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THE EFFECT OF MEANINGFUL ELABORATIONS AND
SUMMARIES ON THE LEARNING AND RETENTION
OF PROSE MATERIALS

A Dissertation
Presented for the
Doctor of Philosophy
Degree
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Elie Aurelien Agesilas

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DEDICATION

This dissertation is dedicated to my wife, Jacqueline and to my two children, Samuel and Heidi, who through their support and understanding have allowed me to complete this additional step in my educational experience.

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ABSTRACT

This investigation was designed to compare the performance of students trained to use either meaningful elaboration or summarization with the performance of students in a control condition on short and long term recall.

Forty-five college juniors and seniors formed the two experimental and the control conditions. Students in the experimental conditions were trained to either summarize or create meaningful elaborations as they studied a text. Students in the control condition were told to use any strategy with which they felt comfortable. Subsequently, students in all three conditions completed a multiple-choice exam over an expository reading selection at interval of two days and again four weeks after training.

Analysis of covariance revealed that students in the control condition scored higher than students in either of the experimental condition on both tests of short or long term retention. However, students who had been trained to use meaningful elaborations experienced a smaller loss on their test scores between the short and long term recall.

Using Bloom's taxonomy of test questions which measure different types of cognitive levels, scores of the three groups were compared. The results showed that students in the control condition scored significantly higher than

students in the meaningful elaboration condition on all four cognitive levels of the short term retention test and at the knowledge level on the long term retention test. Mean scores of students in the summarization condition and in the control condition were not significantly different for either the test of short term or long term recall.

Apparently students in the control condition already had effective strategies for remembering in their repertoire. These normally used study strategies were more efficient than the newly imposed strategies of summarization or meaningful elaboration.

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CHAPTER I

INTRODUCTION

For years, educators and educational scientists have tried to develop new strategies that can be used to help students increase their learning skills, to process information, and to solve problems effectively. In ancient times, teachers such as Aristotle, Quintilian, and Cicero wrote about mnemonic strategies that were used for improving students' memory. Students were trained to use mental imagery and to associate the information to be learned with familiar objects (Wittrock, 1985; Yates, 1966).

During the last two decades, many advances have taken place in the area of cognitive psychology. According to Wittrock (1980), fundamental improvements in education will result from serious efforts to teach learners strategies aimed at enhancing students' attention, comprehension, memory, and motivation. For some educators, education is more than teaching students fundamental principles and knowledge, it is to equip them with meaningful skills that will facilitate their learning experience (O'Neil, 1978). Weinstein and Underwood (1984) indicate that learning strategies can be used in a variety of ways. Researchers and practitioners have identified a number of competencies that the learner needs to have in order to retain

information that can be used in the future. Furthermore, learning strategies are perceived as ways in which the learner receives, organizes, and associates incoming information to existing knowledge.

To this point, summarization and meaningful elaboration have been shown to be successful learning strategies. The summarization of written materials is an activity that has been focussed on in the literature for the past several years. More and more, researchers and practitioners are convinced that students of all ages can be taught how to summarize information from texts and even from lectures. By extracting the gist of a passage, the learner focusses on the main ideas of that passage and this process "facilitates learning as it helps readers clarify the meaning and significance of discourse" (Brown, Campione & Day, 1981, cited in Hidi & Anderson, 1986). Summarization can be taught and has proven to facilitate learning and retention (Marks & Wittrock, 1978).

Meaningful elaboration learning strategy has also received a great deal of attention. For the past few years researchers have studied its effect on learning and, training courses have been developed to help students master the different rules that are involved in creating meaningful elaborations. Since students must depend on personal experiences to create elaborations, what may be meaningful to one student may not be meaningful to another.

Nevertheless, despite the idiosyncratic nature of this technique, educational researchers have developed several guidelines that can be used to facilitate the process of creating these elaborations.

Both of these techniques will form the basis for this study, for they encourage the learner to be directly involved in the learning process. In other words, students will be trained to summarize or to create meaningful elaborations with the material that they are expected to learn. The present study also investigates the effect of these learning strategies on the short and long term retention of prose materials. Meaningful elaborations and summarization of expository passage are strategies that have been shown to improve learning and retention (Annis, 1985; Cook, 1981; Garner, 1982; Hare & Borchardt, 1984; Johnson, 1973; Tyler, 1984, and Wolford, 1971). In addition to comparing the influence of these two learning techniques, this study will examine the student's performance according to Bloom's Taxonomy of Cognitive Objective (1956). By looking into the relationship of these variables, hopefully more will be known about the effectiveness of the information processing model related to prose learning.

Important Terms

During learning and instruction, students often engage in activities that are aimed at increasing their recall of information. Thoughts and activities in which a learner engages while studying can be defined as learning strategies. The principal goal of a learning strategy may vary from the enhancement of the motivational and affective state of the learner to the selection, acquisition, organization and integration of new information (Weinstein and Mayer, 1986).

In addition, Rothkopf (1970) has referred to learning strategies as mathemagenic activities. Mathemagenic activities include every behavior exhibited by the learner during the learning experience that may facilitate the retention of the material to be learned. Examples of mathemagenic activities would include answering adjunct questions after reading a text (Rothkopf, 1966), taking notes (Peper & Mayer, 1978), and verbalizing during learning (Weener, 1974). Dansereau (1985) argues that students can be trained to use these and other learning strategies more efficiently. For the past several years he and his colleagues have revised their "interactive learning strategy system." The system divides learning strategy into two major components, primary strategies and support strategies. primary strategies are those that the learner uses to

"operate" on the material to be learned. They could be identified as comprehension and memory strategies. Support strategies are related to attributes or appropriate mental conditions that will positively influence learning (Dansereau, 1985).

Johnson (1975) notes that learning may be said to be meaningful to the extent that new learning can be associated with existing knowledge. Thus, a concept is considered meaningful when it can be related to the associational background of the learner and also to the semantic structure of the linguistic community from which it derives. The use of elaborators whether verbal or imaginal (Paivio, 1971; Reder, 1980) requires the learner to generate symbolic constructions such as inferences, analogies, or images that will make the new information more meaningful (Weinstein & Underwood, 1985). Elaboration techniques are often divided into two major categories: comparative elaborations and integrative elaborations. Mayer (1980) indicates that comparative elaboration takes place when the learner compare two concepts in the text and explains their relationship. Integrative elaboration occurs when a person explains the relationship that exist between concepts in the text and some other concepts or ideas already in his or her memory. Mayer (1980) notes that these techniques are different from associative elaboration, because they require more mnemonic sentences or images.

Summarizing is the person's ability to work carefully on information whether written or oral and to render it as succinctly as possible (Brown & Day, 1983). To write summaries the learner must be able to condense the information into its essence or gist. Kintstch and Van Dijk (1978) have proposed a model for texts summarization that includes the reader's schema, the microstructure and the macrostructure of the text and a set of pre-established rules for creating summaries (Winograd, 1984). According to this model, learners while reading a text condense its microstructure into a macrostructure through the use of a series of transformations called macro-rules.

The Taxonomy of Educational Objectives (Cognitive Domain) is intended to provide for classification of the goals of our educational system (Bloom, 1956). It is also intended to help teachers and administrators discuss curricular and evaluation problems as well as to develop objectives aimed at specific behaviors. The taxonomy is divided into six levels that cover from the simplest behavior to the more complex (Bloom, 1956).

Knowledge "involves the recall of specifics and universals, the recall of methods and process, or the recall of a pattern, structure, or setting (Bloom, 1956, p. 201).

Comprehension represents the lowest level of understanding. It refers to a type of understanding or apprehension such as the individual knows what is

being communicated and can make use of the material or idea being communicated without necessarily relating it to other material or seeing its fullest implications (Bloom, 1956, p. 204).

Application is the ability to apply principles to actual situations; analysis is the ability to make critical judgments about relationships of the material; synthesis involves rearranging ideas into a new whole; and evaluation requires making judgements based on internal evidence or external criteria (Annis, 1985, p. 6).

Purpose of the Study

The purpose of this study is to examine the effect of learning strategy techniques on the performance of college students. Specifically, attention is given to the students' use of summarization and meaningful elaborations skills as opposed to students using their own study methods.

The idea for comparing these techniques emerged from a growing interest in the area of learning strategies, specifically in teaching students to use summarization and elaboration skills to facilitate their encoding and retrieval processes. In addition, a lack of conclusive evidence on the effectiveness of one method over the other has contributed to an increased interest in this area of inquiry.

Several researchers seem to indicate rather tentatively that both summarization and elaboration strategies work well when compared to students using their own study method

(Annis, 1985; Brown & Smiley, 1978; Johnson, 1973; Wittrock, 1985; Wittrock & Carter, 1975). However, the literature does not seem to indicate which method is more effective in facilitating long term retention.

Instead, it seems that research has focussed on the relevancy of these techniques for particular learning activities. For example, Weinstein and Mayer (1986) suggest the utilization of summarization and meaningful elaborations for complex learning tasks. Dansereau (1985) subsumes these techniques under the comprehension retention category, and Wittrock (1984) simply identifies them as generative techniques because they motivate the learner to be an active participant of the learning experience.

Summarization and meaningful elaborations are used in this study because they represent simple activities that learners can use in the classroom and during their individual study hours. When students read, they need to focus on important information from the text. Summaries help them to be selective in studying large amounts of material. Students without summarization skills take excessive notes when listening to lectures and fail to discriminate between what is important and what is not (Garner, 1984).

Meaningful elaborations involve the student's drawing inferences or implications when studying a text (Weinstein, 1982). Students spend a significant amount of time studying

from texts. For this reason, the meaningful elaboration strategy seems to be a valuable technique that could help students relate main ideas and subordinate concepts to one another in a way that will facilitate the learning and retention of the material to be learned. This study as opposed to other research which has studied these techniques in isolation is designed to investigate which of these two methods help students retain more from a text after a lengthy period of time.

A second reason for selecting these techniques is that they meet the expectations of the information processing theory. One of the most important aspects of the information processing theory is that it focusses on students' participation in the learning process. Learners are expected to use strategies that facilitate learning and retention. This model seeks to motivate learners to do at least three things while studying. First, the learner must pay attention; this can be achieved by using techniques that require them to concentrate on specific sections of the text. Second, the information processing paradigm requires learners to transform incoming stimuli into meaningful symbols of their own. Finally, this model requires learners to search for previously acquired knowledge that may serve as a referential point for the understanding of new materials.

According to Wittrock's (1974) model, reading comprehension is facilitated when learners are required to actively generate or construct meaningful elaborations; that is, students are taught to relate new information to what they already know. Dansereau (1985) and Weinstein (1982) among others have used meaningful elaborations with paired associate learning. Anderson and Biddle (1975), Annis (1985), and Ross & Divista (1976) have asked students to write summaries after reading or listening to a passage. However, students have been asked to create those summaries after every paragraph of the passage. This practice have generated some disagreement among scholars. For example, Dansereau (1985) suggested that frequent summarizations such as after each paragraph may oblige the learner to focus on details rather on the main ideas of the text.

In this study students will be asked to summarize after reading a complete passage rather than after every paragraph. This procedure seems more practical since the main purpose of creating summaries is to focus on main ideas and delete trivia or redundant information. When students are asked to summarize a complete chapter, they are expected to concentrate on major headings or main concepts and to place less emphasis on details. A chapter from a regular reading text will be used as the standard reading material during the training. Following

the training, students will be tested over a 1,525-word article which is closely related to most instructional materials that students read in school or at home.

Hypotheses

The following hypotheses will be tested:

1. There is no difference between the mean scores of students trained to summarize or to use meaningful elaborations and the mean scores of students in the Control group on the tests of short and long term recall.

2. Scores of students on the cognitive levels of knowledge, comprehension, application or analysis are not significantly different between the Summarization, the Meaningful Elaboration, and the Control groups on the short term retention test.

3. Scores of students on the cognitive levels of knowledge, comprehension, application or analysis are not significantly different between the Summarization, the Meaningful Elaboration, and the Control groups on the long term retention test.

4. Students' mean scores in Test One (short term recall) are not significantly different from students' mean scores in Test Two for the Summarization, the Meaningful Elaboration and the Control group.

CHAPTER II

LITERATURE REVIEW

Teaching learning strategies should be an important component of good teaching. Weinstein & Mayer (1986) identify good teaching as a conjunct of activities where the learner learns how to learn, how to recall, how to process information and how to be motivated. It is interesting to note that while many of us place high expantancies on our students' abilities to think and solve problems rationally, little is being done to teach them how to be more efficient learners.

In recent years, a number of researchers have contributed to improving students' learning strategies (Dansereau, 1984). It is evident that much more needs to be addressed on this issue. There is substantial evidence that leads us to believe that a student's capacity for acquiring and using information can be enhanced through proper training. Teaching learners how to apply learning skills to a barrage of information has led researchers to focus on different processes that take place during learning. Cognitive psychologists seek to comprehend what goes on between a stimulus and a response and how information is processed. Farnham-Diggory (1977) notes that "with the emergence of cognitive psychology in the 1960's..., now

instead of a hyphen (between S-R), we have mental structures and processes" (p. 128). Thus, the use of learning strategies may enhance these structures and processes which in turn will affect performance.

Research Trends on Teaching Learning Strategies

For the past two decades, numerous studies and reviews have investigated the need for teaching students how to use particular strategy or a set of strategies for different learning tasks (Andreas & Armbruster, 1984; Snoman & McCoun, 1984). However, these studies have been notorious for isolating and manipulating single learning strategy components such as identification, comprehension, retention, or retrieval of important materials (Dansereau, 1978).

Three major issues, however, were not taken into consideration by the early researchers. First, their research was confined to the laboratory and the materials and techniques used were highly artificial. Students were unable to apply these techniques to new learning situations. Second, these learning technique components were examined separately and no attempts were made to compare them. The following quote illustrates the dilemma

This lack of integration is extremely troublesome obvious interrelationships between some of the components (e.g., enhancing comprehension-retention skills will clearly have an impact on retrieval, and vice versa (Dansereau, 1976, p. 7).

Finally, Dansereau argues that most learning strategies that have been researched have been based on the learner's receiving simple instructions on how to use a strategy in a particular content area. However, little has been done to train students how to use those techniques in other areas as well. Though Anderson (1970); Divesta, Schultz, & Dangel (1973); Levine & Divine-Hawkins (1974) have shown some positive results following training, greater gains could be achieved through planning and developing better training programs.

For the past several years Weinstein and her colleagues have created programs directed toward helping students develop effective learning strategies (Weinstein & Underwood, 1985). Their main objectives were to determine whether students could be trained to use elaboration techniques and whether doing so would increase their ability to learn instructional materials. On several occasions students were trained to use sentences or images as elaborators, to form analogies, to draw implications, to create relationships, and to paraphrase information. In addition, strong considerations were given to the student's ability to transfer these skills to other areas such as science, history, English, foreign language and vocational education.

Bean, Sorter, Singer & Frazee (1983) used direct instruction to teach 10th graders world history. Students received instruction on how to use graphic organizers, to outline, to summarize and to generate questions while reading. Students who were trained to use graphic organizers were able to enhance their limited learning strategy repertoire beyond outline. Bean et al. (1983) suggest that systematic instruction in graphic organizer construction was helpful to average and above average students. In another study, Day (1980) found that training college students to use summarization rules increased their ability to write better summaries. Barlett (1978) taught secondary school students to identify key structure in texts. The results indicated that after training, students were able to recall more ideas from the passage.

Other researchers have demonstrated that students can be trained to paraphrase and to summarize (Dansereau, McDonald, Long, Atkinson, Ellis, Collins, Williams, & Evans, 1974; Doctorow, Wittrock, & Marks, 1978). These researchers among others, clearly indicate that students can be trained to use one or more learning strategies and that the mastery of a particular strategy can increase their comprehension skills, their encoding processes, and their recall abilities. For example, in helping students learn foreign vocabulary, verbal elaborations and imagery skills are often

used. This technique is called the keyword method (Atkinson, 1975, Raugh & Atkinson, 1975). For example, in trying to memorize the Spanish word "trigo" or "wheat," the learner would connect "trigo" with an easily pronounced English keyword that contains part of this foreign word. Thus, the first syllable of the word "trigo" would be associated with the English word tree. Finally the learner would create an imagery link that would connect trigo with its English counterpart; then the student would think of a tree that grows wheat stalks instead of leaves (Weinstein & Mayer, 1986).

Raugh and Atkinson (1975) asked college students to learn 60 pairs of Spanish to English vocabulary words in 15 minutes. An experimental and a control group were formed. Students under the experimental condition were trained to use the keyword method, whereas those in the control group did not receive the training. The results showed that the experimental group scored 88% on a recall test compared to 28% of the control group. Atkinson and Raugh (1975) repeated the study and used Russian vocabulary for the second experiment. Once again, students in the experimental group outperformed those in the control group.

King, Biggs, and Lipsky (1984) trained 87 college freshmen and sophomores enrolled in a developmental reading class to either paraphrase, answer questions, or write summaries after reading text segments. Another group of

students served as a control group. The experimental groups showed an overall gain superior to the control group.

Hare and Borchardt (1984) compared two versions of a summarization intervention program. Forty-four low income minority high school students participated in the study. Two groups of 22 students each were trained to use summarization rules through either a deductive or an inductive teaching method. Fourteen students constituted the control group and did not receive the training, but were asked to provide summaries as pre and post-test measures. Training sessions were also designed to facilitate students' transfer from laboratory reading materials to texts that are generally used in high school classes. The results showed a significant gain for the experimental over the control group in terms of summarization efficiency and summarization role usage. Post instructional effects were observed two weeks after treatment, but no significant difference was found between instructional methods whether given immediately or two weeks after the treatment. Overall, the results suggested that high school students can be taught to summarize effectively. Best of all, teachers and students reported having been satisfied with the program.

Day (1980) trained a group of college students to apply basic rules for summarization and to monitor their performance. Students were divided into two groups of either average or remedial writers. Within these groups,

four training conditions were established, and students were divided among these conditions. The four experimental treatments were first, self-management, where the students were given simple instructions on how to delete information and how to capture main ideas but were not given specific examples that would help them achieve these goals. Second, students were instructed through the use of modeling how to apply summarization rules. Third, the self-management and the rules instruction training from the first and second group were combined.

Finally, the control of the rules group received explicit training on how to use rules for summarization and how to monitor these rules. Students were instructed to look for specific components in their summaries such as topic sentences and for any relevant or redundant information (Brown, Campione, & Day, 1981).

Results indicated that after several days of training students were able to apply more difficult rules to their summaries. These findings also suggested that there were some differences in relation to students' abilities. For example, average students benefited more from all forms of instruction; whereas, remedial students showed a need for more explicit instructions. "The poor ability students were not able to integrate the rules and self-management instructions for themselves and needed explicit instructions" (Brown, Campione, & Day, 1981).

These findings seem to indicate that more mature learners are more prone to benefit from training than are remedial learners. Remedial students seem to need more structure and more direct instructions; they seem to be deficient in incorporating self-management principles into their own learning styles.

A study by Sjostrom and Chou Hare (1984) with hispanic high school students, provides additional support for the usefulness of training students in different learning strategies. In this study, students who were selected to receive training on identifying main ideas in expository texts attended one 75-minute lesson weekly for four weeks for a total of five hours. A five-step instructional strategy by Bauman (1983b) was used in each lesson.

According to Bauman (1983b) learning strategy teaching should involve instructions about the strategy, about its purposes, a good set of relevant examples, direct teacher involvement, feedback, and students providing examples (Sjostrom & Chou Hare, 1984). In this experiment the reading was taken from seventh and eighth-grade textbooks and students were asked to identify main ideas from each of the paragraphs selected. Students' main ideas were later compared to adults main idea selections and were scored accordingly.

Since students' problems with main idea selections seem to affect their performance in areas such as summarization, Brown & Day (1983), and outlining, (Chou Hare & Borchardt 1984). Main idea selection when writing summaries was tested. For this purpose, a seventh grade 641-word passage was introduced to the students and, they were asked to summarize it in no more than 160 words. Summaries were graded on a scale of 1 to 3 depending upon how relevant the information included in the summaries was. Students who received main idea training improved their ability to comprehend and recognize main ideas on expository texts. In addition, this study revealed that students who participated in the training were able to include more relevant ideas in their summaries than students who did not receive the training.

Identifying Teachable Learning Strategies

The first step toward identifying teachable learning strategies is to determine what strategies are used by efficient learners. Weinstein, Underwood, Wicker, & Clobberly (1979) interviewed 72 junior and senior students enrolled in a teacher education program at the University of Texas at Austin. The students were randomly assigned to three groups and each group received five tasks composed of the following materials: "two different paired-associated lists, two different free recall lists, and one reading

list" (p. 49). Students were asked to write down strategies, methods, techniques, or simple tactics that they were using while studying the material. Each student had the opportunity to communicate to the interviewer about his or her specific strategy. From the number of strategies that were presented, eight major techniques were identified. For example, study skills such as re-reading, re-writing, note taking, underlining, reviewing, word similarities and differences, abbreviations, acronyms, abstracting central ideas, creating mental images, meaningful elaborations and relating material to previous knowledge and experience were used. Finally creating phrases or sentences, paraphrasing and categorizing were all identified as learning methods used by successful learners.

These strategies formed the basis for the development of the Learning Activities Questionnaire that was later sent out to students from different disciplines. The pattern of strategies used by individuals across disciplines seemed to be fairly consistent. Graduate students indicated that they used more verbal and imagery elaboration strategies than community college students. However, both groups reported using less rote learning as compared to non-college groups such as army recruits who stated using rote learning or no strategy at all. In general, these data seem to conclude that learners use a variety of techniques while studying and most importantly, college and

graduate students seem to have developed ways of dealing with learning materials that younger students and especially non-college groups have not developed.

These findings support Brown and Smiley's (1978) conclusions that acknowledge age difference as a factor influencing students' abilities to identify essential organizational features of texts. Older students seem to be better equipped to make reasonable decisions about what to delete and what to focus on as relevant information. Brown, Campione, and Day (1981) suggest that the emergence of strategies for dealing with learning materials tend to be dependent upon "the degree and recency of formal schooling" (p. 14). In general, those manifestations of learning strategies appear between the age of five and seven and continue thereafter. The manifestation of learning strategy at an early age may seem to indicate some doubts as to the validity of any program for teaching learning strategies. Brown, Day, and Jones (1983) investigated students ability to summarize materials. Fifth, seventh, eleventh grade, and college students were asked to summarize materials from different texts. The results indicated that students in fifth grade intent to summarize lengthy texts. However, it is not clear whether or not their summaries were done with deliberate judgement and effort to reduce whatever they read to its gist or simply what they recall after reading a text. Brown, Day, and Jones (1983) concluded that students as

young as fifth grade are able to write summaries, but college and high school students outperformed elementary students "in their sensitivity to fine gradations of importance in the text, and in their ability to condense more idea units into the same number of words" (p. 977).

Students ability to generate strategies for learning from texts is not exclusive to the area of summarization. For example, students in Brown and Simley's (1978) study were able to underline and take notes from reading materials. Armbruster (1979) concluded that older students can outline and map learning materials.

Ideas supporting high school students ability to write summaries and engage in other learning strategies have not been very popular with some researchers. For example, Hare and Borchardt (1984) indicate that summarization proficiency is not necessarily acquired by high school students mainly because they do not show much proficiency in utilizing Kintsch and Van Dijk's (1978) macrorules for text summarizations. However, Brown and Day (1983) acknowledge the difficulty that some students may encounter in applying these macrorules. Some of Kintsch and Van Dijk's rules demand different degrees of text manipulation and differ somewhat from the learner's favorite strategy.

In general, we could tentatively conclude that students as they grow older are able to improve their ability to identify complex structures in texts. Thus, training

students to develop or refine learning techniques may simply be a matter of helping them reassess strategies that they may have used improperly in the past and providing them with new examples along with feedback that will hopefully maximize the effectiveness of their methods.

As a second step in identifying teachable learning strategies, Dansereau (1985) suggests the use of task analysis which illustrate processes that are important for the successful completion of different text comprehension tasks. This technique calls for a close observation of the different strategies that students use and the identification of weak areas that need to be improved.

Learning Strategies Training Methods

Dansereau (1978) has developed a model for teaching learning strategies that seems very promising. His approach is divided into six components. First, students are told about the importance of the strategy that they are about to learn, called the stimulation phase. Second, they are provided with psychological and educational information about the effectiveness of the strategy and are shown the connection between learning strategy usage and educational benefits. Dansereau calls this phase the "conceptual level of information" or a "short psychology course." Third, the "strategy instruction" is presented and procedures for applying it are described. At this stage students are

given a few preliminary exercises. Fourth, students move to the strategy application phase and are given guided practice on how to use each of the strategies. Finally, they receive examples from the instructor on how to use the strategy as well as positive feedback. In addition, students are allowed to discuss the application of the strategy and to receive additional feedback from peers. Dansereau suggests that the training program ought to be evaluated and problems ought to be diagnosed. This can be done through the administration of comprehension and retention tests.

Furthermore, Dansereau (1985) asserts that modeling learning strategies for students is one of the most potent ways of teaching learning skills. For this reason, he has suggested three modeling approaches that will benefited students. First, the learner is presented with examples where learning strategies are used correctly; this included a step by step plan on how the strategies are applied. Second, experts model the strategy and give explicit directions as to how it could be used. Finally, Dansereau believes that through the interaction of students with their peers, typically small group interactions, much can be done to ensure students correct usage of the strategy. Feedback and constructive criticism is provided during small group discussions which could help in clarifying problems.

Weinstein and Underwood (1985) have designed courses to teach students how to use elaboration strategies. Their training method involved the following steps. First, students who share a common learning problem were placed in the same group and were given a brief lecture on how the strategy could help them enhance their learning experience. Second, the main concepts or ideas behind the strategy were identified, followed by the presentation of two or three examples. According to Weinstein and Underwood (1985) students should not be given numerous examples prior to their practicing the strategy because it could inhibit their ability to produce their own examples. Often, students would attempt to mimic the same examples that were provided by the instructor. This is counterproductive to the whole notion of elaboration strategies where students are taught to associate what is new to their own existing knowledge. Third, students were given the opportunity to provide examples of the strategy and were encouraged to apply whatever skills they may have learned to other learning materials as well.

While providing examples, students were receiving assistance and feedback from the instructor. Finally, homework was given, and a complete progression form was kept on every learner. One of the important parts of this program was the fact that it allowed students to monitor

their own learning experience so that improvement could be seen continuously.

Summarization Effects on Learning

Kintsch and Van Dijk's (1978) model for summarization has been selected as a conceptual framework for the use of summary strategy since it identifies a set of summarization rules that help individuals transform and condense information to its essence. Kintsch and Van Dijk (1978) assume that discourses are interpreted as sets of propositions that are related among themselves. Some of these propositions are overtly expressed while others are more subtle and need to be inferred by the learner. Furthermore, "the semantic structures of a discourse are characterized at two levels, namely, at the levels of microstructure and macrostructure" (Kintsch and Van Dijk, 1978, p. 365).

The microstructure of a text is characterized by individual propositions within the text, and their interrelations. The macrostructure, however, deals with general characteristics of the text such as major superordinate concepts or ideas. Both microstructure and macrostructure propositions are interconnected by macrorules that unify the text and make it coherent. This model has been used in training students to summarize texts. For example, Chou Hare and Borchardt (1984) developed their

training procedures using Kintsch and Van Dijk's model that consists of six rules for summarization of texts. These are (a) delete trivia, (b) delete redundancies, (c) substitute a superordinate for a list of items, (d) substitute a superordinate for a list of actions, (e) select a topic sentence if one is available or (f) invent a topic sentence if none is available (p. 63).

King, Biggs, and Lipsky (1984) examined the effects of student generated summaries and pre-questions while reading learning materials. Eighty-seven college freshmen and sophomores enrolled in a reading class participated in the experiment. They were taught either to write summaries or to answer questions while reading the text. A same number of students participated in a control condition. The results indicated that the use of summaries appeared to be useful in studying for essay tests. Furthermore, students using summaries scored higher than the control group on the free recall, the objective, and the essay tests and did better than the self-questioning group in the essay test. A tentative conclusion that stems from these results is that students who write summaries seem to benefit from the practice of writing those summaries, and therefore do better in essay tests than students who generate questions while reading.

Weinstein and Mayer (1986) cited in Doctorow Wittrock, and Mark's (1978) worked on the use of summarization skills

by 6th graders. Half of the group of students who participated in the study were given instruction on how to write a summary sentence for each paragraph that they read. Scores on the posttest revealed that students who were instructed to generate summaries outperformed the control group.

Annis (1985) compared the effects of a reading only technique, a taking notes strategy and student generating summaries after reading small paragraphs from texts. Eighty-four college freshmen and sophomores enrolled in Educational Psychology courses participated in all three sessions of the experiment. During the first session, all the participants were tested in order to assess their reading ability. In the second session, students received a randomly assigned packet of materials. Upon reception of the packets, students were asked to follow the instructions provided in their packets. Each packet contained instructions for either reading only, taking notes following students' own guidelines or generating paragraph summaries over a 1,525 word article. Students in the summary condition were instructed to read the passage and to write a brief summary of each paragraph in their own words. They were given thirty minutes to learn the material and were told that they would be tested on a later date.

A week later, a test consisting of 38 questions was administered. Thirty-two of the questions were multiple

choice and were at the level of knowledge, comprehension, application and analysis of Bloom's taxonomy. Two easy questions were given at the synthesis level and four additional ones at the evaluation level of the taxonomy. Bloom's taxonomy (1956) has been used here because according to Annis "there is a need for dependent measures that reflect differential learning of various types of textual material."(p.6) By using the taxonomy it was possible to compare students' achievement in different learning strategies and to have some ideas about their level of cognition. The results showed that students who wrote paragraph summaries scored significantly higher than students in the control group at the application and analysis level. However, those same students scored significantly lower than the other groups at the synthesis and evaluation levels.

A possible explanation for this surprising result may be that students who wrote summaries were so concerned about writing them that they did not have enough time or motivation to relate the new information to what they already knew. In contrast, the "read only" and "note taking" groups were able to divide their time among the three stage of the information processing paradigm--that is "paying attention," "encoding," and "association" (Annis, 1985). In summary, the author suggests that the "read only" and "note taking" students scored higher than summary

students because they had more time available to associate information from the text to prior knowledge.

Winograd (1984) examined different strategies that good and poor readers used when they summarize. Three variables were considered: (a) the reader's awareness of the task, (b) his or her ability to identify important features of the text and (c) his or ability to reduce the text to its gist. Three hypotheses were stated in relation to these variables. For example, poor readers were not aware of the importance of summarizing, they failed to identify information that should be included in a summary and finally, they were not able to use effective transformation strategies used by good readers.

The participants were 36 poor readers, 39 good readers and 34 adults. Reading abilities were evaluated through the Reading Comprehension Subtest of the Stanford Achievement Test. Children who scored below the 50th percentile were considered poor readers, and good readers were defined as those who scored above the 59th percentile mark on the same test. The adults who participated were either undergraduates, graduates, or doctoral students.

At the beginning of the experiment the participants' decoding ability and speed were assessed. During the following session, the children were asked to read a passage and to answer five multiple choice questions, and to write a 60-word summary of the article. They were allowed to refer

to the article while writing the summary. The adults worked with the eighth grade passage as well and data from them were collected during a single two-hour session while final date for the children were recorded six months later. At this time, they were asked to identify the same information that they had identified earlier. This procedure was to ensure that children's identification of important materials on the previous experiment was congruent with their later identification of the same concepts.

The results did not confirm the first hypothesis that poor readers were often confused about the demand of the task. As it was evidenced here most eighth graders knew that a summary contained important ideas from a passage. The findings, however, confirmed the second hypothesis that poor readers have difficulty identifying information that adults consider important. Good readers information was almost identical to adults information. Thus, it is possible that poor readers are not sensitive enough to critical information while they read (Winograd, 1984).

These results also indicate that the ability to select important elements in a passage is a strategy skill that underlies both summarization and comprehension (Winograd, 1984). This study provides great insight on how good readers become successful summarizers. These data indicate that good readers are more sensitive to critical information than are poor readers. For example, the correlation between

good readers and adults was .71 while the correlation between poor readers and adults was .46. Though these students may have a general idea that a summary should include main ideas from a text, they may encounter great difficulty determining which of those ideas to include in their summaries. Winograd (1984) suggests that the development of skills that are responsible for the identification of important elements from texts should be included in instructional strategies training.

Frequent versus Infrequent Summaries

The effect of frequent versus infrequent summarizations has been studied as well. Most research on summarization reviewed in this chapter has followed the frequent summarization trend where students were asked to provide summaries after each paragraph. However, Dansereau (1985) indicates that contrary to common belief, infrequent summarizers seem to do better in focussing in macrostructures than do frequent summarizers. Forty-eight general psychology students were randomly assigned either to a frequent Summarization group who provided four summaries after reading a 2400-word passage; an infrequent Summarization group who generated two summaries, and a Control group who used their own method to study the passage. Sixteen students participated in each group. Five days later the participants were administered an essay, a

short answer, a multiple choice and a close test. The results indicated that the Infrequent Summarization group outperformed the Control group on essay content and organization. All the other differences were nonsignificant (Dansereau, 1985). Those results indicate that infrequent summarizers do a better job in focussing on macrostructures of texts, whereas frequent summarizers dedicate more attention to microrules, perhaps at the expense of main ideas or macrostructure (Kintsch and Van Dijk, 1978). These results could be explained by the fact that frequent summarizers summarize less information which leads into the problem of focusing on too many details of the text, whereas infrequent summarizers focus on a larger portion of the text and are forced to delete more details and concentrate their efforts on reducing the material to its gist.

Meaningful Elaboration Effects on Learning

Research in the area of elaboration strategies has followed two patterns in the literature. Meaningful elaborations have been used with paired associate words or with lists of concepts to be remembered. Students trained to use elaboration strategies are taught to generate verbal or visual associations between the two words that are presented. For example, with a pair of words such as Dog-bicycle the learner may be asked to visualize a dog riding a bicycle (Mayer, 1979).

Recently, Weinstein (1978), Diefhoff (1977) Dansereau (1978) have attempted to apply elaboration procedures to normal reading materials, but a question remains to be answered. Does the association of previously learned materials with new information affect learning? Ausubel and Youssef (1963) ascertain that though learning materials are not organized in sequence, earlier learned information serves as an orienting and subsuming role for future information.

The latter is comprehended and interpreted in terms of existing understanding and paradigms providing by analogous, familiar, previously learned, and already established concepts in cognitive structure (p.331).

Rohwer (1970), cited in Weinstein (1978), indicates that the use of elaborations as a cognitive strategy implies that individuals create mental symbols to add meaning to the information that they want to learn. Mental symbols could involve the creation of analogy, the drawing of inferences implications that help enhance the meaning of the material (Weinstein, 1978).

The elaboration strategy model borrows concepts from motivation theory, attention theory, and assimilation theory. According to Meyer (1979) the general motivation theory stipulates that learning activities such as the creation of elaborators increase the level of interest in the learner which in turn results in an increase in test performance for more information is being encoded and an

increase in test scores can be seen. Mayer (1979) also indicates that the attention theory views the creation of elaborators as a way to capitalize on students paying attention to important information.

Furthermore, the assimilation theory states that for learning to be meaningful it must follow these conditions, (a) the material to be learned must be received by the learner; this is the reception phase, (b) the learner must have meaningful experiences that can be used as scaffolding ground or as points of reference, and (c) the learner must use these referential points and actively relate new information to them. This is called the activation phase (Mayer, 1979).

When these conditions are met, then, the encoding process is one of assimilating and integrating new information. When these conditions are not met, such as with some control subjects, new information must be added to memory piece by piece without integration (Mayer, 1979, p. 28).

Several studies (Atkinson & Raugh, 1975; Borkowski & Kamfonick, 1972; Smith & Marshall, 1976) among others have suggested that students can be trained to use elaboration skills (cited in Weinstein, Underwood, Wicker, & Cubberly, 1979).

Weinstein and her colleagues described several research results suggesting that students who are trained in

generating meaningful elaborators perform better than students who only read and reread the text. For example, Weinstein (1979) taught 75 ninth-grade students to create elaboration skills that could be used with a variety of learning tasks. Three conditions were formed. In one condition, students were trained how to create elaborators, in another condition, students were required to learn the material using their regular method. Students in the third condition did not see the material that was being studied by the other two groups, but took a posttest on its content. The training for the experimental group was divided into five sessions of one hour each. In order to test for short term recall, an immediate posttest was administered a week after the training. The results showed that students in the meaningful elaboration group performed better than students in the control and posttest only groups on the short and long term retention tests. Scores of the control group and the posttest only group were not significantly different from each other.

A second experiment was conducted and, mental imagery, meaningful elaboration, and grouping were selected for training and instruction purposes. This study was set up to investigate the effectiveness of an elaborated long form of instruction versus a short form of instruction.

Thirty-six students participated in the experiment and two passages, one easy, one difficult, were selected as

reading materials for the study. A training and an instruction group constituted the two experimental conditions. Students from the training group participated in two 50-minute sessions. During session one they received the elaborated long form of instructions that consisted of (1) a description and explanation of the techniques, (2) numerous examples related to the strategies, (3) guidelines for practicing the strategy and (4) corrective feedback to each participant. The same instructions were used separately with the three learning strategies, that is, meaningful elaboration, grouping, and mental imagery. At the end of the first session, the students were able to practice these strategies on two pre-selected passages. These passages served as practice exercises for the application of the principles learned. During the second session, the strategy descriptions were reviewed, and students were tested for mastery.

The instruction group received instructions similar to those received by the training group during their second session. Students in this group did not practice the strategies and did not receive feedback. The testing procedure was identical for both groups and the time allowed for studying the material was held constant for all conditions.

The results showed that the training group scored slightly higher than the instruction group on a multiple

choice and on open-ended tests on the difficult passage; whereas, on the easy passage, the training group scored higher than the instruction group. Furthermore, the training group scored significantly higher than the instruction group on the open-ended test. Again, these results support previous findings that suggest that training in the use of cognitive strategies, in this case meaningful elaboration, is more effective than simple instructions for recall of information (Weinstein, Underwood, Wicker, & Cubberly, 1979).

Linden and Wittrock (1981) assigned students from a fourth grade class to four reading classes. Two of these groups were taught to generate elaborations as they read different stories. A third group of students were taught reading by a regular method and students from the fourth group were required to read the stories without using mental aid. The study indicated that the two experimental groups performed significantly better than the control group and the group taught through the conventional method.

These findings reinforce the position of other educational researchers who believe that

by giving students new ways to study, to relate information to their experience, and to build integrated structures as they read, we can enhance their comprehension without an increase in learning time, and without major changes in curricular materials (Wittrock, 1985, p. 125)

CHAPTER III

METHOD AND PROCEDURES

This chapter focusses on the nature of the sample, the dependent and independent variables that were used in the experiment.

Participants and Setting

Subjects

Subjects were 45 undergraduate students who registered for a course in learning principles and classroom management offered by the Department of Educational and Counseling Psychology of the University of Tennessee during the Fall quarter of 1986. There were 38 females and 7 males, who were all admitted to the Teacher Education Program of the University. A cumulative grade point average of 2.5 was a prerequisite for admission to the program. Most students were of junior standing.

A formal request for participation was made to the subjects asking for permission to use their test results and their ACT scores from the admission and records office (see Appendix A). The participants were given a bonus point which was added to their final grade for participating in the study. From six discussion groups of 15 students each,

45 students agreed to participate in the study. From these groups, two experimental and one control conditions were formed.

Materials

The experimental materials consisted of (a) a 1,525-word article entitled "The Lisbon Earthquake" (Kropp, Stoker, & Bashaw, 1966, see Appendix B), (b) a 585-word passage from the article called "Glaciers" (Kropp, et al, 1966, see Appendix C), (c) two eleven minutes videotapes on training students how to generate summaries or meaningful elaborations (for transcripts see Appendix D and E), (d) two written outlines of the different steps that were referred to in the tapes (see Appendix F and G), (e) two eighty-item tests (Kropp et al, 1966, see Appendix H and I), and (f) three sets of guidelines, one for each graduate assistant who was responsible for one of the conditions (see Appendix J, K, and L).

Reading Materials

Both reading passages, "The Lisbon Earthquake" and "Glaciers," were chosen from a project conducted by Kropp & et al (1966) as part of a Cooperative Research Program of the Office of Education, U. S. Department of Health, Education and Welfare. These articles were chosen for several reasons. First, they were extensively tested

in terms of difficulty levels and area of interest. Second, the Lisbon Earthquake article was used as an experimental passage in a recent publication (Annis, 1985). Finally, a pool of relevant questions representing all levels of Bloom's taxonomy accompanied each article. Both readings were slightly modified from their original forms to include information that would provide answers for questions at the synthesis and evaluation levels of the taxonomy. Both articles were selected for a ninth or tenth grade population. Though, the difficulty level of these articles seemed to be considerably low for college juniors and seniors, they were considered appropriate for this project for the time that was allowed to learn them was very limited and a more difficult material might have produced unnecessary stress. Low reading difficulty level passages have been used in previous studies (Annis, 1985; Brown & Day, 1983, Brown & Smiley, 1978, Winograd, 1984).

Videotapes

The information used in both videotapes was a combination of materials selected from different sources. The steps for creating summaries were (a) use a topic sentence, (b) get rid of unnecessary details, (c) collapse lists, (d) collapse paragraphs, and (e) polish the summary. These steps were taken from Hare & Borchardt (1984). For further details about the steps see Appendix D.

The meaningful elaborations learning strategy set of rules was prepared using Weinstein's (1978) model of elaboration skills. These rules were, (a) read the material thoroughly, (b) make free associations of old information to new information, and (c) relate the material to what you know, your belief or attitudes. A complete description of these rules is reported in Appendix E. The passages that were used as examples in the videotapes were taken from different sources. "Athens and Sparta" was selected from the "Story of Mankind," cited in "How to Study in College" (Pauk, 1974), and the passage "How Do Arteries Differ From Veins" (Tessler & Christ, 1960) was taken from Weinstein, (1978). Students in the summarization group received a copy of the steps for writing summaries and students in the meaningful elaboration group received a copy of the rules for creating elaborators.

Tests

The test used in the study was taken from Kropp et al. (1966). It was considered a reliable and valid instrument for much research was done to test its validity. The reliability for raw and corrected scores at each of the six levels of taxonomy are reported in Appendix M. The project staff of the Institute of Human Learning and Educational

Research and Testing of Florida State University was divided into several teams. Each team member was instructed to read the passage and to submit questions related to its content. Each team included a content specialist, a measurement specialist and other members whose experience in the area of teaching were excellent. Each team member was instructed to prepare questions at each of the six levels of Bloom's taxonomy of educational objectives, cognitive domain (Bloom, 1956).

Furthermore, members of all the different teams met on several occasions for revision of test items. Each item was the subject of a group discussion, and three steps were to be followed before an item was accepted. First, "the participants, except for those who prepared the item, attempted to establish the level of taxonomy which the item was intended to represent" (Kropp et al., 1966, p. 47). Second, when differences occurred, they were discussed and rectified. However, when no agreement was reached, the item was simply eliminated. Finally,

when the classification of an item was agreed on, the group criticized the item. The stem and alternatives were considered in term. If only editorial changes were made, then the item was accepted for use. If changes in the substance of the stem or alternatives were made, then the group reconsidered the classification of the item (Ibid., p. 48).

Procedures

The initial step of the experiment was to select the groups that would represent the summarization, meaningful elaboration and control conditions. The class from which the participants were selected was divided into six sections of students. Of the six sections, two were randomly assigned to each condition. When the project was introduced to the students, they were told that their participation was part of their regular classroom activities and that they were expected to attend the training program. Moreover, they were told that they were not required to take the tests unless they were willing to do so.

Six packets of materials, two for each conditions, were prepared and given to six graduate students who served as trainers for each group. Their tasks included showing the videotape, giving feedback and collecting materials from the students. A training session was scheduled with the trainers a week before the experiment. The purpose of the study, and the task of each trainer was discussed in a forty-five minute training session. The different aspects of the experiment were detailed, and examples were provided to facilitate a better understanding of the techniques.

Each trainer received specific instructions on how to proceed with the training program once they enter the classroom.

In addition, the four trainers representing both experimental conditions, two for summarization and two for meaningful elaborations, were told that a video monitor would be placed in their classrooms and they were instructed how to operate the device. Specific details, such as timing and trainers' participation in the experiment were discussed and included in a standard instruction sheet to facilitate the smooth execution of the program.

On the day of the experiment, video monitors were placed in the classrooms five minutes prior to the arrival of the students. Two meaningful elaborations and two summary videotapes were available for the four groups representing both experimental conditions. No video monitor or tape was provided to the control group. The participants were not notified in advance of the type of activity that was about to take place in their group session. As an introductory statement to the class, each trainer read the instructions for the activity in which the students were about to engage. For example for the summarization groups the instructions read:

Today's activity is designed to teach you how to use summarization techniques as a way to improve your learning experience, and we hope result in making higher grades as you complete your education. First, you will see a videotape presentation that will cover

the basic rules for writing good summaries. I will ask you to pay close attention to the information that you will hear. Before we proceed with the tape, I will give you a handout that will be referred to in the tape (see handout, Appendix F).

The same instructions were read for the Meaningful Elaborations groups while the instructors for the Control groups were instructed to involve their groups in a a twenty-minute activity of their choice.

Experimental Groups

Training Procedure Phase One

Prior to showing the videotapes, the trainers for the experimental groups were instructed to make sure that everyone had a copy of the steps or rules that were referred to in the videotapes. The videotapes were then shown, and students were given the opportunity to practice the strategy for 10 minutes using a text called "Glaciers." To introduce this activity, the narrator said

At this time you will receive a xerox copy of a text entitled "Glaciers." For the next 10 minutes I will ask you to read it and to write a brief summary or to create meaningful elaborations about what you read. While writing your summary or elaborations I encourage you to apply the rules for summarization or meaningful elaborations that we just reviewed.

At this point the trainers passed out the material entitled "Glaciers," and the following instruction was read:

Now you have 10 minutes to read this material and to write either a summary about its content or to associate it with what you already know. Please use the paper that has been provided to write your summary

or meaningful elaborations. You are encouraged to use the rules that have been presented in the videotape. I will assist you and give you feedback while you do the task. The text and your summary or meaningful elaborations will be collected in 10 minutes. You may begin to work.

The trainers were instructed to check their time and to walk around the room and give feedback to the students. They were also asked to give additional feedback to students who were following the different steps of the technique. To help those who had difficulties using the technique, the trainers were instructed to assist them for a time no longer than two minutes.

Following this preliminary training, the trainers were instructed to say "you must stop working... Please pass in your papers." Each trainer had to make sure that everyone had returned his/her materials. The participants had to return a copy of the passage, "Glaciers" and their notes.

Training Procedure Phase Two

This phase was to allow the students to learn a new passage using the technique that they had learned earlier. A copy of the passage "The Lisbon Earthquake" was distributed and the following instruction was read:

You have received a xerox copy of a text entitled "The Lisbon Earthquake." You will have 30 minutes to read the material in its entirety and to summarize its content or to create your own meaningful elaborations. You may write on the text if you so desire. The text and any information about the text that you may have written will be collected at the end of the session.

You may not keep the text, the summary or the meaningful elaborations that you have written. You will be tested on this material on two different occasions. You may begin to work

The group trainers were again instructed to check their time. No advice or feedback were to be given to the students during this activity. At the end of the 30 minutes, the participants were told to stop working and to pass their papers. The trainers collected the papers and made sure that all the participants had returned their passage and their notes. The class was dismissed. The entire activity lasted approximately 55 minutes.

Control Group

Students in both Control groups were not shown a videotape; instead they were introduced to the activity of the day. They were involved in reviewing the test that they had the week before or in discussing the material that had been presented in class. This introductory activity lasted 20 minutes. At the end of the 20 minutes the group leaders were instructed to say "now we are going to change our activity for the rest of the session." The leaders then distributed a copy of the text entitled "The Lisbon Earthquake" and the following information was read verbatim:

You have received a xerox copy of a text called "The Lisbon Earthquake," you will have 30 minutes to read and carefully learn the material. You will be tested on the content of this material at two latter

dates, therefore, you may use any learning aid that may help you remember this material. You may write on the text if you so desire. The text and any other information about the text that you have written will be collected at the end of the session. You may not keep the text. You may begin to work.

The group leaders were instructed to check their time. No advice or feedback was to be given to the students during this activity. At the end of the activity, the students were told to stop working and to return their written materials. This activity lasted approximately 30 minutes.

Testing Procedures

Two tests were administered. The first was given two days following the experimental treatment and consisted of 80 multiple choice questions or twenty items for each of the first four levels of Bloom's taxonomy (Kropp et al., 1966). During the training program, the participants were told that they would be tested on two different occasions over the content of the material. However, the exact date for either test was not disclosed.

Two days after the training, the first test was given to all three groups. Thirty-five minutes were reserved at the end of the class period for the participants to take the test. Four weeks later, a second test was administered. This test was essentially similar to the previous one. The questions were the same but were arranged in a different

order. It was decided to use the same test in post evaluation to avoid the problem of presenting items that would not be equivalent to the original questions. The issue with the testing procedure was not just to have two tests that were statistically equivalent, but two tests that would essentially test the same material and at the level of difficulty as provided by the taxonomy.

CHAPTER IV

RESULTS

Results for the present study are described below in the following sequence: (a) the ACT means for the Summarization, the Meaningful Elaboration and the Control groups; (b) the correlation between ACT and scores on Test one for all the three groups combined; (c) the adjusted means and standard deviations for all groups; (d) the planned comparisons between Summarization and Meaningful Elaboration, Summarization and Control, and Meaningful Elaboration and Control groups for Test One and Test Two; the (e) average loss in scores experienced by each group from Test One to Test Two; (f) the comparison of students' scores between Bloom's different cognitive levels of Test One and the cognitive levels of Test Two; and (g) the comparison of students' scores in the experimental groups with students' scores in the control group for each of the four cognitive levels of Test One and Test Two.

Before the data analysis was done, the ACT mean for each group was calculated to insure that the groups did not differ initially on ACT. This analysis revealed that the average ACT score for the Summarization group was 21.2, the Meaningful Elaboration group was 21.9, and the Control group

was 21.3. These means were not significantly different, $F(2, 42) = .52, p > .05$).

In addition, a Pearson correlation coefficient between Act and scores on Test One was calculated to determine whether a relationship existed between aptitude, as measured by ACT and achievement. The results showed that there was a significant relationship between ACT and scores in Test One ($r = .69, p < .05$). That is, students with high ACT scored higher on Test One than students with low ACT. For this reason an analysis of covariance was performed to adjust for initial differences on aptitude on Test One for the three groups. Table 1 shows the adjusted means and standard deviations for Test One and for Test Two.

Hypothesis 1

There is no difference between the mean scores of students trained to summarize or to use meaningful elaborations and the mean scores of students in the Control group on the tests of short and long term recall.

Contrary to this hypothesis, the analysis of covariance revealed a significant difference between the three group means on Test One, $F(2, 41) = 7.22, p < .05$ and on Test Two, $F(2, 41) = 3.40, p < .05$.

These differences were further examined, and a multiple comparisons test was conducted for Test One and for Test Two. As can be seen in Table 2, a significant difference was found between the Summarization and the Meaningful

Table 1

Adjusted Means for Test One and Test Two on Treatment Conditions

Groups	Test One		Test Two	
	$\bar{X}$	SD	$\bar{X}$	SD
Summarization (N = 12)	47.74	2.01	44.51	2.45
Meaningful Elaboration (N= 19)	41.61	1.69	38.79	1.95
Control (N = 14)	50.66	1.86	46.12	2.27

Table 2

Comparisons of Total Score on Test One for The Summarization, Meaningful Elaboration and Control groups

Groups	Estimate	SD	t
Summarization vs Meaningful Elaboration	6.13	2.58	2.38*
Summarization vs Control	-2.92	2.74	-1.06
Meaningful Elaboration vs Control	-9.04	2.46	-3.68**

* $p < .05$ ** $p < .01$

Elaboration groups on Test One which measured short term retention. The Summarization group scored higher than the Meaningful Elaboration group on the test for short term retention. A significant difference was also found between the Meaningful Elaboration group and the Control group in Test One with the Meaningful Elaboration group scoring lower than the Control group on this test.

Table 3 shows that a significant difference was also obtained between the Meaningful Elaboration and the Control groups on the test for long term recall or Test Two. The Control group scored higher than the Meaningful Elaboration group on this test. None of the other comparisons between groups on Test Two were considered significant. It is important to note, however, that the Summarization and the Meaningful Elaboration groups did not differ significantly from each other on either Test One or Test Two. These results failed to fully support the first hypothesis of no difference between the mean scores of students in the three conditions.

Hypothesis 2

Scores of students on the cognitive levels of knowledge, comprehension, application or analysis are not significantly different between groups on Test of short term retention.

In order to test the second hypothesis, and analysis of covariance was conducted to compare students scores at each

Table 3

Comparisons of Total Score on Test Two for the
Summarization, Meaningful Elaboration, and Control Groups

Groups	Estimate	SD	<u>t</u>
Summarization vs Meaningful Elaboration	5.73	3.14	1.82
Summarization vs Control	-1.61	3.34	-0.48
Meaningful Elaboration vs Control	-7.33	2.99	-2.45*

* $p < .05$.

of the four cognitive levels of the test. The mean scores at the knowledge, comprehension, application, and analysis levels of students in the Summarization group were compared with the mean scores of students at the same level in the Meaningful Elaboration and Control groups. The results indicated that the three groups did not differ significantly at the knowledge level.

At the comprehension level of the test, the three groups differed significantly, $F(2, 41) = 7.35, p < .05$. A multiple comparison analysis revealed that the Summarization group and the Control group were significantly different from the Meaningful Elaboration group (see Table 4). On the application level, a significant difference was obtained between the groups as well, $F(2, 41) = 3.34, p < .05$. The multiple comparisons test revealed that scores of students in the Meaningful Elaboration group were significantly lower than scores of students in the Control group (see Table 4). A significant difference was also found at the analysis level of the test $F(2, 41) = 2.95, p < .05$. The multiple comparisons test revealed that the difference was between the Meaningful Elaboration and the Control groups with the Control group scoring higher than the Meaningful Elaboration group. None of the other comparisons indicated that a significant difference existed between the Summarization and the Control groups.

Table 4

Comparisons of Students' Scores in the Experimental Groups with Students' Scores in the Control Group for each of the Difficulty Levels of Test One (N = 45)

Test Levels	M	SD	t
<u>Knowledge</u>			
Summarization vs. Meaningful Elaboration	.58	.98	0.61
Summarization vs. Control	-1.47	1.00	1.47
Meaningful Elaboration vs. Control	-2.05	.89	-2.28*
<u>Comprehension</u>			
Summarization vs. Meaningful Elaboration	2.23	0.86	2.58*
Summarization vs. Control	-0.77	0.92	0.84
Meaningful Elaboration vs. Control	3.00	0.82	-3.64**
<u>Application</u>			
Summarization vs. Meaningful Elaboration	1.49	0.83	1.79
Summarization vs. Control	-0.44	0.89	-0.50
Meaningful Elaboration vs. Control	-1.93	0.79	-2.43*
<u>Analysis</u>			
Summarization vs. Meaningful Elaboration	1.82	0.98	1.85
Summarization vs. Control	-0.24	1.05	-0.22
Meaningful Elaboration vs. Control	-2.06	0.94	-2.19*

* $p < .05$.

Hypothesis 3

Scores of students on the cognitive levels of knowledge, comprehension, application or analysis are not significantly different between groups on test for long term retention.

An analysis of covariance was also used to test the third hypothesis. A significant difference between groups was obtained on questions at the knowledge level, $F(2, 41) = 3.22, p < .05$. The multiple comparisons indicated that the Meaningful Elaboration and the Control groups were significantly different, with the Control group scoring higher than Meaningful Elaboration group (see Table 5). The results indicated that at the comprehension level the three groups did not differ significantly. Comparisons between groups at the application and at the analysis level of Test Two did not reveal any differences that were significant. These results did not fully support the third hypothesis of no difference in scores between groups at the knowledge, comprehension, application, and analysis of Test Two.

Hypothesis 4

Students' mean scores on Test One are not significantly different from students' mean scores on Test Two for the Summarization, the Meaningful Elaboration and the Control groups.

In order to test this hypothesis, three t tests for correlated samples were performed to measure the difference between Test One and Test Two for the three groups. The

Table 5

Comparisons of Students' Scores in the Experimental Groups with Students' Scores in the Control Group for Each of the Difficulty Levels of Test Two (N = 45)

Test Levels	M	SD	t
<u>Knowledge</u>			
Summarization vs. Meaningful Elaboration	1.72	0.89	1.92
Summarization vs. Control	-0.24	0.95	-0.25
Meaningful Elaboration vs. Control	-1.96	0.85	-2.29*
<u>Comprehension</u>			
Summarization vs. Meaningful Elaboration	2.53	1.20	2.12*
Summarization vs. Control	0.29	1.27	0.23
Meaningful Elaboration vs. Control	-2.25	1.14	-1.97
<u>Application</u>			
Summarization vs. Meaningful Elaboration	1.50	1.05	1.43
Summarization vs. Control	-0.39	1.11	-0.35
Meaningful Elaboration vs. Control	-1.88	1.00	-1.88
<u>Analysis</u>			
Summarization vs. Meaningful Elaboration	-0.03	0.96	-0.03
Summarization vs. Control	-1.27	1.02	-1.24
Meaningful Elaboration vs. Control	-1.24	0.92	-1.35

* $p < .05$

differences in mean scores between Test One and Test Two are reported in Table 6. As can be seen, students in all three conditions experienced a drop in mean scores from Test One to Test Two; however, the drop was most significant for the Control condition.

These differences were further analyzed, and the difference in mean scores between each of the cognitive levels of Test One and each of the cognitive levels of Test Two were examined. Additional t tests for correlated samples were performed between the levels of knowledge, comprehension, application, and analysis of the test. As can be seen in Table 7, students in the Meaningful Elaboration group experienced their largest drop in scores between Test One and Test Two on questions designed to test factual information of the material to be learned, that is at the knowledge level according to Bloom's taxonomy of cognitive objectives. Students in the Control condition, also, experienced a significant drop in scores from Test One to Test Two on questions designed to test factual information (knowledge) and questions designed to test the learner's general understanding of the material that was being tested (comprehension). Other differences between Test One and Test Two were not significantly different. These findings failed to support the second hypothesis between scores of students in Test One and scores of students in Test Two.

Table 6

Average Loss in Scores Experienced by Each Group Between Test One and Test Two

Groups	$\bar{X}_1$	$\bar{X}_2$	D	SD	t
Summarization (N = 12)	47.74	44.52	-3.22	1.68	-1.91*
Meaningful Elaboration (N = 19)	41.62	38.79	-2.83	1.43	-2.11*
Control (N = 14)	50.66	46.12	-4.54	1.56	-2.90**

* $p < .05$.

** $p < .01$.

$\bar{X}_1$ = mean score for Test One

$\bar{X}_2$ = mean score for Test Two

Table 7

Students' Score Differences Between Each of the Cognitive Levels of Test One and Test Two for the Three Groups

Groups		Mean Difference	SD	t
<u>Summarization</u>	12			
Knowledge		.84	.60	1.40
Comprehension		.63	.84	.75
Application		.60	.82	.73
Analysis		1.14	.75	1.52
<u>Meaningful Elaboration</u>	19			
Knowledge		1.98	.48	4.13**
Comprehension		.93	.67	1.39
Application		.61	.65	.94
Analysis		-.70	.60	1.17
<u>Control</u>	14			
Knowledge		2.07	.56	3.70**
Comprehension		1.69	.78	2.16*
Application		.65	.77	.84
Analysis		.11	.70	.16

*p < .05.

**p < .01.

CHAPTER V

DISCUSSION, CONCLUSIONS, AND SUGGESTIONS FOR FURTHER STUDY

Discussion

Several studies have suggested that students can be taught a variety of learning skills at almost every level of the educational ladder. For example, students have been taught to paraphrase texts (Doctorow, Wittrock, & Marks, 1978); to summarize (King, Biggs, & Lipsy, 1984); and to create meaningful elaborations (Diefhoff & Dansereau, 1978, Weinstein, 1978). Most of these studies have shown that in the majority of cases, students who were taught to use one of these techniques performed significantly better than students in control groups.

The present study focussed on whether or not these learning methods, summarization and meaningful elaborations, will facilitate students' short and long term retention. This study was not only concerned with deciding whether or not the experimental groups scored higher than the control group after training, but also finding out whether the loss experienced by all three groups in the long term retention would be less for either the experimental groups or the control group.

In the present study, significant differences were obtained between the experimental and control groups on the test for short and long term recall. On the test of short term recall, students in the Control and in the Summarization groups scored higher than students in the Meaningful Elaboration group. No significant differences were obtained between students in the Control group and students in the Summarization group. The Control group scored higher than either group on short term recall.

These results indicate that the training procedure did not improve short term recall for students in the Summarization and in the Meaningful Elaboration groups. These results may be due to the fact that students who received the training on how to create elaborators or summaries needed additional time to practice and applying these strategies. They were taught the technique in approximately 25 minutes, were asked to practice it, and were given feedback on their performance. Then, they were given 30 additional minutes to apply the technique to a text entitled "The Lisbon Earthquake" (Kropp et al., 1966). Both the summarization and meaningful elaboration techniques require time to be assimilated. Even if students had learned the technique, they may have been prevented from applying it because of time. Research has shown that to be actively involved in processing information takes time.

Students in the experimental groups indicated that they needed more time to study the techniques.

Results also showed that students in the Summarization group did better than students in the Meaningful Elaboration group. These results seem to indicate that summarization may facilitate better retention than meaningful elaboration for short term recall. It was also believed that students in the Summarization group may have already had some knowledge about summary construction before training. Some of the steps for creating summaries were probably in these students' repertoire; therefore were easier to use. On the other hand, the training procedure for creating meaningful elaborations may have provided the foundations for a technique that was not well known to college students.

The results also showed that on the test for long term retention, students in the control group scored significantly higher than students in the Meaningful Elaboration group. Students in the Summarization group did not differ significantly from students in the Meaningful Elaboration group.

Because of the unexpected results of the Control group scoring higher than the experimental groups, the notes of students in the control condition were carefully examined by two graduate students. Since most of the notes seemed to be written in form of an outline, a set of guidelines appropriate for the evaluation of outlines were given to

the graduate students. They were instructed to evaluate each worksheet of students in the Control group and to look for three main ideas of the text and important supporting details such as, the circumstances under which the disaster happened, the economical and political measures that were taken by Pombal, and the main ideas of each of the three philosophers.

Forty-five percent of the notes were written in form of an outline. The inter-rater reliability was .86. Outlining may be a powerful study technique for students who use it well (Dickinson & O'Connell, 1987; Snyder, 1984). Students in the control condition may have used this technique to their advantage.

An analysis of the mean score differences between Test One and Test Two revealed that a significant loss took place in all three conditions. However, students in the Control condition experienced a larger loss between Test One and Test Two. Though it was shown that the loss was less for students in the experimental groups, the training condition failed to increase long term retention over the control group. That is, even though the experimental groups lost less, the Control group still remembered more.

As indicated earlier, both tests were prepared according to Bloom's Taxonomy of Educational Objectives, and special consideration was given to the first four levels of the taxonomy: knowledge, comprehension, application, and

analysis. At the knowledge level of Test One and Test Two the Meaningful Elaboration and the Control groups experienced a significant decrease in scores. It is important to note that questions at this level were factual and simple. They required the learner to recall specific details from the text.

A significant loss from Test One to Test Two was also observed at the comprehension level for the Control group. Comprehension involves the ability to extrapolate, to interpret, or to translate specific information in a slightly different way (Annis, 1985). Only at the application and analysis levels, students in the Control group did as well as students in both experimental conditions. Though questions at these levels were more difficult in nature, they required students to "make critical judgments about the relationship of the material" (Annis, 1985, p. 6).

A possible reason for students in the Control group scoring higher may have been due to the fact that they were more efficient using their unique learning strategies. They were experienced learners whose diverse learning experiences may have helped to acquire several skills that enabled them to interrelate the material. Obviously, their ability to outline may also have contributed to these results. Normally students do not outline in studying for a test (Dickinson, 1987), so the procedure may have in some

way "cued" them to use a more effective procedure than they might have done otherwise.

In addition, both training procedures may have been incompatible with students' learning styles which may have generated some resistance from students who did not want to change their own learning strategies. These students were juniors and seniors who have established a degree of success in using their own study technique. For this reason, they may have been reluctant to adopt a new strategy and consequently, may have put little effort in learning it. This situation may have also contributed to their scoring lower in both tests.

Finally, the results are based on the assumption that the experimental and control groups were equal on all relevant variables before the study were commenced. Even though ACT was controlled through analysis of covariance and the groups were assigned randomly to the experimental and control conditions, it is possible that the group were not equal on their ability to learn the information contained in the text. It is recommended that should this study be replicated, that all groups be given a test on prose material before the treatment is applied.

The results differ from other studies, in that other studies have shown that teaching meaningful elaborations or summaries is superior to control condition. Most researchers have utilized longer training times. In addition

to having longer training sessions, other studies have had longer practice sessions. Also previous research has shown that different study techniques may produce different kinds of learning (Annis, 1985). Students who summarize, for example , seem to score higher on higher level questions. This was not the case in this study. The Control group outscored both the Summarization and the Meaningful Elaboration group.

Conclusions

In the present study, teaching a group of undergraduate juniors and seniors to apply a summarization or a meaningful elaboration technique did not prove to be effective in improving students scores on either tests short or long term retention. The results have also shown that students in the control condition were already using their own strategies quite effectively, and scored higher on the tests than students who were expected to use the summarization or the meaningful elaboration strategy. Students who have already mastered good study skills may use these skills quite effectively in new learning situations and may be in an advantageous position over students who are required to learn a new technique.

Since learning strategies are so idiosyncratic, it may be difficult to ask students to adopt a new strategy that they may not feel comfortable with. The transition process

between an old study method and a new one may take sometime, and students may not be willing to change. Therefore, the meaningful elaboration and the summarization strategies may be used in addition to the strategies that students are already using. For example, summarization could be used when students need to learn several chapters of a book, and meaningful elaboration could be used when students want to remember key concepts and ideas from a text. The focus, therefore, should be in adding these techniques to existing techniques that have proven to work well for these students. For those who do not use any particular strategy the the summarization or the meaningful elaboration learning strategy method could be very helpful.

Suggestions for Further Study

The present study indicates a need for additional time for the training program. Most studies dealing with the teaching of learning strategies have dedicated more than 30 minutes to their training programs. Thirty minutes was not enough to master the rules for creating elaborations or for writing summaries. Furthermore, students in the control group ought to be restricted to one study method, read and reread only. In this study, most of the students in the control condition used a fairly good study technique of their own to learn the material. For this reason, a more meaningful assessment of the effect of the use of these

strategies was not observed between the experimental and the control group.

Moreover, students in the experimental conditions ought to be allowed to use the technique in other areas and to get acquainted with it. This experience could increase students' confidence in the technique and could help increase their performance in the test as well.

Researchers also ought to determine in advance how familiar students are with the technique that they are planning to teach. Students ought to be tested on the use of a particular technique before any attempt be made to teach them a particular strategy. More time ought to be allowed to complete the test and questions at the synthesis and evaluation levels ought to be included in the text as well.

Finally, college freshmen and sophomores ought to be included in the sample in order to represent the entire college population.

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APPENDICES

APPENDIX A

Informed Consent

We are asking your permission to participate in a research project dealing with the effect of using different learning strategies on learning and retention. Our purpose will be to learn which of three study techniques results in the highest learning. You will be randomly assigned to one of the three experimental conditions. In one of the conditions you will be taught how to summarize what you have read. In another condition you will be taught how to associate what you are currently learning with material learned earlier. In the third condition you will be given practice on those techniques which you normally use.

The entire training procedure should take no more than 50 minutes plus two tests, taking about 30 minutes each. The entire time devoted to the research should not exceed two hours and could be of some benefit in teaching you how to study.

We are also asking for permission to obtain your ACT scores and scores from both tests. All test scores will be confidential and only you and the investigators will have access to them. Only group data will be published. You may withdraw this permission at any time without penalty. This investigation should in no way be harmful to you.

Statement of Permission

I understand that this research is being conducted by Mr. Elie Agesilas and Dr. Donald J. Dickinson, in the Department of Educational and Counseling Psychology at the University of Tennessee, Knoxville. I have read the project description and I understand that it is a truthful representation of this project and of what I am requested to do. I consent to participate in this project with the understanding that my consent and/or data may be withdrawn at any time without penalty. I further understand that my participation in this research is on a voluntary basis. If I have questions regarding my participation, now or later, I can contact any of the persons listed below.

Date _____

Signature

Printed name

APPENDIX B

The Lisbon Earthquake

Some catastrophes demand of man far more than relief and rehabilitation: they literally call for rethinking on a universal scale. This was so with the man-made disaster of Hiroshima. Similarly, the great earthquake at Lisbon on November 1, 1755, shook the minds of men.

While controversy surrounds most statistics dealing with the Lisbon earthquake, there is little doubt that it is one of the most severe recorded, Voltaire's classic description in the story, *Candide*, vividly paints the tragic scene after the earth started to tremble under the feet of the people of Lisbon: "The sea rose in foaming masses in the port and smashed the ships which rode at anchor. Whirlwinds of flame and ashes covered the streets and squares; the houses collapsed, the roofs were thrown upon the foundations, and the foundations were scattered; thirty-thousand inhabitants of every age and both sexes were crushed under the ruins."

In all, there were three shocks. The first, which lasted two minutes, shook the earth so slightly that an eyewitness recalled that he thought it had been caused by a passing vehicle. Two minutes later a second quake was felt, and this time its violence left no doubt as to what it was. During its ten minute visitation of terror, the dust from falling buildings was so great it obscured the sun. Next came another awful tremor, and the buildings which still remained standing now came tumbling down, bringing added dust, and plunging the city into total darkness. After twenty minutes of death-spelling noises, all became quiet. Then, to quote an eyewitness, "a very boisterous (stormy) wind" suddenly arose, fanning the flames of the candle-fed fires which had broken out all over the city.

Unfortunately, a combination of circumstances made the disaster greater than it might otherwise have been. For one thing, the quake occurred on All Saints' Day, which meant that candles had been burning since early morning in homes and churches. Then, to make matters worse, the earthquake struck at a bad time: shortly before ten in the morning--an hour when most of the people were at church. The violent movements of the earth caused the roofs of heavy stone to topple on congregants, who, if they were not crushed to death, died in the flames.

The people experienced all the possible elements of horror. To falling stones and fires must be added the forty foot tidal wave which engulfed those who rushed to the quays after having escaped the earlier shocks. Furthermore, man, or at least a lower species, contributed looting and murder to the scene of despair. Valuable records, irreplaceable documents were lost, and since there exists no inventory of Lisbon's art treasures of that time, we cannot even guess what the world has lost.

The older, medieval section of Europe's westernmost capital was completely destroyed. So, for that matter, were the towns within a distance of 20 leagues. "I write to you from the depths of the country" complained a survivor, "for there is not a habitable house left. Lisbon has vanished!" Built on a more substantial foundation of basalt, the newer section of Lisbon survived the earthquake.

The Lisbon earthquake, whose tremors were reportedly felt as far north as Norway and as far south as North Africa, made a profound impression on Europe. Great Britain was the first to offer help. Parliament voted the then tremendous sum of one hundred thousand pounds to aid the victims, in addition to gifts of food and clothing. Spain changed her tariff laws to favor Portugal's recovery. Also, large sums of money and provisions from all over Europe were generously offered by sympathetic nations and individuals.

Like today's moral and intellectual repercussions from man-made disastrous weapons, Lisbon's disaster registered severely on the mental seismographs of some of the outstanding thinkers of the eighteenth century. A noted historian of Portugal declares that to the little country on the Iberian Peninsula, the earthquake was "more than a cataclysm (disaster) of nature; it was a moral revolution.

So shattered was the moral and material structure of Lisbon society that it was seriously proposed that the government be transferred to Rio de Janeiro, the capital of its great colony! Fortunately, the crisis brought to complete power a ruthless, but exceedingly capable dictator, Pombal.

He was appointed Minister of Foreign Affairs and War by King Jose I in 1750 and quickly established himself as a dominant figure in Portuguese politics. The earthquake provided an opportunity for him to obtain complete power. On the day after the earthquake he told the Chief Justice to appoint a special magistrate for each of the twelve wards of the city. These magistrates were given authority to carry out the government's emergency directives. Troops were

rushed to Lisbon in order to maintain law and order and to assist in clearing up the ruins. Pombal's immediate concern was to prevent a plague; steps were taken to remove the bodies of men and animals from the ruins as quickly as possible, pools of stagnant waters were drained and contaminated food was destroyed. A most urgent matter was providing food and shelter for the survivors. Food centers were established and field kitchens were built. Prices of food and building materials were strictly controlled to prevent profiteering. Steps were taken to prevent looting. On November 4 immediate public execution after a summary trial was ordered for those caught looting the ruins.

Although many of Pombal's reforms were short lived, his great schemes and actual reforms shook Portuguese society loose from its medieval foundations. Starting with physical reconstruction while Lisbon was still smouldering, he built a new and more modern city. Temporary wooden structures were constructed outside the city to provide emergency housing and governmental offices. In early 1756 Pombal ordered unauthorized building in stone or brick stopped and the city was rebuilt according to a master plan. Taxation, civil law and public administration were reformed, new industries were set up, communications were improved, colonial relationships were re-evaluated, and education was revamped. Above all, by this ensuing power conflicts with the nobility and the clergy, Pombal helped Portugal advance on the road to a more modern society.

Meanwhile, elsewhere in Europe numerous accounts of the great earthquake were being published in virtually all languages. More than 20 reports, not including magazine articles, were published in 1755 in England alone! The great philosopher Immanuel Kant took time out from his studies to write a book on the theory of earthquakes. But the intellectual crisis in which Europe was embroiled for almost all the rest of the century took place mainly in France. Basically, the great quarrel of the age concerned the validity of the popular optimistic philosophy (hopeful outlook) of Leibniz, who believed that "What is, is Right," and that this is the "best of all possible worlds."

Leibniz stated that man could have no free will in a perfect world and that "Our world is suited to our desires and appetites." He believed that the world was built on a plan which harmonizes with the moral government of its inhabitants and theorized that the past, present, and future have already been set with as much order and harmony as possible. Leibniz surmised that "the world must be destroyed and repaired by natural means, at such times as the government of spirits may demand it for the punishment

of some and the reward of others." He felt that evil tends to evoke a greater good in the long run and maintained, "It is impossible to make the world better than it is, not only as a whole and in general, but also for ourselves in particular.

Voltaire, in his long poem, "The Lisbon Earthquake," vigorously attacked the Leibniz philosophy. He regarded it as unprogressive in that "physical evil deserved man's attention." It was also a cruel dogma, he believed, in that it implied that "your particular misfortune is nothing; it contributes to the universal good." Voltaire expressed faith in progress which, he said, depended upon the good sense of mankind.

Leibniz, however, held that we should be content with the order of the past because it is in conformity with the absolute will of God. Although Leibniz suggested that we should make the future in conformity with the presumed will of God, he cautioned against becoming upset if we were unsuccessful.

Rousseau, in an impassioned refutation (answer) maintained an "all is good" theme. Man must be patient and recognize evil as the consequence of his own nature. Furthermore Rousseau claimed that civilization had corrupted man. Although Rousseau looked to the past and said progress was an illusion, he was later to expound, in his Social Contract, a theory, of rule by the consent of the governed and actually advocated revolt by the people if they were unfairly ruled.

In Candide Voltaire, as we know returned to the fray with slashing attacks on Rousseau and Leibniz for their views concerning human progress. Practically all the philosophers of the eighteenth century took sides in what has been called the "theology of earthquakes." Such was the exchange of arguments, in fact, that the wordy Dr. Johnson complained that he was weary of hearing about the subject.

While no such clear-cut philosophical discussion fills out twentieth century air, we scarcely need be reminded that, once again, recent catastrophes have sent man to meditate on life's eternal questions. Obviously, man is worried about possible misuse of fission and fusion.

In addition, Nature, with her unlady-like hurricanes of recent years, and the devastating floods of the past summer, has intruded into what had begun to seem to many like a man-manipulated world. While we are, today better equipped for relief and rehabilitation than the Portuguesees were two hundred years ago, it is well to remember that as in the

case of the Lisbon disaster, the Northeast floods were not even predicted, much less staved off.

Nature's calamities and their aftermath of re-evaluation are still very much with us.

Adapted from

Albert Alexander, "The Lisbon Earthquake," Social Education, Vol. XX, No. 1, January, 1956, pp. 27-28.

and

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APPENDIX C

Glaciers

Ice plays a critical role in the water economy of the earth. About 86 percent of it is in the Antarctic, where it exerts a profound influence on the weather in all parts of the world.

By William O. Field

Water is one of the few substances on earth existing in nature in all three physical states--liquid, solid, and gaseous. Altogether our planet contains some 350 million cubic miles of water, most of it, of course, in the oceans. Of the earth's total water budget, not much more than one per cent is in the solid form of ice or snow, and far less than that in the form of water vapor in the atmosphere. Yet these proportions make up a delicate balance which is immensely important to life on the earth. Any appreciable change in the ratios of water, ice and atmospheric moisture would have catastrophic consequences for man and his economy. The ice piled in glaciers on the lands, for instance, exercises a vital control over sea levels, climate and continents' water supplies.

Glaciers now cover about ten per cent (nearly six million square miles) of the world's land area. Our estimate of the total amount of water in them is only a rough guess, mainly because we have only a hazy notion of the thickness of the Antarctic ice sheet. This vast icecap accounts for about 86 per cent of the world's glacial area. The Greenland icecap makes up another ten per cent. The remaining four per cent is not minor, as far as its effects go, for it includes tens of thousands of square miles of glaciers on mountains in the temperate zones, where they intimately influence man's climate and water supplies.

Estimates for the total volume of water in the world's glaciers range from about 2.4 million to more than six million cubic miles. If all this ice melted, the level of the world's oceans would rise by something like 65 to 200 feet!

Glaciers can grow only in areas where the snowfall is great enough year after year to exceed the annual rate of melting. Consequently, the ice sheet is not necessarily thickest where the climate is coldest. In Alaska the greatest concentration of glaciers is along the southern coast, which is the warmest part of the Territory but has the heaviest winter snowfall. Parts of northern Greenland are barren of glaciers because there is not enough snowfall.

APPENDIX D

Summarization Learning Strategy

The ability to summarize material constitutes a powerful skill that many students are lacking. To be able to distinguish what is important from what is not seems to be crucial in helping students process information from texts. The ability to use summarization rules seems to be developmental in nature. Research indicates that high school students as well as college students are able to use some summarization rules quite effectively as opposed to elementary students who rely primarily on copy-delete technique.

Though many college students are using summarization techniques much needs to be done to motivate more students in using these strategies. One of the leading researchers in the area of summarization suggests that direct and specific instruction in distinguishing what is important from what is unimportant in a learning material needs to be given to a larger number of students who do not demonstrate proficiency in this academically relevant activity (Garner, 1984). During the past, decade, several studies were conducted to verify the benefit of teaching students summarization skills. Results of these studies support the idea that students who use summarization techniques usually perform better than students in control conditions.

This program is designed to help you be more proficient in the area of text summarization. To summarize a text is to be able to reduce it to its essence or gist, to eliminate irrelevant or redundant information so that main ideas or concepts are represented succinctly.

In order to help you develop good summaries, I would like to introduce you to five general steps that I believe will help you increase your ability to summarize written materials.

First, use a topic sentence: Often authors write a sentence that summarizes a whole paragraph. It is called a topic sentence. If the author gives you one, you can use it in your summary. Unfortunately, not all paragraphs contain topic sentences. That means you may have to make up one for yourself. If you don't see a topic sentence make up one of your own.

Second, get rid of unnecessary details: Some text information may be repeated in a passage. In other words, the same thing can be said in a number of ways, all in one passage. Other text information may be unimportant, or trivial. Since summaries are meant to be short, get rid of repetitive or trivial information.

Third, collapse lists: If you see a list of things, try to think of a word or phrase name for the whole list. For example, if you saw a list like eyes, ears, neck, arms, and legs, you could say "body parts." Or if you saw a list

like ice skating, skiing, or sledding, you could say "winter sports."

Fourth, collapse paragraphs: Paragraphs are often related to one another. Some paragraphs explain one or more other paragraphs. Some paragraphs just expand on the information presented in other paragraphs. Some paragraphs are more necessary than other paragraphs. Decide which paragraphs should be kept or gotten rid of, and which might be joined together.

Finally, polish the summary: When a lot of information is reduced from an original passage, the resulting concentrated information often sounds very unnatural. You can solve this problem and create a more natural-sounding summary by making some adjustments in your summary such as: paraphrasing words, adding connecting words like "and" or "because" or inserting introductory or closing statements. Paraphrasing is especially useful here for two reasons: one, because it improves your ability to remember the material, and two, it avoids using the author's words.

After you have completed your summary, I suggest you to do the following:

First, rethink the text: Reread a paragraph of the text. Try to say the theme of that paragraph to yourself. Is the theme a topic sentence? Have you underlined it? Or is the topic sentence missing? If it is missing, have you written one in the margin?

Second, check and double-check your summary: Did you leave in any lists? Make sure you don't leave things out in your summary. Did you repeat yourself? Make sure you did not. Did you skip anything? Is all the important information in the summary?

In order to provide you with examples I will apply these rules for summarization to two different paragraphs. Some of the rules such as collapsing lists will not be represented in the examples, however, you may find this rule very useful when you have to summarize lists of names or things in your regular reading materials. (Copied from "Direct Instruction of Summarization Skills," Chou Hare & Borchardt, 1984, p. 66).

Example #1:

Athens and Sparta were both Greek cities and their people spoke a common language. In every other respect they were different. Athens rose high from the plain. It was a city exposed to the fresh breezes from the sea, willing to look at the world with the eyes of a happy child. Sparta, on the other hand, was built at the bottom of a deep valley, and used the surrounding mountains as a barrier against foreign thoughts. Athens was a city of busy trade. Sparta was an armed camp (The Story of Mankind, cited in How to Study in College, p. 108).

I will carefully apply the rules for summarization to this paragraph.

Rule number one: Use a topic sentence. You may develop one of your own. In this case the paragraph has a topic sentence: "Athens and Sparta were both Greek cities and their people spoke a common language." You may create

your own topic sentence by combining the two sentences that appear at the beginning of your paragraph. For example, "Athens and Sparta were Greek cities that shared a common language but were different in every other respect.

Rule number two: Get rid of unnecessary details. For example, the phrase "willing to look at the world with the eyes of a happy child" is not essential and can be omitted from the summary.

Rule number three: or collapse lists does not apply to this passage.

Rule number four: Collapse paragraphs. This example consists of one paragraph, but in order to demonstrate the value of collapsing paragraphs, I am going to reduce this passage to its gist and I will eliminate all the unnecessary details from it. My new paragraph will read: Athens and Sparta were both Greek cities that were different in everything but their language. Athens was located in a plain while Sparta was built in a valley surrounded by mountains. Athens was famous for its business while Sparta was famous for its army.

You will notice that I eliminated the details from the original text. It is important that you remember that to summarize a paragraph or a chapter is to reduce it to its most important and meaningful parts. Anything else is used to elaborate on the main ideas. Therefore excessive details do not need to be reproduced in your summary. This process

of collapsing several sentences can be done with paragraphs as well. In that case you would collapse several paragraphs into a manageable set of three to four sentences.

Example #2:

How Do The Arteries Differ From The Veins?

Arteries and veins are both hollow tubes through which the blood flows. The two differ, however, in three important respects. The work of an artery, first of all, is to carry blood rich in oxygen from the heart to the various organs of the body. The work of a vein on the other hand, is to return to the heart blood laden with carbon dioxide. In structure too, veins and arteries differ markedly. Although the walls of both are composed of three coats of tissue, the veins are thinner than the arteries and less elastic. A third point of difference is the way the blood moves within the two types of vessels. Propelled by the force of the heartbeat, the blood rushes through the arteries, which expand and contract to push it forward in spurts. In the veins, however, the blood flows slowly and smoothly (Tressler and Christ, 1960, p. 55).

Again I will apply the rules for summarization to this paragraph.

Rule number one: Use a topic sentence. The topic sentence that I used for this paragraph is a combination of the first two sentences of the passage, and it reads like this: "Though arteries and veins are hollow tubes through which the blood flows, they are different in other respects."

Rule number two: Get rid of unnecessary details. For example, the sentence "the work of an artery, first of all, is to carry blood rich in oxygen from the heart to the various organ of the body" can be simplified by saying that

"an artery carries blood with oxygen from the heart to the different organs of the body."

Another example would be "the work of a vein, on the other hand, is to return to the heart blood laden with carbon dioxide." This sentence could read "veins carry blood contaminated with carbon dioxide to the heart."

A third example of unnecessary details would be the following sentence "although the walls of both are composed of three coats of tissue, the veins are thinner than the arteries and less elastic." This sentence could read "though they have three coats of tissues like arteries, veins are thinner and less elastic."

Rule number three: collapse lists of words does not apply to this passage.

Rule number four: Collapse paragraphs. Since this example consists of one paragraph I will proceed in collapsing it to its gist or most essential parts:

Though arteries and veins are hollow tubes through which the blood flows, they are different in other respects. First, arteries carry blood with oxygen from the heart to the organ of the body. Veins, however, carry blood contaminated with carbon dioxide to the heart. Second, though they have three coats of tissues like arteries veins are thinner and less elastic. Third, arteries expand and contract to push forward the blood that is propelled by the heart, while blood flows smoothly in the veins.

In this example I reduced the original text considerably. If I had several paragraphs to summarize I would have to collapse sentences from each paragraph and

probably combine sentences from different paragraphs in order to reduce the material to its essence.

At this time you will receive a Xerox copy of a text entitled "Glaciers." For the next ten minutes I will ask you to read it and to write a brief summary of what you read. While writing your summaries I encourage you to apply the rules for summarization that we just reviewed. If you have any questions I encourage you to consult with the person in charge of your section. You will be receiving some feedback about your performance. Try to be as clear as possible and write your summary in the space that has been provided for you.

Thank you for your participation.

APPENDIX E

Meaningful Elaboration Learning Strategy

For the past several years, educational scientists have argued that our current educational practices do not facilitate student learning. For this reason, many attempts have been made to teach students how to use a variety of learning strategies. This training program that you are participating in is aimed to teach you how to use meaningful elaborations to facilitate your learning of written materials. Meaningful elaboration is conceptualized here as your ability to associate the material that needs to be learned with your prior knowledge.

From the cognitive learning strategies project of the University of Texas have emerged different assessment procedures aimed to explore objectively the different types of elaborations that students use when engaging in learning activities. Several pilot studies were developed to ascertain the types of elaboration techniques that students were using. In one case, the participants were asked to report all mental activities, "tricks," or mental aids that they used to study the material that was provided for the experiment. Seven categories of learning strategies were identified as techniques that the participants used to complete the task.

As a follow-up, a second study was conducted to provide information on how familiar other students were with the learning strategies that were identified earlier. Based on the seven categories of learning strategies that were previously selected, a questionnaire was developed and administered to different pools of students. The result indicated that successful students do use elaboration techniques more often than less successful students. In addition, several studies have demonstrated that students that are taught how to use meaningful elaboration procedures perform significantly better than students who use their own study methods.

One of the advantages of this technique is that it allows you to associate the new material with your personal experience, or to anything that you and only you know. This make of meaningful elaboration a very idiosyncratic process. For example, no one can establish the connection between what you may be reading and what happened to you two years ago. By connecting your experience to what is happening in the text, you may be able to recall the information.

It is difficult to prescribe a step by step procedure that would be appropriate for everyone, however, I will present to you important guidelines that I believe will help you be more efficient in using meaningful elaboration techniques.

The material that you have received contains the steps that you must follow in order to create meaningful elaborations. This list has been reduced from an original list of fourteen techniques that were used in the cognitive learning strategies project. The meaningful elaboration model that will be used in this training program will involve the following strategies:

Strategy number one: Read the material thoroughly in order to have an idea about its content and its theme.

Strategy number two: Read the material for a second time, and as you read try to use one or more of the following strategies:

a. Make free associations, that is think about the topic or content of the material and see what emerges from your mind. As new ideas come to you, try to associate them with important concepts or ideas that are in the text.

b. As you go through this brainstorming process of remembering relevant information and association it with new concepts, look for common sense or logical ways that "old information" can fit nicely with recent information.

c. Relate the material to what you already know. For example, to people's names, places, events, dates, objects, general information and so on.

e. Remember that these strategies work with concepts and general ideas, not with detailed information. For this reason think about ideas and concepts that are broad enough

to give you a general feeling for the material that you want to learn.

The next phase of the program will deal with teaching you how to apply these rules to a text. I will proceed to apply these rules to two paragraphs that were selected to that purpose. Paragraph number one of which you have a copy is entitled "Athens and Sparta." I will proceed to read the material thoroughly in order to have an idea about its content and its theme. I encourage you to follow along with me.

Athens and Sparta were both Greek cities and their people spoke a common language. In every other respect they were different. Athens rose high from the plain. It was a city exposed to the fresh breezes from the sea, willing to look at the world with the eyes of a happy child. Sparta, on the other hand, was built at the bottom of a deep valley, and used the surrounding mountains as a barrier against foreign thoughts. Athens was a city of busy trade. Sparta was an armed camp.

As step number two I will read the passage a second time and while I do so I will try to use one or more of the following strategies.

I am going to make free associations, that is I am going to think about the content of the material and see what I can think of. For example, when I think of Athens and Sparta I remember that Athens is a windy town located in a plain in East Tennessee. Many businesses in town use Spartan products to clean their offices in order to prevent the invasion of foreign visitors such as dust and dirt.

These business owners agree that Spartan products constitute an armed camp against invaders.

As I go through the brainstorming process of remembering relevant information and associating it with new concept, I will look for logical ways that "old information" can fit nicely with recent information. For example, I can say that there is a town called athens in East Tennessee. I also remember that I bought Spartan products when I worked as a janitor supervisor several years ago. I also recall that a remarkable feature that distinguished Spartan products from others was the soldier's helmet that was printed in each label. The helmet reminds me that Sparta was a city famous for its first class soldiers. Spartan products were famous for their cleaning power. The company sponsoring these products was located in a valley near the home of my dear friend Bob in San Juan, Puerto Rico.

Next, I will try to relate the material to either my own experience, my beliefs or attitudes. An example of how to relate the passage to my own experience would be the fact that I used cleaning products by the name of Spartan and they were very good. This experience is meaningful to me. The text can be associated with my beliefs in the sense that Athens is a pretty place to live in beautiful East Tennessee. These Spartan products changed my attitude about cleaning products in general. I was so pleased that I recommended them to my colleagues.

The second example that I will use to demonstrate the technique is called "How Do The Arteries Differ From The Veins?"

Arteries and veins are both hollow tubes through which the blood flows. The two differ, however, in three important respects. The work of an artery, first of all, is to carry blood rich in oxygen from the heart to the various organs of the body. The work of a vein, on the other hand, is to return to the heart blood laden with carbon dioxide. In structure, too, veins and arteries differ markedly. Although the walls of both are composed of three coats of tissue, the veins are thinner than the arteries and less elastic. A third point of difference is the way the blood moves within the two types of vessels. Propelled by the force of the heartbeat, the blood rushes through the arteries, which expand and contract to push it forward in spurts. In the veins, however, the blood flows slowly and smoothly (Tressler and Christ, 1960, p. 55).

In order for me to learn to differentiate between an artery and a vein, I may try to associate veins with thin hollow tubes thin like vermicelli. Or I may fabricate a story which would connect a vein with a thin tube such as the vain woman that was thin as a rubber tube. Although the word vain in this sentence is not the same as the word vein meaning a structure in the body, it could still help you to learn this property of veins. I could also associate a vein with thin rubber water pipes. Both are thin tubes, relatively rigid and have fluid going through them.

I think of the arteries as big water pipes that supply clean water to an entire community. Though many water pipes are coated with the same material, they differ in size and functions. I may also associate the blood rushing to the

arteries with clean water coming from the water tower and rushing through big pipes while used water that returns from the community move slowly through small pipes into the water processing plant.

As you have noticed these associations are based on my personal experience; you may create different elaborations for yourself.

At this time you will receive a Xerox copy of a text entitled "Glaciers." For the next ten minutes we will ask you to read it and to create elaborations that may help you to remember the text. I encourage you to use the same rules that were just presented. If you have any questions, I encourage you to consult with the person in charge of your section. You will be receiving feedback about your performance. Try to be as clear as possible and write your elaborations in this space that has been provided for you.

Thank you for your participation.

APPENDIX F

Steps for Summarization

In order to help you develop good summaries, I would like to introduce you to five general steps that I believe will help you increase your ability to summarize written materials.

First, use a topic sentence. Often authors write a sentence that summarizes a whole paragraph. It is called a topic sentence. If the author gives you one, you can use it in your summary. Unfortunately, not all paragraphs contain topic sentences. That means you may have to make up one for yourself. If you don't see a topic sentence make up one of your own.

Second, get rid of unnecessary details. Some text information may be repeated in a passage. In other words, the same thing can be said in a number of ways, all in one passage. Other text information may be unimportant, or trivial. Since summaries are meant to be short, get rid of repetitive or trivial information.

Third, collapse lists. If you see a list of things, try to think of a word or phrases name of the whole list. For example, if you saw a list like eyes, ears, neck, arms, and legs, you could say "body parts." Or if you saw a list like ice skating, skiing, or sledding, you could say "winter sports."

Fourth, collapse paragraphs. Paragraphs are often related to one another. Some paragraphs explain one or more other paragraphs. Some paragraphs just expand on the information presented in other paragraphs. Some paragraphs are more necessary than other paragraphs. Decide which paragraphs should be kept or gotten rid of, and which might be joined together.

Finally, polish the summary. When a lot of information is reduced from an original passage, the resulting concentrated information often sound very unnatural. You can solve this problem and create a more natural-sounding summary by making some adjustments in your summary such as: paraphrasing words, adding connecting words like "and" or "because" or inserting introductory or closing statements. Paraphrasing is especially useful here for two reasons: one, because it improves your ability to remember the material, and two, it avoids using the author's words.

After you have completed your summary I suggest you to the following:

First, rethink the text. Reread a paragraph of the text. Try to say the theme of that paragraph to yourself. Is the theme a topic sentence? Have you underlined it? Or is the topic sentence missing? If it is missing, have you written one in the margin?

Second, check and double-check your summary. Did you leave in any lists? Make sure you don't list things out in

your summary. Did you repeat yourself? Make sure you did not. Did you skip anything? Is all the important information in the summary?

In order to provide you with examples I will apply these rules for summarization to two different paragraphs. Some of the rules such as collapsing lists will not be represented in the examples, however, you may find this rule very useful when you have to summarize lists of names or things in your regular reading materials.

APPENDIX G

Steps for Meaningful Elaboration

The material that you have received contains the steps that you must follow in order to create meaningful elaborations. This list has been reduced from an original list of fourteen techniques that were used in the cognitive learning strategies project. The meaningful elaboration model that will be used in this training program will involve the following strategies:

Strategy number one: Read the material thoroughly in order to have an idea about its content and its theme.

Strategy number two: Read the material for a second time, and as you read try to use one or more of the following strategies:

a. Make free associations, that is think about the topic or content of the material and see what emerges from your mind. As new ideas come to you, try to associate them with important concepts or ideas that are in the text.

b. As you go through this brainstorming process of remembering relevant information and associating it with new concepts, look for common sense or logical ways that "old information" can fit nicely with recent information.

c. Relate the material to your experience, your belief or your attitudes.

d. Relate the material to what you already know. For example, to people's names, places, events, dates, objects, general information and so on.

e. Remember that these strategies work with concepts and general ideas, not with detailed information. For this reason think about ideas and concepts that are broad enough to give you a general feeling for the material that you want to learn.

The next phase of the program will deal with teaching you how to apply these rules to a text. I will proceed to apply these rules to two paragraphs that were selected for that purpose. Paragraph number one of which you have a copy is entitled "Athens and Sparta." I will proceed to read the material thoroughly in order to have an idea about its content and its theme. I encourage you to follow along with me.

APPENDIX H

Test One

NAME: _____

This test is designed to measure how much you remember from the material that you read about the "Lisbon Earthquake." Please try to do your best in answering each question. Mark your response to the questions on the answer sheet provided. Write your name on the answer sheet as well as on the test booklet. Thank you for your kindness in participating in this project.

1. The disasters at Hiroshima and Lisbon were alike in that both
 1. happened in the spring
 2. were man-made
 3. called for universal re-thinking
 4. were earthquakes.
2. Who was the author of Candide?
 1. Kant
 2. Leibniz
 3. Rousseau
 4. Voltaire.
3. What was Voltaire's profession?
 1. orator
 2. writer
 3. painter
 4. physician.
4. How many earth shocks were felt in the Lisbon earthquake?
 1. 2
 2. 3
 3. 4
 4. 5
5. How long was the first earthquake shock at Lisbon?
 1. two minutes
 2. ten minutes
 3. twenty minutes
 4. thirty-two minutes.
6. On which of the following days did the Lisbon earthquake occur?
 1. All Saints' Day
 2. Christmas
 3. Easter
 4. Good Friday.
7. Which of the following was not true of the Lisbon earthquake?
 1. It happened during evening services
 2. A tidal wave also struck
 3. The sun was obscured part of the time
 4. It occurred about 10 o'clock in the morning.

8. The newest section of Lisbon survived the earthquake because
 1. it was the most westerly part of the city
 2. there was only one tremor in that section
 3. it was built on a basalt foundation
 4. there was no fire in that section
9. The first country to offer aid to Lisbon was
 1. France
 2. Great Britain
 3. Norway
 4. Spain.
10. Parliament is a representative assembly in
 1. Great Britain
 2. Norway
 3. Portugal
 4. Spain.
11. Which of the following was not offered by Great Britain to help Portugal?
 1. clothing
 2. food
 3. lowering of trade tariffs
 4. money
12. King Jose I appointed Pombal to the position of
 1. Minister of Foreign Affairs and War
 2. Chief Justice
 3. Dictator
 4. Chief Magistrate.
13. Before the earthquake, Pombal was
 1. dictator of Portugal
 2. a dominant figure in Portuguese politics
 3. influential among the common people
 4. a noted philosopher.
14. Immediately following the earthquake Pombal's major concern was to
 1. rebuild the city
 2. prevent looting
 3. provide shelter
 4. prevent a plague.
15. Prices of food and building material were strictly controlled after the earthquake to prevent
 1. inflation
 2. profiteering
 3. shortages
 4. waste.

16. Persons caught looting the ruins were punished of execution
 1. without a fair trial
 2. by the soldiers who caught them
 3. after a summary trial
 4. after a long delay.
17. Lisbon was rebuilt
 1. in a haphazard manner
 2. outside the old city limits
 3. without using brick or stone
 4. according to a master plan.
18. Voltaire's poem, "The Lisbon Earthquake," was an attack on
 1. Pombal's emergency directives
 2. Leibniz's philosophy
 3. Kant's philosophy
 4. King Jose I's lack of action.
19. Rousseau considered that the misfortunes resulting from the earthquake were nothing compared with the good which ultimately resulted from it. Which one of the following agreed with him?
 1. Johnson
 2. Kant
 3. Leibniz
 4. Voltaire.
20. Order the following statements according to the time of occurrence
 - A. Countries offered goods or concessions to aid Portugal's recovery.
 - B. A severe earthquake destroyed much of the capital of Portugal in 1755
 - C. A great deal of moral and intellectual discussion took place concerning the earthquake
 - D. The rebuilding of Portugal, especially of the city of Lisbon, went hand in hand with a reform movement

The correct order is

 1. B, A, D, C
 2. B, D, A, C
 3. B, C, D, A
 4. B, D, C, A

21. Dr. Johnson said that he was "weary of hearing about the subject." He was dissatisfied with the
 1. lack of interest in the Lisbon problem
 2. overly optimistic viewpoint of others
 3. lack of interest in philosophical arguments
 4. amount of material written about the subject.
22. Of the statements below, the one which means the opposite of "This is the best of all possible worlds is"
 1. "progress is our most important goal"
 2. "let sleeping dogs lie"
 3. "better safe than sorry"
 4. "moderation in all things is to be desired."
23. Why was the Lisbon earthquake the basis of much philosophical discussion?
 1. A capital of a country was destroyed.
 2. Many of Portugal's treasures were lost.
 3. Pombal's form of government was a dictatorship.
 4. 30,000 or more inhabitant were killed in the disaster.
24. The response of the English Parliament in 1775 served the function of what agency today?
 1. United Nations
 2. International Workers of the World
 3. Red Cross
 4. Overseas Refugee Association.
25. The article states that the tremors of the Lisbon earthquake were felt over a wide area. In which of the following countries were these tremors most violent?
 1. England
 2. Germany
 3. Italy
 4. Spain
26. If the earthquake had not occurred, which of the following would have been most likely?
 1. King Jose I would have become an absolute monarch
 2. Pombal would have lost his power and influence

3. Pombal would have had a less profound influence on Portugal's future
 4. The Chief Justice would have become the most powerful person in Portugal.
27. Which of the following words might best describe basalt?
 1. brittle
 2. sandy
 3. solid
 4. spongy.
28. What is the relationship between the following statements?
 - A. Pombal's conflict with the nobility and the clergy
 - B. Modernization of Portugal
 1. A caused by B
 2. B caused by A
 3. A and B are related, but one did not cause the other
 4. A and B are unrelated.
29. "Man or at least a lower species contributed looting and murder to the scene of despair." In this sentence "lower species" most nearly means
 1. non-noblemen and working men
 2. looter and robbers
 3. animals of high order
 4. morally inferior men.
30. What is the relationship between the following statement?
 - A. Charging of unreasonable prices for rent
 - B. Rent control following the earthquake
 1. A caused B
 2. B caused A
 3. A and B related, but one did not the other.
 4. A and B are unrelated.
31. What is the relationship between the following statements?
 - A. Many ships were destroyed during the earthquake
 - B. Tariff regulations were changed following the earthquake
 1. A caused B
 2. B caused A
 3. A and B are related, but one did not cause the other
 4. A and B are unrelated

32. Which of the following philosophers would have most likely supported Pombal's policies?
1. Kant
 2. Leibniz
 3. Rousseau
 4. Voltaire.

Note: The following information must be used in answering questions 33-35:

Voltaire and Leibniz might have argued about whether or not the following conclusion was true: "Great social, political, and economic reforms are needed and men are justified in putting forth their greatest effort in this direction." Decide how Voltaire and Leibniz would have used each of the following statements, if at all, in arguing about this conclusion. Mark your answer according to the following key:

- Key:
1. Voltaire would have used the statement to argue that the conclusion was true.
 2. Leibniz would have used the statement to argue that the conclusion was true.
 3. The statement has no bearing on the argument.
 4. The statement relates to the argument but neither would have used it.

33. Evil will bring about greater good.
34. All events have predetermined since the beginning of time.
35. Miserable conditions should not be tolerated because man has enough common sense to overcome them.

36. If man were to misuse nuclear fission and fusion which person's philosophy would have the least relevance
1. Leibniz
 2. Pombal
 3. Rousseau
 4. Voltaire

37. Which one of the following conditions would have resulted in the reduction of damage to the older section of Lisbon?
1. The existence of a basalt foundation under all of Lisbon
 2. The occurrence of the earthquake on a non-religious holiday
 3. The use of wooden roofs for buildings
 4. The location of the center of the earthquake ten leagues away.
38. Which one of the following would most likely not have been a "good Samaritan?"
1. Kant
 2. Leibniz
 3. Pombal
 4. Voltaire.
39. What is the relationship between the following statement?
- A. Voltaire's poem "The Lisbon Earthquake."
 - B. Leibniz's philosophy.
 1. A caused B
 2. B caused A
 3. A and B are related, but one did not cause the other
 4. A and B are unrelated.
40. The number of persons killed in the earthquake was undoubtedly increased because stone was used for
1. sea walls
 2. streets and sidewalks
 3. sidewalls of building
 4. roofs of buildings.
41. What is the relationship between the following statements?
- A. Scarcity of food
 - B. Scarcity of building materials.
 1. A caused B
 2. B caused A
 3. A and B are related, but one did not cause the other
 4. A and B are unrelated.
42. A viewpoint which cannot be found in the reading passage is that of
1. an observer
 2. a scientist
 3. a philosopher
 4. an historian

43. In what way were the results of the destruction of Hiroshima similar to those of the Lisbon earthquake?
1. What Pombal did for Lisbon, the U.S. military government did for Hiroshima.
 2. The disaster led to philosophical arguments around the world.
 3. Hirohito strengthened his position in Japanese government and used dictatorial powers to help his people.
 4. The large nations of the world came to the aid of the citizens of Hiroshima.
44. If you lived in a country where most of the citizens were poor and lived in slums and the rulers were rich and lived in palaces, what would you do if you believed in the later teachings of Rousseau?
1. Urge the people to revolt against the rulers.
 2. Urge your fellow citizens to let well enough alone.
 3. Urge the government to build schools for the poor.
 4. Remind your fellow citizens that progress is bound to occur.
45. Which of the following statements best represents Pombal's philosophy of life?
1. What is to be will be.
 2. Might makes right.
 3. God punishes guilty and innocent alike.
 4. Bury the dead and feed the living.
46. If an earthquake of the same magnitude as the Lisbon earthquake were to occur today in a large U.S. city,
1. aid would be needed from foreign countries
 2. the city would be self-supporting, and outside aid would be unnecessary
 3. a philosophical argument similar to Lisbon's would begin
 4. it would make headlines for a few weeks, then it would be forgotten.
47. "What is, is right," is most nearly equivalent to
1. "what is to be, will be"
 2. "the end justified the means"
 3. "might makes right"
 4. "the sky is the limit."

48. What characteristic of a medieval society discouraged modernization of Portugal?
1. Political and economic power of the nobles and clergy.
 2. The existence of an old section in the towns.
 3. Great emphasis on religion.
 4. Lack of trade with other countries.
49. At the time of the earthquake, Lisbon society could best be described as
1. enlightened
 2. medieval
 3. progressive
 4. modern.
50. Why were most of the discussions of the Lisbon earthquake philosophical?
1. Few written accounts were available.
 2. There were few survivors.
 3. There was no accurate means of describing the disaster.
 4. Philosophers were the spokesmen of the time.
51. The statement, "Lisbon is the capital of Portugal," is
1. a guess
 2. not true
 3. supported by the reading passage
 4. impossible to make from the reading selection alone.
52. Which of the following statements is best supported by the philosophy of Voltaire?
1. Social welfare programs should be curtailed.
 2. The American foreign aid program should be eliminated.
 3. People with children in school should pay a tax to support education.
 4. Big cities should start slum clearance projects.
53. Which of the following would most likely have done as Nero did--"Fiddle while Rome burned?"
1. Kent
 2. Pombal
 3. Rousseau
 4. Voltaire

54. What action, if any, would Pombal probably have taken if most of the skilled craftsmen like carpenters and bricklayers had left Lisbon immediately following the earthquake?
1. None, because there would have been fewer people to feed and shelter.
 2. None, because other areas needed these people more than Lisbon did.
 3. Action to return them so they could be punished for leaving.
55. A "mental seismograph" is a
1. scientific device for detecting ideas
 2. figure of speech for the mind
 3. mental record
 4. mechanical device for recording earthquakes.
56. What is the relationship between the following statements?
- A. There were many fires in Lisbon after the earthquake.
 - B. Most of the inhabitants of Lisbon observed religious holidays.
1. A caused B
 2. B caused A
 3. A and B are related, but one did not cause the other
 4. A and B are unrelated.
57. What is the relationship between the following statements?
- A. Scarcity of food.
 - B. Control of prices of food.
1. A caused B
 2. B caused A
 3. A and B are related, but one did not cause the other
 4. A and B are unrelated.
58. How could you best describe the statement that Lisbon has vanished?" It is
1. absurd
 2. accurate
 3. exaggerated
 4. unsubstantiated

Note: The following information must be used in answering questions 59-61:

Voltaire and Leibniz might have argued about whether or not the following conclusion was true: Great social, political, and economic reforms are needed and men are justified in putting forth their greatest effort in this direction." Decide how Voltaire and Leibniz would have used each of the following statements, if at all, in arguing about this conclusion. Mark your answer according to the following key:

- Key:
1. Voltaire would have used the statement to argue that the conclusion was true.
 2. Leibniz would have used the statement to argue that the conclusion was true.
 3. The statement has no bearing on the argument.
 4. The statement relates to the argument, but neither would have used it.

59. History shows that civilizations improve over time.

60. Man has a responsibility to society.

61. Natural disasters cause great suffering.

62. What is the relationship between the following statements?

- A. An earthquake.
- B. The rise of a dictator.
 1. A caused B
 2. B caused A
 3. A and B are related, but one did not cause the other
 4. A and B are unrelated.

63. Which one of the following statements could be attributed to Voltaire?

1. Research is more important than application.
2. Benefit to man is the primary goal of science.
3. Science serves the purpose of discovering the natural harmony and order of the world.
4. The study of science is not a proper activity for man.

64. Which fact about Pombal is most consistent with the belief that he accepted the philosophy of Voltaire?
1. He did not move the capital to Rio de Janeiro.
 2. He was ruthless
 3. He broke with tradition
 4. He used Voltaire's poem, "The Lisbon Earthquake," as his guide to reconstruct Lisbon.
65. Pombal was able to assume complete power following the earthquake because he was
1. a member of the nobility
 2. the spokesman of the people
 3. established in the power structure of Portugal
 4. well liked by the king and his court.
66. Which of the following best describes the reason aid was given to Lisbon?
1. A feeling of sorrow and charity.
 2. A desire for extra rights in rich colonies.
 3. A feeling of loyalty and friendship for a neighboring country.
 4. A desire to establish good relations for possible future benefit.
67. Which of the following is both a sequential relationship and a cause-and-effect relationship?
1. All Saint's Day celebration--Lisbon earthquake.
 2. Consideration of moving to Rio de Janeiro--Pombal's rise to power.
 3. "Theology of Earthquakes"-- extensive news coverage of the Lisbon earthquake.
 4. The Lisbon earthquake--European aid to Portugal.
68. Assume that flood waters have ruined the agricultural area of a foreign country and millions will starve unless aid is received. Were he living now, which one of the following individuals would most likely advocate that U.S. surplus crops be made available to the distressed country?
1. Kant
 2. Leibniz
 3. Rousseau
 4. Voltaire.

69. Many of Pombal's measures were short lived because
1. they were too modern
 2. they were emergengy reforms
 3. they were not endorsed by the clergy
 4. of foreign intervention in the Portugal's affairs.
70. In which country is the westermost European capital?
1. France
 2. Norway
 3. Portugal
 4. Spain.
71. Which one of the following contributed most toward the continuing discussion of the "Theology of Earthquakes"?
1. The issue was very controversial and many philosophers were interested in it.
 2. The progress of science was at stake for the rest of the century.
 3. Acceptance or rejection of Leibniz's philosophy would govern man's attitude toward his world.
 4. The common man was interested in having a better life.
72. The greatest damage to articles such as books, tapestries, and paintings was probably caused by
1. fire
 2. tremors
 3. water
 4. wind
73. From which point of view was the passage written?
1. historical
 2. military
 3. political
 4. scientific.
74. Which one of the following would have been most likely to break with tradition?
1. Kant
 2. Leibniz
 3. Rousseau
 4. Voltaire.

75. The article states that there were four primary causes of death in the Lisbon earthquake. Which one probably took the fewest lives?
1. falling objects
 2. fire
 3. murder
 4. tidal wave.
76. What is the relationship between the following statements?
- A. A philosophical controversy which lasted the better part of a century.
 - B. The Lisbon earthquake.
 1. A caused B
 2. B caused A
 3. A and B are related, but one did not cause the other.
 4. A and B are unrelated.
77. What is the relationship between the following statements?
- A. Spain changed its tariff laws.
 - B. Pombal rose to power as a dictator.
 1. A caused B
 2. B caused A
 3. A and B are related, but one did not caused the other
 4. A and B are unrelated.
78. Which one of the following conclusions is accurately based upon some part of the reading passage?
1. The earthquake was on Sunday.
 2. The Lisbon police were ineffective in maintaining law and order.
 3. The English were the only generous people in the 18th century Europe
 4. The damage would have been just as bad as on any other popular religious holiday.
79. If the Lisbon earthquake had happened after Thomas Edison invented the light bulb, which of the following would have been most likely?
1. The tidal wave could have been averted.
 2. There would have been fewer fires.
 3. There would have been a minimum amount of dust.
 4. The "boisterous," stormy wind would not have arisen.

80. What is the relationship between the following statements?
- A. Voltaire, Rousseau, and other prominent philosophers were Frenchmen.
 - B. The center of controversy regarding the "Theology of Earthquakes" was in France.
 - 1. A caused B
 - 2. B caused A
 - 3. A and B are related, but one did not cause the other
 - 4. A and B are unrelated.

APPENDIX I

Test Two

Name _____

This test is designed to measure how much you remember from the material that you read about the "Lisbon Earthquake." Please try to do your best in answering each question. Mark your response to the questions on the answer sheet provided. Write your name on the answer sheet as well as on the test booklet.

Thank you for your kindness in participating in this project.

1. Parliament is a representative assembly in
 1. Great Britain
 2. Norway
 3. Portugal
 4. Spain
2. The first country to offer aid to Lisbon was
 1. France
 2. Great Britain
 3. Norway
 4. Spain
3. The newest section of Lisbon survived the earthquake because
 1. it was the most westerly part of the city
 2. there was only one tremor in that section
 3. it was built on a basalt foundation
 4. there was no fire in that section.
4. Which of the following was not true of the Lisbon earthquake?
 1. it happened during evening services
 2. a tidal wave also struck
 3. the sun was obscured part of the time
 4. it occurred about 10 o'clock in the morning.
5. On which of the following days did the Lisbon earthquake occur?
 1. All Saints' Day
 2. Christmas
 3. Easter
 4. Good Friday.
6. How long was the first earthquake shock of Lisbon?
 1. two minutes
 2. ten minutes
 3. twenty minutes
 4. thirty-two minutes.
7. How many earth shocks were felt in the Lisbon earthquake?
 1. 2
 2. 3
 3. 4
 4. 5

8. What was Voltaire's profession?
 1. Orator
 2. Writer
 3. Painter
 4. Physician.
9. Who was the author of Candide?
 1. Kant
 2. Leibniz
 3. Rousseau
 4. Voltaire.
10. The disasters at Hiroshima and Lisbon were alike in that both
 1. happened in the spring
 2. were man-made
 3. called for universal re-thinking
 4. were earthquakes.
11. Rousseau considered that the misfortunes resulting from the earthquake were nothing compared with the good which ultimately resulted from it. Which one of the following agreed with him?
 1. Johnson
 2. Kant
 3. Leibniz
 4. Voltaire.
12. Voltaire's poem, "The Lisbon Earthquake," was an attack on
 1. Pombal's emergency directives
 2. Leibniz's philosophy
 3. Kant's philosophy
 4. King Jose I's lack of action.
13. Lisbon was rebuilt
 1. in a haphazard manner
 2. outside the old city limits
 3. without using brick or stone
 4. according to master plan.
14. Persons caught looting the ruins were punished of execution
 1. without a fair trial
 2. by the soldiers who caught them
 3. after a summary trial
 4. after a long delay.

15. Prices of food and building material were strictly controlled after the earthquake to prevent
 1. inflation
 2. profiteering
 3. shortages
 4. waste
16. Immediately following the earthquake Pombal's major concern was to
 1. rebuild the city
 2. prevent looting
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 1. Dictator of Portugal
 2. a dominant figure in Portuguese politics
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 4. money.
20. Why was the Lisbon earthquake the basis of much philosophical discussion?
 1. a capital of a country was destroyed
 2. many of Portugal's treasures were lost
 3. Pombal's form of government was a dictatorship
 4. 30,000 or more inhabitants were killed in the disaster.
21. The article states that the tremors of the Lisbon earthquake were felt over a wide area. In which of the following countries were these tremors most violent?
 1. England
 2. Germany
 3. Italy
 4. Spain.

22. The response of the English Parliament in 1775 served the function of what agency today?
1. United Nations
 2. International Workers of the World
 3. Red Cross
 4. Overseas Refugee Association
23. Of the statements below, the one which means the opposite of "This is the best of all possible worlds" is
1. "progress is our most important goals"
 2. "let sleeping dogs lie"
 3. "better safe than sorry"
 4. "moderation in all things is to be desired."
24. Dr. Johnson said that he was "weary of hearing the subject." He was dissatisfied with the
1. lack of interest in the Lisbon problem
 2. overly optimistic viewpoint of others
 3. lack of interest in philosophical arguments
 4. amount of material written about the subject.
25. Order the following statements according to the time of occurrence
- a. countries offered goods or concessions to aid Portugal's recovery
 - b. a severe earthquake destroyed much of the capital of Portugal in 1755.
 - c. a great deal of moral and intellectual discussion took place concerning the earthquake.
 - d. the rebuilding of Portugal, especially of the city of Lisbon, went hand in hand with reform movement
- The correct order is:
1. b, a, d, c
 2. b, d, a, c
 3. b, c, d, a
 4. b, d, c, a

26. What is the relationship between the following statements?
- A. Many ships were destroyed during the earthquake.
 - B. Tariff regulation were changed following the earthquake
 - 1. A caused B
 - 2. B caused A
 - 3. A and B are related, but one did not cause the other
 - 4. A and B are unrelated.
27. What is the relationship between the following statements?
- A. Charging of unreasonable prices for rent.
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 - 4. morally inferior men.
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- A. Pombal's conflict with the nobility and the clergy.
 - B. Modernization of Portugal.
 - 1. A caused B
 - 2. B caused A
 - 3. A and B are related, but one did not cause the other
 - 4. A and B are unrelated.
30. Which of the following words might best describe basalt?
- 1. brittle
 - 2. sandy
 - 3. solid
 - 4. spongy.

31. If the earthquake had not occurred, which of the following would have been most likely?
 1. King Jose I would have become an absolute monarch.
 2. Pombal would have lost his power and influence.
 3. Pombal would have had a less profound influence on Portugal's future.
 4. The Chief Justice would have become the most powerful person in Portugal.
32. Which of the following philosophers would have most likely supported Pombal's policies?
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 3. Rousseau
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Note: The following information must be used in answering questions 33-35:

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Key:

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33. Evil will bring about a greater good.
34. All events have been predetermined since the beginning of time.
35. Miserable conditions should not be tolerated because man has enough common sense to overcome them.

36. Which one of the following conditions would have resulted in the reduction of damage to the older section of Lisbon?
1. The existence of a basalt foundation under all of Lisbon.
 2. The occurrence of the earthquake on a non-religious holiday.
 3. The use of wooden roofs for buildings.
 4. The location of the center of the earthquake ten leagues away.
37. If man were to misuse nuclear fission and fusion which person's philosophy would have the least relevance?
1. Leibniz
 2. Pombal
 3. Rousseau
 4. Voltaire
38. In what way were the results of the destruction of Hiroshima similar to those of the Lisbon earthquake?
1. What Pombal did for Lisbon, the U.S. military government did for Hiroshima.
 2. The disaster led to philosophical arguments around the world.
 3. Hirohito strengthened his position in Japanese government and used dictatorial powers to help his people.
 4. The large nations of the world came to the aid of the citizens of Hiroshima.
39. A viewpoint which cannot be found in the reading passage is that of
1. an observer
 2. a scientist
 3. a philosopher
 4. an historian.
40. What is the relationship between the following statements?
- A. Scarcity of food.
 - B. Scarcity of building materials.
1. A caused B
 2. B caused A
 3. A and B related, but one did not cause the other
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41. The number of persons killed in the earthquake was undoubtedly increased because stone was used for
1. sea walls
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42. What is the relationship between the following statements?
- A. Voltaire's poem "The Lisbon Earthquake."
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43. Which one of the following would most likely not have been a "good samaritan?"
1. Kant
 2. Leibniz
 3. Pombal
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44. Why were most of the discussions of the Lisbon Earthquake philosophical?
1. Few written account were available
 2. There were few survivors
 3. There was no accurate means of describing the disaster
 4. Philosophers were the spokesman of the time.
45. At the time of the earthquake, Lisbon society could best be described as
1. enlightned
 2. medieval
 3. progressive
 4. modern.
46. What characteristic of a medieval society discouraged modernization of Portugal?
1. Political and economic power of the nobles and clergy.
 2. The existence of an old section in the towns.
 3. Great emphasis on religion.
 4. Lack of trade with other countries.

47. "What is, is right," is most nearly equivalent to
1. "What is to be, will be."
 2. "The end justified the means."
 3. "Might makes right."
 4. "The sky is the limit."
48. If an earthquake of the same magnitude as the Lisbon earthquake were to occur today in a large U.S. city,
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 3. a philosophical argument similar to Lisbon's would begin
 4. it would make headlines for a few weeks, then it would be forgotten.
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1. What is to be will be.
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50. If you lived in a country where most of the citizens were poor and lived in slums and the rulers were rich and lived in palaces, what would you do if you believed in the later teaching of Rousseau?
1. Urge the people to revolt against the rulers.
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- A. Scarcity of food.
 - B. Control of prices of food.
 1. A caused B
 2. B caused A
 3. A and B are related, but one did not cause the other.
 4. A and B are unrelated.
53. What is the relationship between the following statements?
- A. There were many fires in Lisbon after the earthquake.
 - B. Most of the inhabitants of Lisbon observed religious holidays.
54. A "mental seismograph" is a
1. scientific device for detecting ideas
 2. figure of speech for the mind
 3. mental record
 4. mechanical device for recording earthquakes.
55. What action, if any, would Pombal probably have taken if most of the skilled craftsmen like carpenters and bricklayers had left Lisbon immediately following the earthquake?
1. None, because there would have been fewer people to feed and shelter.
 2. None, because other areas needed these people more than Lisbon did.
 3. Action to return them so they could help rebuild the city.
 4. Action to return them so they could be punished for leaving.
56. Which of the following would most likely have done as Nero did--"Fiddle while Rome burned?"
1. Kant
 2. Pombal
 3. Rousseau
 4. Voltaire.
57. Which of the following statement is best supported by the philosophy of Voltaire?
1. Social welfare programs should be curtailed.
 2. The American foreign aid program should be eliminated.

3. People with children in school should pay a tax to support education.
4. Big cities should start slum clearance projects.

58. How could you best describe the statement that "Lisbon has vanished?" It is

1. absurd
2. accurate
3. exaggerated
4. unsubstantiated.

Note: The following information must be used in answering questions 59-61:

Voltaire and Leibniz might have argued about whether or not the following conclusion was true: "Great social, political, and economic reforms are needed and men are justified in putting forth their greatest effort in this direction." Decide how Voltaire and Leibniz would have used each of the following statements, if at all, in arguing about this conclusion. Mark your answer according to the following key:

Key:

1. Voltaire would have used the statement to argue that the conclusion was true.
2. Leibniz would have used the statement to argue that the conclusion was true.
3. The statement has no bearing on the argument.
4. The statement relates to the argument, but neither would have used it.

59. History shows that civilization improve over time.
60. Man has a responsibility to society.
61. Natural disasters cause great suffering.
62. Which one of the following statements could be attributed to Voltaire?
 1. Research is more important than application.
 2. Benefit to man is the primary goal of science.
 3. Science serves the purpose of discovering the natural harmony and order of the world.
 4. The study of science is not proper activity for man.

63. What is the relationship between the following statements?
- A. An earthquake
 - B. The rise of a dictator.
 - 1. A caused B
 - 2. B caused A
 - 3. A and B are related, but one did not cause the other.
 - 4. A and B are unrelated.
64. In which country is the westernmost European capital?
- 1. France
 - 2. Norway
 - 3. Portugal
 - 4. Spain.
65. Many of Pombal's measures were short lived because
- 1. they were too modern
 - 2. they were emergency reforms
 - 3. they were not endorsed by the clergy
 - 4. of foreign intervention in Portugal's affairs.
66. Assume that flood waters have ruined the agricultural area of a foreign country and millions will starve unless aid is received. Were he living, now, which one of the following individuals would most likely advocate that U.S. surplus crops be made available to be distressed country?
- 1. Kant
 - 2. Leibniz
 - 3. Rousseau
 - 4. Voltaire
67. Which of the following is both a sequential relationship and a cause-and-effect relationship?
- 1. All Saints' Day celebration--Lisbon earthquake.
 - 2. Consideration of moving to Rio de Janeiro --Pombal's rise to power
 - 3. "Theology of Earthquakes"--extensive news coverage of the Lisbon earthquake.
 - 4. The Lisbon earthquake--European aid to Portugal.

68. Which of the following best describes the reason aid was given to Lisbon?
1. A feeling of sorrow and charity
 2. A desire for extra rights in rich colonies
 3. A feeling of loyalty and friendship for a neighboring country
 4. A desire to establish good relations for possible future benefit.
69. Pombal was able to assume complete power following the earthquake because he was
1. a member of the nobility
 2. the spokesman of the people
 3. established in the power structure of Portugal
 4. well liked by the king and his court.
70. Which fact about Pombal is most consistent with the belief that he accepted the philosophy of Voltaire?
1. He did not move the capital to Rio de Janeiro.
 2. He was ruthless.
 3. He broke with tradition.
 4. He used Voltaire's poem, "The Lisbon Earthquake," as his guide to reconstruct Lisbon.
71. What is the relationship between the following statement?
- A. Spain changed its tariff laws
 - B. Pombal rose to power as a dictator.
 1. A caused B
 2. B caused A
 3. A and B are related, but one did not cause the other.
 4. A and B are unrelated.
72. What is the relationship between the following statements?
- A. A philosophical controversy which lasted the better part of a century.
 - B. The Lisbon earthquake
 1. A caused B
 2. B caused A
 3. A and B are related, but one did not cause the other.
 4. A and B are unrelated.

73. The article states that there were four primary causes of death in the Lisbon earthquake. Which one probably took the fewest lives?
1. falling objects
 2. fire
 3. murder
 4. tidal wave.
74. Which one the following would have been most likely to break with tradition?
1. Kant
 2. Leibniz
 3. Rousseau
 4. Voltaire.
75. From which point of view was the passage written?
1. historical
 2. military
 3. political
 4. scientific.
76. The greatest damage to articles such as books, tapestries, and paintings was probably caused by
1. fire
 2. tremors
 3. water
 4. wind.
77. Which one of the following contributed most toward the continuing discussion of the "Theology of Earthquakes?"
1. The issue was very controversial and many philosophers were interested in it.
 2. The progress of science was at stake for the rest of the century.
 3. Acceptance or rejection of Leibniz's philosophy would govern man's attitudes toward the world.
 4. The common man was interested in having a better life.
78. What is the relationship between the following statements?
- A. Voltaire, Rousseau, and other prominent philosophers were Frenchmen.
 - B. The center of controversy regarding the "Theology of Earthquakes" was in France.
1. A caused B
 2. B caused A
 3. A and B are related, but one did not cause the other.
 4. A and B are unrelated.

79. If the Lisbon earthquake has happened after Thomas Edison invented the light bulb, which of the following would have been most likely?
1. The tidal wave would have been averted.
 2. There could have been fewer fires.
 3. There would have been a minimum amount of dust.
 4. The "boisterous," stormy wind would not have arisen.
80. Which one of the following conclusion is accurately based upon some part of the reading passage?
1. The earthquake was on Sunday.
 2. The Lisbon police were ineffective in maintaining law and order.
 3. The English were the only generous people in the 18th century Europe.
 4. The damage would have been just as bad on any other popular religious holiday.

APPENDIX J

Guidelines for Summarization Group

TODAY'S ACTIVITY IS DESIGNED TO TEACH YOU HOW TO USE SUMMARIZATION TECHNIQUES AS A WAY TO IMPROVE YOUR LEARNING EXPERIENCE. FIRST, YOU WILL SEE A VIDEOTAPE PRESENTATION THAT WILL COVER THE BASIC RULES FOR WRITING GOOD SUMMARIES. I WILL ASK YOU TO PAY CLOSE ATTENTION TO THE INFORMATION THAT YOU WILL HEAR. BEFORE WE PROCEED WITH THE TAPE, I WILL GIVE YOU A HANDOUT THAT WILL BE REFERRED TO IN THE TAPE.

*** Instructor make sure that everyone has a copy of the rules for summarization.***

*** Make sure that there is enough silence in the room before starting tape.***

*** Begin tape*** (Press button where white tag is located).
At the end of the tape (approximately 10 minutes).

*** turn off the set and pass out the second set of reading entitled "Glaciers."

Then please say:

NOW YOU HAVE 10 MINUTES TO READ THIS MATERIAL AND TO WRITE A BRIEF SUMMARY ABOUT ITS CONTENT. PLEASE USE THE PAPER THAT HAS BEEN PROVIDED TO WRITE YOUR SUMMARY. YOU ARE ENCOURAGED TO USE THE RULES THAT HAVE BEEN PRESENTED IN THE VIDEOTAPE. I WILL ASSIST YOU AND GIVE YOU FEEDBACK WHILE YOU DO THE TASK. THE TEXT AND YOUR SUMMARY WILL BE COLLECTED IN 10 MINUTES. YOU MAY BEGIN TO WORK.

*** Instructor please check your time at this moment***

*** Please walk around the room and check on each student.

Please tell them that they are doing well if they are following the steps. If some students need help in using the technique, please assist briefly (1 or 2 minutes per students).

*** At the end of the 10 minutes please say "YOU MUST STOP WORKING... PLEASE PASS IN YOUR PAPERS."

*** Please make sure that everyone has returned his/her materials. Each students should return a copy of the text and his/her notes.***

NEXT PHASE

*** Instructor please pass out text entitled "The Lisbon Earthquake."***

*** Make sure that everyone has a copy of the material.***

Then Please say

"YOU HAVE RECEIVED A XEROX COPY OF A TEXT ENTITLED "THE LISBON EARTHQUAKE." YOU WILL HAVE 30 MINUTES TO READ THE MATERIAL IN ITS ENTIRETY AND TO SUMMARIZE ITS CONTENT. YOU MAY WRITE ON THE TEXT IF YOU SO DESIRE. THE TEXT AND ANY OTHER INFORMATION ABOUT THE TEXT THAT YOU MAY HAVE WRITTEN WILL BE COLLECTED AT THE END OF THE SESSION. YOU MAY NOT KEEP THE TEXT OR THE SUMMARY THAT YOU HAVE PRODUCED. YOU WILL BE TESTED ON THE CONTENT OF THIS MATERIAL AT TWO LATER DATES. YOU MAY BEGIN TO WORK."

*** Instructor please check your time at this moment.***

*** Please do not help, give advice or feedback to students during this activity.***

At the end of the 30 minutes please say "YOU MUST STOP WORKING. PLEASE HAND IN YOUR PAPERS."

*** Instructor collect papers.***

*** Please make sure that everyone has returned his/her materials.

Each student should return a copy of the text and his or her notes***

*** Dismiss class.***

NOTE: Students may keep the first set of material or the steps for writing meaningful elaborations.

APPENDIX K

Guidelines for Meaningful Elaboration

TODAY'S ACTIVITY IS DESIGNED TO TEACH YOU HOW TO USE MEANINGFUL ELABORATION TECHNIQUE AS A WAY TO IMPROVE YOUR LEARNING EXPERIENCE. FIRST, YOU WILL SEE A VIDEOTAPE PRESENTATION THAT WILL COVER THE BASIC RULES FOR DEVELOPING GOOD ELABORATIONS. I WILL ASK YOU TO PAY CLOSE ATTENTION TO THE INFORMATION THAT YOU WILL HEAR. BEFORE WE PROCEED WITH THE TAPE, I WILL GIVE YOU A HANDOUT THAT WILL BE REFERRED TO IN THE TAPE.

*** Instructor make sure that everyone has copy of the rules for meaningful elaborations.***

*** Make sure that there is enough silence in the room before starting tape.***

*** Begin tape.*** (Press button where white tag is located.)

At the end of the tape (approximately 10 minutes)

turn off the set and pass out the second set of reading entitled "Glaciers."

Then please say:

NOW YOU HAVE 10 MINUTES TO READ THIS MATERIAL AND TO ASSOCIATE IT WITH WHAT YOU ALREADY KNOW. PLEASE USE THE PAPER THAT HAS BEEN PROVIDED TO WRITE YOUR MEANINGFUL ELABORATIONS. YOU ARE ENCOURAGED TO USE THE RULES THAT HAVE BEEN PRESENTED IN THE VIDEOTAPE. I WILL ASSIST YOU AND GIVE

YOU FEEDBACK WHILE YOU DO THE TASK. THE TEXT AND YOUR MEANINGFUL ELABORATIONS WILL BE COLLECTED IN 10 MINUTES. YOU MAY BEGIN TO WORK.

*** Instructor please check your time at this moment.***

*** Please walk around the room and check on each student.

Please tell them that they are doing well if they are following the steps. If some students need help in using the technique please assist them briefly (1 to 2 minutes per students).***

At the end of the 10 minutes please say "YOU MUST STOP WORKING... PLEASE PASS IN YOUR PAPERS."

*** Please make sure that everyone has returned his/her materials. Each student should return a copy of the text and his or notes.***

NEXT PHASE

*** Instructor please pass out text entitled "The Lisbon Earthquake."

Make sure than everyone has a copy of the material.

Then please say

YOU HAVE RECEIVED A XEROX COPY OF A TEXT ENTITLED "THE LISBON EARTHQUAKE." YOU WILL HAVE 30 MINUTES TO READ THE MATERIAL AND TO CREATE YOUR OWN MEANINGFUL ELABORATIONS. YOU MAY WRITE ON THE TEXT IF YOU SO DESIRE. THE TEXT AND ANY INFORMATION ABOUT THE TEXT THAT YOU MAY HAVE WRITTEN WILL BE COLLECTED AT THE END OF THE SESSION. YOU MAY NOT KEEP THE TEXT OR THE MEANINGFUL ELABORATIONS THAT YOU HAVE

WRITTEN. YOU WILL BE TESTED ON THE CONTENT OF THIS MATERIAL AT TWO LATER DATES. YOU MAY BEGIN TO WORK.

*** Instructor please check your time at this moment.***

*** Please do not help, give advice or feedback to students during this activity.***

At the end of the 30 minutes please say "YOU MUST STOP WORKING. PLEASE HAND IN YOUR PAPERS."

*** Instructor collect papers.***

*** Please make sure that everyone has returned his/her materials.

Each student should return a copy of the text and his or her notes***

*** Dismiss class.***

NOTE: Students may keep the first set of material or the steps for writing meaningful elaborations.

APPENDIX L

Instructions for Control Condition

*** Instructor please check time at the beginning of class.***

Please start with the activity planned for the day.

Do not mention the activities that are taking place in the other groups. Please limit your activity to 20 minutes. At the end of the 20 minutes, please say "NOW WE ARE GOING TO CHANGE OUR ACTIVITY FOR THE REST OF THE SESSION."

*** Instructor please pass out the text entitled "The Lisbon Earthquake."***

*** Make sure that everyone has a copy of the material***

Then please say

YOU HAVE RECEIVED A XEROX COPY OF A TEXT CALLED "THE LISBON EARTHQUAKE." YOU WILL HAVE 30 MINUTES TO READ AND CAREFULLY LEARN THE MATERIAL. YOU WILL BE TESTED ON THE CONTENT OF THIS MATERIAL AT TWO LATER DATES, THEREFORE, YOU MAY USE ANY LEARNING AID THAT MAY HELP YOU REMEMBER THIS MATERIAL. YOU MAY WRITE ON THE TEXT IF YOU SO DESIRE. THE TEXT AND ANY OTHER INFORMATION ABOUT THE TEXT THAT YOU HAVE WRITTEN WILL BE COLLECTED AT THE END OF THE SESSION. YOU MAY BEGIN TO WORK.

*** Instructor please check your time at this moment.***

*** Do not help, give advice or feedback to students during this activity.***

At the end of the 30 minutes please say "YOU MUST STOP
WORKING. PLEASE HAND IN YOUR PAPERS."

*** Instructor please collect papers.***

*** Make sure that everyone has returned his/her material.
Each student should return a copy of the text and his/her
notes.***

*** Dismiss class.***

APPENDIX M

Reliability Coefficient For Raw and Corrected Scores for Each of The Six Levels of Test

	Raw scores	Corrected scores
Knowledge	.758	.885
Comprehension	.743	.862
Application	.689	.834
Analysis	.684	.824
Synthesis		.71
Evaluation		.81

VITA

Elie Aurelien Agesilas was born in Saint-Esprit, Martinique, on October 20, 1952. He received a Bachelor of Arts degree in Theology, with a minor in Biblical Languages, from Antillian College, in Mayaguez, Puerto Rico, in May, 1979. He earned a Master of Arts in Education, with a major emphasis in Counseling and Guidance, from the Inter-American University, San German, Puerto Rico, in December of 1981.

He entered the Graduate School of the University of Tennessee, Knoxville, in September of 1983. In Fall of 1985, he accepted a teaching assistantship from the Educational and Counseling Psychology Department. In Fall of 1986 he received a graduate assistantship position from the Orientation Office of the University.

He was awarded the Doctor in Philosophy degree in Education at the University of Tennessee, Knoxville, Tennessee, in August 1987.