of the difficulty students have with written materials appears to be due more to a lack of field independence than to inherent concept complexity. It would be challenging to see if someone could find a way to measure the proportion of difficulty that is due to poorly designed prose (lack of field independence) and the proportion due to content difficulty.

Contributions of the Study

One contribution of this study has been its introduction of a new tool that the instructor can add to his store of learning aids. It is sometimes difficult for teachers to find written materials that are appropriate for their students, not only in terms of content, but also in terms of readability. This study has suggested that an instructor can shorten the amount of time a student needs to spend studying a given piece of prose by preparing a one-page construction preface for the student.

Another contribution of this study has been its suggestion that vocabulary be carefully divided between the organization of an article and the inherent organization of its content. From experience it has been found that these concepts are difficult to teach because they are so similar. Historically, the word structure has been used to describe both, contributing to the difficulty of telling them apart. It is felt that dividing vocabulary carefully between the two concepts will make it easier to differentiate between them. The word structure is retained in the sense in which it has most commonly been used, the structure of matter. A new term is suggested to refer to how an article is put together, the word construction.

It is hoped that the information gained from this research effort will be of assistance to educators who are looking for ways of making

written materials more "learnable." It is also hoped that, in some small way, this study has brought us closer to the day when a field of written instruction is established. Only when this happens will instructors receive the kind of support they need from the materials they use most often: printed matter.

APPENDIX A

PROCEDURES

PROCEDURES

1. Administer Nelson-Denny, Form A according to directions (directions: 10 min., test: 30 min.). Pencils used for this test will be retained for answering the questionnaires. Students will be asked to use their first name and last initial for identification.

2. Distribute the preface, if any. While subjects read the preface, distribute the first reading selection, face down.

   "Please do not turn the article over until requested to do so."

   "When you are asked to begin you will have _____minutes to read the article. Do not skip the note at the beginning. After the articles have been collected you will be asked to answer questions about what you have read. They will be fill-in and short answer type questions. "Are there any questions? .....Please begin reading."

   Pick up the prefaces while students read the article.

3. After_____minutes:

   "Please turn the articles over and lay them face down."

4. Collect the articles and distribute the appropriate questionnaire, again face down.

   "Please do not turn these over until you are requested to do so."

   "Answer the questions to the best of your ability. Complete sentences are not necessary. In most cases a word or phrase will do.
   Are there any questions?"

   "Please begin working."

5. After all students have completed the questionnaire:

   "Please turn the questionnaires face down."

6. Collect the questionnaires, checking to make sure that the name blank has been filled in.

7. Allow a 5 minute break, requesting students not to discuss what they have read.

8. Repeat steps #2 through #8 for the other two selections. Omit the break. Administer the selections in this order: "Mondrian", "It Don't Hurt Much Ma'am," "Conservation in a World of Rising Expectations."

APPENDIX B

CONSTRUCTION PREFACES

MONDRIAN

PURPOSE: The purpose of this article is to describe something. The author is not trying to prove a point or convince the reader of anything. He is merely presenting information about a topic.

As you read, try to keep in mind what the main topic is, what subtopics it has been broken into and the facts or details of those subtopics. This is the information you will be tested on.

MAIN TOPIC: The author plunges right into the life of Mondrian, the painter, without telling what his focus is. However, an examination of the article shows that the main topic is Mondrian's development as an oil painter. Although Mondrian's work with watercolors is mentioned, it is apart from the main thrust of this article.

SUBTOPICS: This author has used subtopics as a way to break a big subject down into manageable parts. He has chosen the stages in Mondrian's development as an oil painter to be subtopics. Some of the stages Mondrian passed through are Art Nouveau, Fauvism and Cubism. The stages are described in the order in which they happened.

DETAILS: The stages seem very much alike but you can tell them apart by their details. At each stage the details of color and subject matter differ slightly. Other details that will help you tell the stages apart are the problems the artist tried to solve and the names of his paintings.

IT DON'T HURT MUCH MA'AM

PURPOSE: The author's purpose in writing this article was to prove a point. He is trying to convince you of something.

As you read, try to keep in mind the main point he is making, the subtopics he uses to prove his point and the details or facts presented under those subtopics. This is the information you will be tested on.

MAIN POINT: Parker maintains that many of the things that happened to gunfighters in the Old West were not the same as we see on film and television. Be careful not to mistake any of the subtopics for this main topic. For example, gunfights are discussed at length, but it's the gunfighters not the gunfights that are the focus of the article.

SUBTOPICS: To support his main point the author jumps from example to example with little apparent organization. The examples are good, they are just unorganized. His examples, or subtopics, include guns, bullets, wounds, barroom brawls and medical attention.

DETAILS: In any article, details are the facts that flesh out the examples. In this article, specific information is given about many things: bullet size, types of guns, names of real and make-believe gunfighters, kinds of wounds, etc.

CONSERVATION IN A WORLD OF RISING EXPECTATIONS

PURPOSE: This speech was prepared for an international audience. The author/lecturer does not identify his purpose. He never makes clear whether his intent is to describe conservation, to share new information about it, or to convince the reader about something related to conservation. Assume that the author is trying to make a point, to convince us of something.

As you read, keep in mind the main point he is making, the subtopics he uses to prove his point, and the facts or details of those subtopics. This is the information you will be tested on.

MAIN POINT: The author feels that conservation cuts across national boundaries and is more important than individual disagreements between countries. Even though the author mentions India frequently, his focus is on the world, not on India.

SUBTOPICS: His subtopics support the author's point that conservation cuts across national boundaries. Each subtopic, or example, is a conservation practice or concern existing in one country that could equally well apply to other countries. The examples include such things as unproductive land, high yield crops, and the role of birds in conservation. They are not arranged in any special order.

DETAILS: Details are the facts given in examples. Due to the worldwide range of the subtopics you will find a large variety of details in this article. They include such specifics as the causes of unproductive land, kinds of high yield crops, and names of useful birds.

APPENDIX C

PLACEBO PREFACES

MONDRIAN

NOTE: Piet Mondrian (he spelled it Mondriaan) was born in 1872, nine years before Picasso. He died in 1944. Although not as well-known as Picasso, he has had much influence on advertising and packaging. The way colors and shapes are used on cereal boxes, for example, stems from his paintings. This turn-of-the-century artist worked with oils, watercolors and charcoal. Piet Mondrian's niche in the history of art is secure.

As you read this article, try to keep in mind what the main topic is, what subtopics are used and the details of those subtopics. This is the information you will be tested on.

IT DON'T HURT MUCH MA'AM

NOTE: The author is a history buff who is working on his doctorate in entomology at Utah State University. "It Don't Hurt Much Ma'am", written with humor and accuracy, will be of interest to movie and television fans as well as to other history buffs.

As you read this article, try to keep in mind the author's main point, the subtopics he uses and the details presented under the various subtopics. This is the information you will be tested on.

CONSERVATION IN A WORLD OF RISING EXPECTATIONS

NOTE: Zafar Futehally is Vice President of the International Union for Conservation of Nature and Natural Resources. He also serves as the Honorary Secretary of the Bombay Natural History Society, India. This abstract is from the keynote address of the Eleventh General Assembly of the International Union for the Conservation of Nature and Natural Resources; Banff, Canada; September, 1972.

As you read this speech, keep in mind the author/lecturer's main point, the subtopics he uses and the details that are given. You will be tested on this information.

APPENDIX D

ARTICLES

MONDRIAN

Charles W. Millard

Mondrian's earliest style was not far removed from that developed by Mauve and the Hague school some twenty to thirty years previously, and for the first ten years of his career, until roughly 1900, he produced compositions worked out in a somber and narrow tonal range which depended largely on black, brown, and dark greens and purples. His motif was principally landscape which, treated with this almost monochrome palette, became as solid, opaque, and unatmospheric a subject as Van Gogh had made of it when he had worked in a similar style. Despite that fact, one is struck by how different in effect Mondrian's canvases are from those of Van Gogh, not only in the beginning but throughout his career. For a Dutch artist who began painting about 1890, and for whom Van Gogh must therefore have been or become the principal artistic fact of life, this surely evidences a conscious effort of avoidance and a protective determination to assert one's individuality at all costs.

Such assertion was to characterize Mondrian's work for the first twenty-five years of his career, the period during which he experimented with most of the major movements of his time. In 1901, for example, one sees him composing a quintessentially Cezannesque subject, a still life with apples, a plate, and a ginger pot, in a wholly un-Cezannesque way by isolating each pictorial element. The background wall which defines the picture's shallow space is clearly distinguished from the cloth-covered table of the foreground, while the elements of the still life itself are carefully separated from both wall and table and from each other. Nothing could be compositionally less like Cezanne than the way in which the ginger pot anchors the left end of the still life, that in which the marshalled apples define its lateral extent, or that in which the severe arc of the plate embraces the other less geometrical forms.

In the early years of the twentieth century Mondrian gave himself to a geometricized Dutch version of Art Nouveau style in which liquid shapes, perhaps developed under the impact of his work in watercolor,

melted into one another, usually establishing two large tonal areas, a dark foreground and a light background. Some element of the composition (mill, tree, etc.) inevitably reached to the top of the canvas to lock dark and light areas together, and not infrequently Mondrian resorted to backlighting, especially evening half-light and moonlight, to suppress the atmospheric effect naturally suggested by his light backgrounds.

Up to this point, color had played a minor role in Mondrian's work, but beginning about 1907-08 he seems to have fallen under the influence of Fauvism, and in the latter year he painted several pictures in which color at high intensity combined with a fat and obvious paint application to produce a style not dissimilar from that of Munch. This similarity is especially noticeable in a picture such as Devotion, in which the art nouveau arabesques of the brushwork, the figure's flowing hair, and the unexplained juxtaposition of girl and flower, a recurrent image for Mondrian at this time, combine into a vaguely symbolist configuration of a sort not untypical of the Norwegian master. Mondrian continued to explore this Fauve-Art Nouveau avenue for two or three years, using both a broad, liquid touch and a more discrete, tachiste application, and favoring particularly a blue-orange color combination. Church at Zoutelande of 1909-10 is almost entirely worked out in these colors, the orange of the church facade forming the coloristic equivalent of the dark foreground tonality of the earlier landscapes, and the blue sky that of the lighter backgrounds. The intensity of the color and obviousness of the paint application maintain the opacity formerly assisted by location of the light source.

In 1911, Mondrian painted a curious triptych that seems both an artistic and personal summa, the production of which probably freed him for the work of his maturity. The fact that he chose a traditional religious form for this work is in itself indicative of its importance to him, as is its title, Evolution. Each panel of the triptych represents a woman and a stylized flower, the figures worked out in the angular and elongated contours of the Art Nouveau, and the total conception is as close as Mondrian ever came to the work of his countryman Toorop. The color pattern is not far from the blue-orange of the previous years, in this case two panels of blue-yellow and one of blue-red. While the work is too contrived and too programmatic to rank among Mondrian's best productions, it is the sort of ambitious effort which must have had immense personal importance for its creator. In certain ways, most notably the thin and modulated Cezannesque paint application, it points toward what lay immediately ahead for him.

Mondrian's final and decisive encounter with a contemporary style not of his own devising was with Cubism. In 1911-12 he painted several pictures clearly derived from Analytical Cubism yet, as with all his work, clearly his own. One sees in these pictures the Cubist linear web combined with a modulated monochrome ground applied in small strokes which add together to form larger areas. In Mondrian's pictures, however, the ground is in no way atmospheric, as in true Cubism, and the linear

structure functions as edge and not as open armature. The resulting density is wholly in keeping with Mondrian's sensibility from the start and, indeed, these Cubist variations are closer in feeling to his earliest work than anything he had done for years.

Throughout 1912 Mondrian continued to experiment with Cubist-derived forms, his web-like structures becoming smaller-scaled, denser and even less orthodox as certain neutral colors, principally grayed blues and ochres, appeared. Large curving shapes further distinguished Mondrian's compositions from those of French Cubism. These were generally naturalistic references to trees, a subject which had occupied him for about three years and which eased his way into Cubism by providing ready-made linear structures standing out against neutral backgrounds. For the next several years Mondrian played with these linear patterns. In painting he tended to use bounded square forms filled in with color, rather than less distinct forms behind which color led an independent life, as in Klee's Cubist experiments. In drawing, his patterns were more open, tending to resolve themselves into cross shapes carefully juxtaposed. Probably because drawing is traditionally a less ambitious medium than painting, and hence put Mondrian less on his guard, the drawings clung to vestiges of representation (church facades, etc.) longer than the paintings.

Finally, about 1916-17, Mondrian reached the threshold of his mature style in a series of canvases using color squares and/or rectilinear patterns drawn in black. Because their pictorial elements are seldom attached to the edges of the canvas, and because the background against which they are seen is always dense and hence the forms do not float but are held taut across the surface, these pictures have a staccato rhythm, vital to both their organization and their visual effect, to which Mondrian was to return at the very end of his life. For the moment, he tightened his compositions by enlarging their rectilinear patterns, attaching them firmly to the edges of the canvas, and filling in the resulting squares with red, blue, yellow, or shades of white. Because the color squares were entirely contained by the black grid their overall effect was less noticeably rhythmical and more serene than that of the immediately preceding pictures. Mondrian combatted the danger of mechanical lifelessness by experimenting with diamond-shaped canvasses and by increasing the intensity of his colors, as well as by augmenting the variety of his pictorial elements by reducing their size and increasing their number.

Finally, however, he seems to have realized that the pictorial effect he sought was one of increased rather than diminished scale and of fewer rather than more elements, and he began to reduce the number of squares per canvas, increasing their size and varying their shapes and sizes to give them life. By 1920 he had devised a format in which long narrow rectangles bordered a central group of squarer shapes. Although the color variations of these elements mitigated against the smaller peripheral rectangles being read as a frame Mondrian apparently felt constrained by them for he soon developed a different and more satisfactory format. By 1921, all but two or three of the ordering grid

lines stopped short of the edge of the canvas, while the square and rectilinear shapes distributed themselves more freely about the composition. The former device allowed the pictures to breathe more freely, the latter integrated them more completely by de-localizing shape, that is, by discouraging the identification of particular shapes with particular parts of the canvas.

The next step taken by Mondrian, and the one which led him to the basic format with which he was to be occupied throughout the 1920's, was in the direction of purification. He reduced his color areas in size and banished them to the edges of the canvas. Because the white areas thus freed weighed less usually, this allowed him to reattach the black linear patterns to the canvas edges, something made more desirable by the anomalous edges between color areas at the points at which they were not controlled by the black grid.

Having arrived at a satisfactory set of relationships among controlling grid lines and controlled white and colored areas, Mondrian was faced with another problem. Because his color areas were spaced around the periphery of the canvas, one's eye tended to skip from one to another, making the entire composition rotate around its open center, which thus functioned as a kind of image. Since Mondrian's pictorial development had been consistently away from imagery, he found it necessary to combat this effect, sometimes by eliminating color altogether and sometimes by using diamond-shaped canvasses (square turned on end) which inhibited the eye from skipping from point to point around the edge. By these means, and by occasionally allowing the central white rectangle to run off the edge of the canvas and not be completely enclosed within it, Mondrian came closer to the stasis he seems to have sought, and which he always promoted by the use of neutral-shaped square or only slightly rectangular canvasses.

Having played a great many variations on his themes of the 1920's Mondrian began to take up new themes in the '30's. To overcome further any effect of centralized image, he ran lines through the centers of his canvasses, strapping them unequivocally to the edges. He also began to experiment with thinner lines put down in pairs, which led, in turn, to increasingly complicated grid patterns. These patterns were elaborated by shorter connecting lines not attached to the canvas edge, the total effect tending once again toward that of a vibrating rhythm of taut elements rather than toward the absolute rest of the previous years.

As the complexity of the patterns increased, small color areas unbounded by black began to appear, until in the early 1940's Mondrian took the tremendously important unifying step of eliminating colored areas altogether in favor of colored lines. At first this was done so that the resulting grid was composed of both black and colored lines, but soon black was completely eliminated, resulting in an identification of controlling and controlled elements unique for their time.

The one remaining problem was the effect of overlap where the colored grid lines crossed, which introduced ideas of depth antithetical to Mondrian's basic pictorial premises. In his last two pictures, Broadway Boogie-Woogie and Victory Boogie-Woogie of 1942-43, he solved this problem by simply changing the color at each linear intersection, an idea no doubt also suggested to him by the visual "pop" caused by the Whitish after-images at the intersections of the lines in the black grid pictures. The two boogie-woogie pictures pulse with a rhythmical visual life recalling that of the gridless canvasses of twenty-five years earlier, and they represent both a final synthesis of pictorial ideas their creator had been working with for half a century and a path for the future that testify to the substance of Mondrian's art.

If one is struck by the consistency of that art, by the absence of qualitative lapses throughout Mondrian's career, one is struck also by its relative lack of fire, the absence of the spark that would have bridged the gap between continuing high quality and brilliance. A clue to that puzzle is to be found in the almost obsessive single-mindedness with which Mondrian continued to purge his art.

A more important clue is contained in what are in many ways his most beautiful and most personal works, the series of drawings and watercolors of flowers, mostly chrysanthemums, that he produced from the turn of the century through the 1920's. Soft and atmospheric, frequently worked out in pale blue and white wash with only a hint of drawn contour, sometimes carefully delineated in charcoal on bare white paper, these drawings, which form a separate, self-contained episode in Mondrian's career, speak of the need for an outlet less rigorously pure than that he allowed himself in his paintings. More important, they speak of forces unassimilated into the mainstream of his art which might, in Mondrian's own terms, have prettified it; but which might also, in absolute terms, have enriched it and raised it to the level it so often misses by so little. Only in his last two pictures is there some significant hint of what might have been produced by less resistance to this strain in his character, so clearly identified as feminine in the woman and flower image of the first years of the century. The difference between an art of first quality and one of such supreme quality as to be beyond qualitative distinctions is to be found in the number of things assimilated, not in the number rejected; and it is in realizing this that one touches on the major limitation to an artistic production otherwise so advanced, so substantial, and so well-founded.

IT DON'T HURT MUCH MA'AM

James S. Parker

"Oh, Sam, what happened?"

"Nothing serious, Miss Sally - Luke just picked up a little bit of lead."

"Oh, no!"

"Now Miss Sally, don't you fret. It's just a little ol' hole in his shoulder. He'll be up and about in no time a-tall."

Sure enough, in two or three days good old Luke is up and raring to resume his defense of sweet Miss Sally, the Bar-X spread, and the honor of the old, wild West. And Luke's adventure and miraculous recovery, with slight alterations, occur over and over on the pages of western fiction and on the imaginative screens of Hollywood and television.

But what really happened to those gunshot heroes and villains in that tempestuous period of loose laws and fast gunplay? The reality was quite gruesomely different.

The disastrous effect of a large-caliber bullet on the human body can hardly be comprehended by those whose knowledge of shooting is limited to movie and television westerns. The favorite guns of the West were the .44 and .45 caliber revolvers. Bullet caliber is measured by the diameter in inches: the lead slugs for these guns were nearly half an inch in diameter. Such a bullet packs a terrific wallop, knocking the victim off his feet if it hits any solid part of the body. He doesn't just drop dead, either. Here is a description of a real gunfight by a man who knew the subject well, Dr. George Goodfellow, the "gunfighter's surgeon" of Tombstone, Arizona:

> In the Spring of 1881 I was a few feet distant from a couple of individuals who were quarreling. They began shooting. The first shot took effect, as was afterward ascertained, in the left breast of one of them, who, after being shot, and while staggering back some 12 feet, cocked and fired his pistol twice, his second shot going into the air, for by that time he was on his back.

It may be remarked that the recipient of the first shot was a tough man indeed to manage two shots himself before going down; but the significant phrase is "while staggering back some 12 feet." Compare this, just for instance, with the climactic scene in the movie Vera Cruz (1954), in which Burt Lancaster and Gary Cooper are resolutely facing each other in a frontier street, their hands just above their guns. In a blurred movement they both draw, and two shots ring out; but neither man staggers back one foot, let alone twelve. The logical conclusion is, of course, that they have both missed. Not so; justice has triumphed again. After a long, tantalizing pause, bad-guy Lancaster crumples to the ground, dead. He has not moved an inch otherwise (or even stopped smiling), after being hit by that .45 caliber express train - an effect totally beyond belief. The U. S. Army, testing the Colt .45 in the Chicago stockyards, found that it would bowl over a 1,000 pound steer with one shot, even if the wound was not fatal.

Another sentimental curiosity of western mythology is the hierarchy, so to speak, of wound areas. Good guys are almost invariably lucky and get hit in the arm, the shoulder, or the fleshy part of the leg. Bad guys are much more likely to take it in the chest, abdomen, or back, which means that they are thenceforth dead. And nobody ever gets hit in the face.

The explanations are not obscure. Even an audience comfortably deluded about the destructive power of a .44 or .45 slug would hardly believe a face wound that didn't show up as more than a neat little hole. In reality, gunfighters were hit in the face fairly often, and the big lead bullets caused horrendous damage to mouths, teeth, noses, and eyes. You can't show that on the family TV set, no matter how bad the bad guy is.

The reason that heroes so often are hit in the shoulder is that this is fondly imagined to be a relatively "safe" area, well removed from the vital organs. One would think that the human shoulder was made of some self-healing material, rather like a puncture-proof tire. The fact is that except for fat men and weightlifters, you can't penetrate much of the shoulder without striking a complicated arrangement of bones, tendons, blood vessels, and nerves. A shoulder wound from a high-caliber weapon could be not only incapacitating; it could be fatal. Civil War medical records showed that one third of the victims of shoulder-joint wounds died as a result of severe damage, such as severed arteries, or from subsequent infection. Even if the bullet hit the upper arm or forearm, sparing the shoulder joint, the injury was so great that the usual result was amputation. Any meeting between bone and the old high-caliber bullet was likely to be highly traumatic: in 1893 an Army medical report observed that "if a bone is struck, the destruction is enormous, the wound of exit frightful in size and irregularity."

This brings up another important point that TV and movie writers might take more notice of - the great difference between the old lead slug and modern steel-jacketed bullets. The speed of today's high-velocity slug in effect sterilizes the outer surface and at the same time usually enables the projectile to drill a rather neat, aseptic hole through tissue and bone alike. The old lead bullet, in contrast, readily lost shape on impact and tore viciously through the victim's body, carrying along unsterile pieces of skin and clothing. It made a large wound and often left a track out of all proportion to the size of the bullet. Extensive bleeding and shock were common, and infection virtually assured. Almost every gunshot wound was highly dangerous, no matter where the bullet hit.

If a gunfighter survived a gunfight but was wounded in the process, he still had to survive the medical conditions of the Old West. Doctors were scarce, and some of those available were of doubtful value. In most places there were few if any laws regulating the practice of medicine, and all too often a frontier doctor was anyone who chose to so designate himself. Perhaps a fourth of the "doctors" of the early American West held medical degrees; and even at that it must be remembered that in those days many medical schools would certify an M.D. after just a year or two of study.

No nurses were to be found, with the possible exception of a few tender-hearted school marms or "soiled doves" from the dance halls; there were no hospitals worthy of the name, no laboratories, no antibiotics, and few medicines. The universal anesthetic and cure-all was whiskey, which, while it may have raised the morale of both patient and doctor, was not calculated to increase the efficacy of surgery.

Very often, incidentally, swift and accurate surgery meant the difference between life and death. "Given a gunshot wound of the abdominal cavity with one of the above caliber balls (.44 and .45)", Dr. Goodfellow wrote, "if the cavity be not opened within an hour, the patient by reason of hemorrhage is beyond any chance of recovery." It hardly needs saying that blood transfusions were not to be had.

Parenthetically, it may be noted also that if there was actually a large percentage of abdominal and body wounds in western gunfights, it was not by accident. The arm, leg, and shoulder wounds so frequently enjoyed - that seems to be the right word - by heroes and subheroes on the screen were usually, in real life, the consequences of poor shooting and did not occur any more often than the shooter could help. He went for the broadest and most obvious target, namely the chest and abdomen of his opponent.

The opponent was well aware of this, naturally, and did his best to avoid full exposure. The dramatic showdown that has climaxed so many Hollywood and TV westerns, where two stalwarts deliberately stalk down the street toward each other, good guy waiting for bad guy to go for his gun, was certainly a rare occurrence. Far more often a man was shot without ever having had a chance to touch his gun. Jesse James was shot in the back; Virgil Earp was ambushed at night; Morgan Earp got it through a window while he was playing billiards; Billy the Kid died in a darkened room without shooting back; Wild Bill Hickok was shot from behind while concentrating on a hand of poker.

A whole separate branch of the mythology of western fiction and film has to do with fist fights and barroom brawls. Ferocious encounters - featuring multiple knockdowns, repeated haymakers to the face, kicks to the stomach, thumps on the head with bottles, chairs, and miscellaneous furniture, and other egregious violence - usually produce nothing more than a temporary daze, with no visible bruises to speak of. Little boys find out better, of course, the first time they are in a real fist fight in the school yard.

In the meantime, the gunfight myths of the West live on in books, movies, and on television. Only the other night I watched Escape from Fort Bravo on TV, and I kept wondering when William Holden, the star, would acquire his mandatory flesh wound. Sure enough, he gets shot in (what else?) the shoulder, and for a while it looks as if he is done for - almost as if the screenwriter had been studying up on the real effects of large-caliber bullets. Then, just before the ornery redskins move in to finish him off, the U.S. cavalry thunders to the rescue. Minutes later, there is our hero, sitting straight and tall in the saddle and galloping away at the head of his own cavalry troop as if nothing has happened. Oh yes, he does have his arm in a sling.

CONSERVATION IN A WORLD OF RISING EXPECTATIONS

Zafar Futehally

Conservation is, as we all know, a new movement, or perhaps one should say a new necessity, and its complex ends are still being discussed. The meetings at Stockholm revealed how easily one can slip from it into areas of sociology or economics, and from there into acrimonious debates between the haves and havenots which have no basic connection with it. This emotional stance is not very useful and, of course, the truth is that both the rich and the poor countries have their different, but almost equally acute environmental problems. On the one hand, the problems are due to various kinds of industrial pollution, and on the other the environmental degradation is due to poverty and lack of means. In the circumstances, the undeveloped countries have the double task of dealing with the causes which underlie their own environmental problems, while at the same time they must plan carefully to avoid bringing on themselves the pollution problems of the West. Conservation, then, is the concern of rich and poor alike, and must remain one area which is free from the traditional, irrational animosities and divisions between nations. Again, since the conservation of natural resources is now seen as the foundation of material well-being, and closely connected with the more refined and sophisticated aspects of human life, it may perhaps prove to be a meeting ground for different sections of society.

For the past century the mind of the world was captivated by economics. We have been taught that this is a science dealing with scarce resources or if any resource were not capable of being used for alternative ends, then it did not come within the purview of economics. We were frequently given the example of air as a free resource, which did not come within the ambit of our enquiries. The fact that today fresh air has to be purchased on the streets of Tokyo and that millions of pounds have had to be spent to clear the air over London suggests that ecology and economics are far closer to each other than was suspected even a decade ago. This is a dramatic example of how suddenly our attitudes to the essential elements of our environment have had to change, and it should be a warning to all that, dealing as we do with a complex mechanism which we only partially understand, we should be as cautious as possible in tampering with natural forces.

Inaugurating the first meeting of the National Committee on Environmental Planning and Coordination last April, Prime Minister Indira Gandhi said: "We must be able not only to choose our direction, but to know where to stop and when to turn. We should be mature enough to resist the temptation of non-essentials which glitter for a while." She went on to say that for centuries Indian students have received instruction under trees. Yet today the school building seems to have acquired greater importance than what is taught and the quality of the teacher. In temperate and northern latitudes a school building is absolutely essential. But in India, where a benevolent sun shines for eight months in the year, a good teacher under a grove of trees could teach in an environment which would be far more satisfying than the average classrooms of today. If the millions that are spent on buildings could be used for raising adequately the salaries of the teaching staff, we might perhaps be able to restore to the educational profession the dignity which is their due. What applies in this case is true of many others, and in every case the right answer can be provided by a total view of the local situation, taking into account the availability of material as well as the innate character and genius of the people.

In India a great deal of the land wears a sad aspect and is unproductive because of overuse by men and cattle. Three hundred million head of cattle, many of them largely useless, live on the natural capital of the country. One study in the Gir Sanctuary proved that when the land is not trampled by bovine hoofs and human feet, the annual crop of grass is as much as 4,500 kilograms per hectare. But around village sites where it is trampled by cattle, the crop is only 475 kilograms per hectare. By proper management of the land, India could have ten times the output of grass, and what a difference this could make to her agricultural economy.

The Government of India formulated a National Forest Policy in 1952, in which it was recommended that 30 percent of the land should be under forest cover, for both its protective and productive functions. But because most State Governments did not take this seriously, today less than 20 percent is under forest. Apart from all the other disadvantages of this position, including a serious loss of ground water resources, the cost of damage by flood is increasing year by year. At a time when land use specialists can prove that the most productive use of land can be decided by looking both at its history as well as its innate ecological characteristics, it is wasteful in the extreme for developing countries to disregard the signals provided by ecologists, and to ignore the mistakes made by developed nations in the past. More than anyone else it is the farmer who should realize the importance of retaining wild vegetation, wild in its truest biotic sense, which can be utilized for genetic manipulation as the needs of the time specify. Wild strains bred with domesticated ones have often resulted in a progeny with outstanding qualities, and the option to draw on the vitality and genius of nature must always remain at hand.

Dr. M. S. Swaminathan, one of the leading agricultural scientists of the world, warns that genetic diversity on which all plant breeding programs depend is being wiped out as old cultivars are being replaced by new varieties. One consequence of this is that, as whole regions move towards one or a few genetically related varieties, the narrower gene bases are invitations to epidemics of diseases and pests. In the subcontinent of India and Pakistan there were only ten hectares of land under Mexican wheat and their derivatives in 1964-1965. But in 1971, 10 million hectares were given over to the cultivation of these varieties. In addition, there is a progressive erosion of the germ plasm base in both wild species and cultivated crops, some of which are of great importance to human nutrition.

It must also be remembered that the main sources of resistance to plant pests and diseases as well as other beneficial characters such as winter hardiness, drought tolerance, and nutritional value have always come from the traditional wild and weedy relatives of our cultivated crops. We thus need desperately to maintain as much genetic variability as possible for our breeding programs - but the greatest genetic variability occurs in the developing countries, where it is necessary to replace the old cultivars with others of higher quality or yield. This is a challenging paradox to which a solution is urgently required.

In many developing countries the emphasis is now shifting from the production of high yielding hybrid varieties to protection against insect pests by the use of chemicals. At the moment India is only using 160g per hectare against 10,000g used in countries such as Germany. Should we follow these methods blindly, or take note of the new opportunities of biological control suggested by, for example, the Environmental Research Council of the United Kingdom where 300 kinds of viruses have been developed for specific pests?

Exotics have done their mischief in India as they have in so many regions of the world. Eucalyptus, Lantana, Eupatorium and the water hyacinth have damaged large areas of land. Much more care is obviously called for in dealing with the introduction of exotics by weighing their pros and cons. Some of them are undoubtedly desirable imports, for example Acacia auriculiformis and Prosopis juliflora have played a better role in India than any local plant could have done in the rehabilitation of denuded lands.

The building of large multipurpose dams has brought tremendous problems of maintenance; they have resulted in the uprooting of human societies from valley bottoms and the ruination of many valuable natural habitats. It is the view of some that ground water resources (which allegedly amount to 90 percent of all water resources) should be relied upon much more than surface irrigation for our needs.

Of course, India has some spectacular wetlands throughout the country, but many administrators unfortunately have not recognized that these liquid assets need to be conserved and not reclaimed. The ratification of the convention formulated at the International Conference on the Conservation of Wetlands and Waterfowl at Ramsar, Iran, in January 1971, will ensure not only the permanent conservation of some of our major wetlands of international importance as migratory waterfowl refuges but, as a corollary, provide a "Green Route," a Statewide sprinkling of minor wetlands where the birds may enjoy rest and protection. In addition to their intended primary function as waterfowl refuges, all those wetlands could serve a multiplicity of useful purposes.

And in any imaginative and scientific planning for the future we cannot leave out of consideration the role of birds in our agricultural economy. In 1912, in the Agricultural Research Institute, Pusa, of the Imperial Department of Agriculture in India, two Englishmen, C. W. Mason and H. Maxwell Lefroy, investigated the economic status of the different species of resident and migratory birds. Their report shows that birds play a significant part in keeping down injurious insect pests. It seems that in days gone by the farmers were fully aware of the beneficial role of birds in keeping down pests. One interesting practice was to stick a branch in every paddyfield as a perch for the Black Drongo, Dicrurus adsimilis, which destroys winged insects to which paddyfields are particularly prone. Normally these fields do not provide any resting places for those birds, and this ancient custom can be usefully revived.

In recent years Dr. Salim Ali almost singlehandedly has attempted to keep this aspect before our administrators, and some research into weaver birds, Ploceus philippinus, which he had organized seems to suggest that the harm the birds do in destroying grain is recompensed many times over by the vast numbers of insects which these birds destroy to feed their young. If this is the case with a bird like the Baya which is practically a grain eater, the activities of the other species must be overwhelmingly favorable for agriculture and hence for ourselves. Also, in view of the fact that in certain areas almost 25 percent of the grain of the country is damaged by rodents, we should not forget that birds of prey are nature's instruments for keeping rodent populations under control. Both owls and diurnal birds of prey must be stringently protected for this purpose.

Conservation must also deal with the culture and the customs of people, which are such an uplifting and stimulating force, and which really make our world the fascinating place that it is. We hear of many ancient skills which are vanishing, because there is no economic demand for them, and many traditional practices being lost because their value has never been scientifically assessed. In the old days there used to be a class of people known as Puqqees whose job it was to follow and recover strayed domestic animals for their owners. They knew the footprints of the hundreds of animals accurately. Similarly, the hunter-sportsmen of India of the nineteenth century have paid tribute to the uncanny qualities of the Oopligas and Kurrabas trackers of

Mysore, and of others, in following the spoors and paths of wild animals. The naturalists of today rely on telemetry to track down animals in the wild, but it will be a great loss for the world of the future if, with every development of technology, the direct sensory capabilities of human beings are attenuated. I would suggest that an inventory of such skills on a world scale be made, and steps taken for their conservation.

To ask a starving man to conserve rather than exploit and to refrain from living on the capital of the land and wait until he can derive an income from it, is, of course, pointless. We all regret the prodigal use of trees as fuel, as well as the colossal damage done to vegetation and soil by shifting cultivation and similar bad land-use practices. But in most places trees will cease to be cut only when kerosene or something similar is supplied free to the people. If forests are indeed as essential to the health of our planet as ecologists make out, then perhaps the affluent countries could step up their assistance so that this vital resource is not further denuded. I know this is difficult because we are informed that there are only 2,500 billion barrels of oil left to exploit and the demands increase day by day. Be that as it may, if we wish to maintain the ecological health of our one world we must either be prepared for substantial shifts of resources from surplus to needy areas or resign ourselves to the prospect of a low quality of life for all in the decades to come.

We are speaking of a world of rising expectations today, but in fact every period of history people have attempted to better their material condition. Until recently it was always a small minority of people who, by their superior intelligence, greater vitality, or brute power, raced ahead and established their dominance over society and the landscape as well. These autocratic minorities, whether the Hapsburgs in Vienna or the Bourbons in Paris, the Tudors in England or the Moghuls in India, though they do not conform to our ideas of egalitarianism, had one quality which we must admire and emulate. They had an excellent sense of space and esthetics, and of the problems. We will have to evolve a strategy which will ensure that though we build for the comfort and the delight of the multitude, it will not be the lowest common denominator which is allowed to inform our plans. As yet, there is little evidence of success in this direction, and the falling standards of architecture, and of city planning in general, make the human environment more unpleasant than it need be.

It has often been said that unless we educate the young in the concepts of conservation and ecology and natural beauty, the unhealthy environmental trends will not be arrested. Actually, considering the urgency of the situation and the overwhelming influence which the politician wields over his domains today, especially in the developing world, I feel that educating our masters is the most important task of the day.

APPENDIX E

TESTS

MONDRIAN

Test

DIRECTIONS: Answer with words or short phrases. Write clearly.

1. What country was Mondrian from?

2. About what year did he begin painting?

3. Name the four colors he used most during the first ten years he painted.

4. What colors were used in the painting "Church at Zoutelande"?

5. Name two things in the picture "Devotion".

6. How did Fauvism influence Mondrian?

7. Name two ways in which "Devotion" and "Evolution" are similar.

8. What three things did Mondrian experiment with to combat the danger of mechanical lifelessness?

9. What does "de-localizing shape" mean?

10. Besides Fauvism, what other art styles did Mondrian explore?

11. What important step did Mondrian take in the early 1940's?

12. Name his last two paintings.

13. What problem was caused where grid lines crossed?

14. How did he solve this problem in his last two paintings?

15. How difficult was this article to understand?

___easy ___somewhat easy ___medium ___somewhat hard ___hard

16. Which best describes the

___To show what Mondrian's life was like.
___To describe what Mondrian's work as an artist was like.
___To show how Mondrian's work with oils developed.
___To show how Mondrian worked with watercolors.

(Note: This question was not scored because it contained a typographical error.)

17. Which best describes the way in which this article was written?

___The items were in no special order.
___The author first described minor points and then a major point.
___The author stated a major point and then discussed the minor points that supported it.
___The author described things in the order in which they happened.

18. What was the author's purpose for writing this article?

___To present new information in his field.
___To describe something.
___To prove a point.
___None of the above.

19. What did the author use subtopics for?

___To break his topic up into manageable chunks.
___To give evidence supporting his main point.
___To show that the stages in Mondrian's work were unrelated to each other.
___To make his article seem important.

IT DON'T HURT MUCH MA'AM

Test

DIRECTIONS: Answer with words or short phrases. Write clearly.

1. What were the two favorite guns of the old west?

2. How big were the slugs for those guns?

3. How is bullet caliber measured?

4. Name the "gunfighter's surgeon."

5. Where did he live?

6. Name two stars of the movie <u>Vera Cruz</u>.

7. What was impossible about the climactic scene of that movie?

8. List four things that are false about old west gunfights as shown in movies.

9. What do Civil War records show about shoulder wounds?

10. What percentage of old west doctors held medical degrees?

11. What was the universal anesthetic?

12. Where were the largest percentage of gunfighters actually wounded?

13. Name five actual gunfighters and tell how they were fatally shot.

14. Who was the star of Escape from Fort Bravo?

15. Besides gunfights, what other aspect of the old west did the article say is inaccurate in the movies?

16. How difficult was this article to read?

___easy ___somewhat easy ___medium ___somewhat hard ___hard

17. Which best describes the main point of this article?

___To show what fistfights were really like in the old west.
___To discuss the author's favorite movie stars.
___To prove that movies and television do not show accurately what happened to gunfighters.
___To show that gunfight wounds were much worse than we see in the movies and on television.

18. Which best describes the way in which this article was written?

___The subtopics were in no special order.
___The author described minor points leading up to a major point.
___The author discussed a series of major points.
___Things were described in the order in which they happened.

19. What was the author's purpose for preparing this article?

___To present new information.
___To describe something.
___To prove a point.
___None of the above.

20. What did the author use subtopics for?

___To break his topic up into manageable chunks.
___To give evidence supporting his main point.
___To give him an organized way of arranging his material.
___To make his article seem more scholarly.

CONSERVATION IN A WORLD OF RISING EXPECTATIONS

Test

DIRECTIONS: Answer with words or short phrases. Write clearly.

1. List as many different things as you can that this article said or implied we <u>should</u> be doing in the area of conservation.

2. What does the author feel is the most important task of the day?

3. List two facts supporting the statement that air is not a free resource:

4. What non-essential does Indira Ghandi feel they could resist in India?

5. What is a hectare?

6. What does bovine mean?

7. How many times more grass crop can be produced on untrampled land than on trampled land?

8. Where in India was the study done that proved this? (Refer to question 7.)

9. What year did the Government of India formulate a National Forest Policy?

10. What did that policy recommend?

11. To what extent is that policy being followed today?

12. State two disadvantages of not following the National Forest Policy.

13. What is the danger in wiping out wild vegetation?

14. What kind of wheat was named as being grown in India and Pakistan?

15. How many times more of this wheat was being grown in 1971 than in 1964-65?

16. What is the main source of resistance to plant pests and diseases?

17. The Environmental Research Council of the United Kingdom has developed what?

18. How many kinds has it developed? (Refer to question 17.)

19. What are they used for? (Refer to question 19.)

20. What are exotics?

21. Name four exotics that have done mischief in India.

22. What is a "Green Route" and what is its primary function?

23. What is a Black Drongo?

24. Is it harmful or beneficial? (Refer to question 23.)

25. Why? (Refer to question 24.)

26. What did Puqqees do?

27. How much oil is left in the world to exploit?

28. Why are diurnal birds of prey beneficial?

29. How difficult was this article to read?

___easy ___somewhat easy ___medium ___somewhat hard ___hard

30. Which best describes the main point of this article?

___Conservation is of vital concern to all countries of the world.
___We must educate our leaders.
___India and other developing countries are facing conservation problems.
___Weaver birds are important to conservation.

31. Which best describes the way in which this article was written?

___The items were in no special order.
___The author first described minor points and then a major point.
___The author stated a major point and then discussed the minor points that supported it.
___The author described things in the order in which they happened.

32. What was the author's purpose for preparing this article?

___To present new information.
___To describe something.
___To convince the reader of something.
___None of the above.

33. What did the author use subtopics for?

___To break his topic up into manageable chunks.
___To give evidence supporting his main point.
___To give him an organized way of arranging his material.
___To make his article seem more scholarly.

APPENDIX F

TABLE OF MEANS AND DEVIATIONS

Table 22: Means and Deviations

VARIABLE	GRAND MEAN	DEVIATION FROM GRAND MEAN *					
		Group 1		Group 2		Group 3	
		Unadjusted	Adjusted for Covariate	Unadjusted	Adjusted for Covariate	Unadjusted	Adjusted for Covariate
Detail	33.71	6.96	5.56	-0.21	-2.06	-9.57	-6.14
Difficulty	10.70	0.75	0.75	-0.36	-0.37	-0.76	-0.75
Total Construction	5.94	1.73	1.65	-0.69	-0.79	-1.87	-1.68
Mainpoint	1.46	0.40	0.38	-0.21	-0.23	-0.39	-0.35
Order	1.35	0.55	0.55	-0.44	-0.44	-0.42	-0.43
Purpose	1.56	0.34	0.33	0.10	0.09	-0.56	-0.54
Subpoints	1.56	0.44	0.39	-0.15	-0.21	-0.50	-0.37

* The true mean for a group on any one variable is found by adding the group's adjusted deviation to its grand mean for that variable.

BIBLIOGRAPHY

BIBLIOGRAPHY

1. Allen, D. Ian. "Some Effects of Advance Organizers and Level of Question on the Learning and Retention of Written Social Studies Material." Journal of Educational Psychology, 61:333-339 (1970).

2. Apter, M.J., D.Boorer, and S. Murgatroyd. "A Comparison of the Multiple-Choice and Constructed Responses Pre-Tests in Programmed Instruction." Programmed Learning and Educational Technology, 8:125-130 (1971).

3. Ausubel, David. "The Use of Advance Organizers in Learning and Retention of Meaningful Verbal Material." Journal of Educational Psychology, 51:267-272 (1960).

4. Ausubel, David P. and Donald Fitzgerald. "Organizer, General Background, and Antecedent Learning Variables in Sequential Verbal Learning." Journal of Educational Psychology, 53:243-249 (1962).

5. Ausubel, David P. "The Use of Ideational Organizers in Science Teaching." Occasional Paper 3. Columbus, Ohio: ERIC Information Analysis Center for Science Education, 1970.

6. Barnes, Buckley R. and Elmer U. Clawson. "Do Advance Organizers Facilitate Learning? Recommendations for Further Research Based on an Analysis of 32 Studies." Review of Educational Research, 45:637-659 (1975).

7. Bloom, Benjamin S. (ed.) Taxonomy of Educational Objectives: Handbook I: Cognitive Domain. New York: David McKay Compay, Inc., 1969.

8. Case, Robbie. "Gearing the Demand of Instruction to the Developmental Capacities of the Learner." Review of Educational Research, 45:59-87 (1975).

9. Cline Terry A. "Readibility of Community College Textbooks." Journal of Reading, 16:33-37 (1972).

10. Creamer, W.A. "A Comparison of the Readibility of Community College Textbooks with the Students Who Use Them." Unpublished manuscript, Gloucester County College, Sewell, N.J.: 1968.

11. Dalis, G.T. "Effect of Precise Objectives upon Student Achievement in Health Education." The Journal of Experimental Education, 39:20-23 (1970).

12. Davies, Ivor K. Competency Based Learning: Technology, Management and Design. New York: McGraw-Hill Book Company, 1973.

13. Dean, Howard and Kenneth Bryson (eds.) Effective Communication. Englewood Cliffs, N.J.: Prentice-Hall, 1961.

14. Decco, John P. The Psychology of Learning and Instruction: Educational Psychology. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1968.

15. Distad, H.W. "A Study of the Reading Performance of Pupils Under Different Conditions on Different Types of Materials." Journal of Educational Psychology, 18:247-258 (1927).

16. Doty, C.R. "The Effect of Practice and Prior Knowledge of Educational Objectives on Performance." Unpublished Doctoral Dissertation, Ohio State University, 1968.

17. Duchastel, Philippe C. and Paul F. Merrill. "The Effects of Behavioral Objectives on Learning: A Review of Empirical Studies." Review of Educational Research, 43: 53-69 (1973).

18. Engel, R.S. "An Experimental Study of the Effect of Stated Behavioral Objectives on Achievement in a Unit of Instruction on Negative and Rational Base Systems of Numeration." Unpublished Masters Thesis, Boston, University, 1968.

19. Etter, D.C.G. "Adult Learner Characteristics and Instructional Objectives." Unpublished doctoral dissertation, University of California Los Angeles, 1969.

20. Ferguson, George A. Statistical Analysis in Psychology and Education. New York: McGraw-Hill Book Company, 1966.

21. Fleming, Malcolm L. Perceptual Principles for the Design of Instructional Materials. Final Report, Grant OEG-5-9-245001-0016(010). Washington, D.C.: U.S.Office of Education, 1970.

22. Frase, L.T. "Learning from Prose Material: Length of Passage, Knowledge of Results, and Positive Questions." Journal of Educational Psychology, 58:266-72 (1967).

23. Frase, L.T. "Questions as Aids to Reading: Some Research and Theory." American Educational Research Journal, 5:319-332 (1968).

24. Frase, Lawrence T. "Cybernetic Control of Memory While Reading Connected Discourse." Journal of Educational Psychology, 60:49-55 (1968).

25. Gustafson, H.W. and D.L.Toole. "Effects of Adjunct Questions, Pre-Testing and Degree of Student Supervision on Learning from Instructional Text." The Journal of Experimental Education, 39:53-5- (1970).

26. Hartley, James. "The Effect of Pre-Testing on Post-Test Performance." Instructional Science, 2:193-214 (1973).

27. Hastings, G.R. "Independent Learning Based on Behavioral Objectives." The Journal of Educational Research, 65:411-16 (1972)

28. Jenkins, J.R. and S.L. Deno. "Influence of Knowledge and Type of Objectives on Subject Matter Learning." Journal of Educational Psychology, 62:67-70 (1971).

29. Kolzow, Lee. "Reading in the Content Area in the Two Year College." Journal of Reading, 16:46-49 (1972).

30. Lawson, Tom E. "Effects of Instructional Objectives on Learning and Retention." Instructional Science, 3: 1-21 (1974).

31. Long, J.D. and S.W. Huck. "The Effect of Behavioral Objectives on Student Achievement." Paper presented at the annual American Educational Research Association meeting, Chicago, 1972.

32. Major, A.G. and A.T. Collette. "Readability of College General Biology Textbooks." Science Education, 45:216-24 (1961).

33. Merrill, P.F. and N.J. Towle. "The Effects of the Availability of Behavioral Objectives on Performance in a Computer -Managed Graduate Course." Tech Memo No. 47. Tallahassee: CAI Center, Florida State University, 1972.

34. Morse, J. and M. Tillman. "Effects on Achievement of Possession of Behavioral Objectives and Training Concerning their Use." Paper presented at the annual meeting of the American Education Research Association, Chicago, 1972.

35. Nie, Norman H., C. Hadlai Hull, Jean G. Jenkins, Karin Steinbrenner and Dale H. Bent. Statistical Package for the Social Sciences, Second Edition. New York: McGraw-Hill Book Company, 1970.

36. Papay, J.P. "An Investigation of the Effects of Type, Location and Distribution of Learning Instructions on the Acquisition and Retention of Meaningful Prose Materials." Unpublished doctoral dissertation, Florida State University, 1971.

37. Postlethwaite, S.N., J. Novak, and H.T. Murray Jr. The Audio-Tutorial Approach to Learning. Minneapolis, Minnesota: Burgess Publishing Company, 1972.

38. Postman, Leo and Virginia L. Senders. "Incidental Learning and Generality of Set." Journal of Experimental Psychology, 36:153-65 (1946)

39. Romberg, Thomas A. and James W. Wilson. "The Effect of an Advance Organizer, Cognitive Set, and Post Organizer on the Learning and Retention of Written Materials." Journal of Research in Mathematics Education, March, 1973: 68-76.

40. Rothkopf, Ernst Z. "Learning from Written Instructive Materials: An Exploration of the Control of Inspection Behavior by Test-like Events." American Educational Research Journal, 3:241-249 (1966).

41. Rothkoph, E.Z. and R. Kaplan. "Exploration of the Effect of Density and Specificity of Instructional Objectives on Learning from Text." Journal of Educational Psychology, 63:295-302 (1972).

42. Smith, S.A. "The Effects of Two Variables on the Achievement of Slow Learners on a Unit in Mathematics." Unpublished Master's thesis University of Maryland, 1967.

43. Stedman, C.H. "The Effects of Prior Knowledge of Behavioral Objectives on Cognitive Learning Outcomes Using Programmed Materials in Genetics." Unpublished doctoral dissertation, Indiana University, 1970.

44. Tickton, Sidney G. (ed.) To Improve Learning: An Evaluation of Instructional Technology, Vol. 1. New York: R.R. Bowker Co., 1970.

45. Tiemann, P.W. "Students Use of Behaviorally-Stated Objectives to Augment Conventional and Programmed Revisions of Televised College Economics Lectures." Paper presented at the annual meeting of the American Educational Research Association, Chicago, 1968.

46. Warr, P.B., W.W. Bird and N. Rackham. Evaluation of Manangement Training. London: Gower Press, 1970.

47. Washburne, J. N. "The Use of Questions in Social Science Material." Journal of Educational Psychology, 20:321-359 (1929).

48. Weinberg, H. "Effects of Presenting Varying Specificity of Course Objectives to Students on Learning Motor Skills and Associated Cognitive Material." Unpublished doctoral dissertation, Temple University, 1970.

49. Welch, W.W. and H.S. Walberg. "Pre-Test and Sensitisation Effects in Curriculum Evaluation." American Educational Research Journal, 7:605-614 (1970).

50. Wong, Martin R. "Additive Effects of Advance Organizers." Journal of Structural Learning, 4:165-73 (1974).

51. Zimmerman, C.L. "An Experimental Study of the Effects on Learning and Forgetting When Students are Informed of Behavior Objectives Before or After a Unit of Study." Doctoral dissertation, Universtity of Maryland. Ann Arbor Mich.: University Microfilms, No. 72-21, 140.