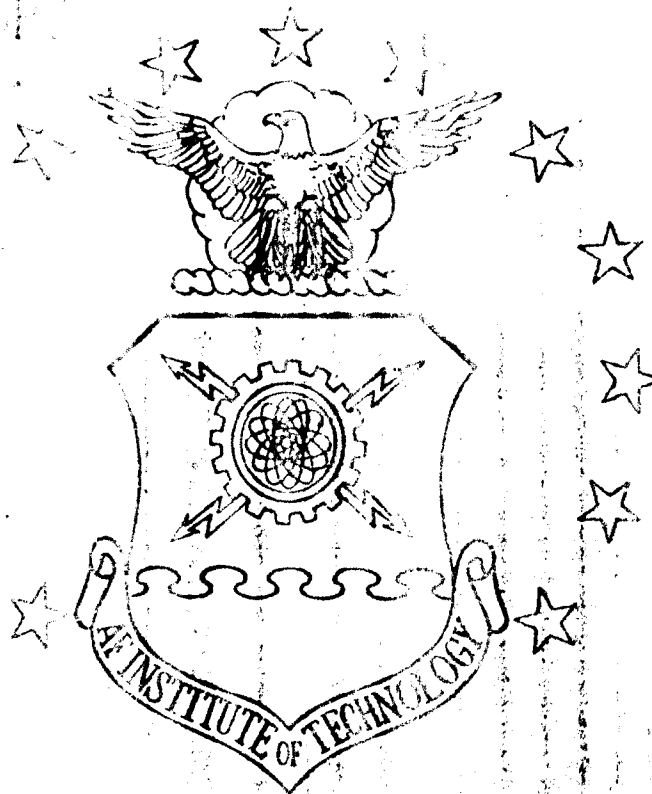ANALYSIS OF THE EFFECT OF CURRICULUM
STRUCTURE ON STUDENT PERFORMANCE
MEASURES IN A COMPUTER-BASED
INSTRUCTIONAL ENVIRONMENT

THESIS

James F. Altensee, Captain, USAF

AFIT/GSM/LSR/90S-1

DEPARTMENT OF THE AIR FORCE

AIR UNIVERSITY

AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

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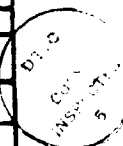
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The opinions and conclusions in this paper are those of the
author and are not intended to represent the official
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ANALYSIS OF THE EFFECT OF CURRICULUM STRUCTURE

ON STUDENT PERFORMANCE MEASURES IN A

COMPUTER-BASED INSTRUCTIONAL ENVIRONMENT

THESIS

Presented to the Faculty of the School of Logistics

of the Air Force Institute of Technology

Air University

in Partial Fulfillment of the

Requirements for the Degree of

Master of Science in Systems Management

James F. Altensee, B.S.

Captain, USAF

September 1990

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I would also like to thank Lt Col Phil Miller for sharing his valuable time and insights in discussions of the statistical aspects of this research.

Finally, and most importantly, I thank my daughters, Jamie and Katie, and my son, Kenny, for the patience and support they have given me these past fifteen months. A Dad never had a better cheering section; what a blessing.

<div align="right">Jim Altensee</div>

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Abstract

Recent experiments emphasize the need for further
research to determine how to design and use computer-based
instruction (CBI) with maximum effectiveness. This research
addresses that need by investigating the differences caused
by top-down or deductive and bottom-up or inductive
curriculum (lesson) structuring in self-paced CBI. Three
research variables were measured to investigate these
differences: student learning (measured by performance
testing), CBI course completion time, and student attitude
toward the learning experience. Computer programs, written
for each curriculum structure using BASIC programming
language, were administered to students at the Air Force
Institute of Technology in post-test randomized design
experiments. Descriptive statistics and nonparametric tests
were used to analyze these results. The nonparametric tests
showed that the data was not statistically significant (at
0.1) for any of the three variables. This key finding
indicated that CBI educators can use either curriculum
structure with almost equal effect. In addition, the
differences which resulted were used to develop scenarios
where one variable was seen as the primary objective with
the other two of lesser (but still essential) importance.
Such an analysis offers guidance to CBI educators seeking

the structure which maximizes their particular learning
objective.

ANALYSIS OF THE EFFECT OF CURRICULUM STRUCTURE

ON STUDENT PERFORMANCE MEASURES IN A

COMPUTER-BASED INSTRUCTIONAL ENVIRONMENT

I. Introduction to the Study

Background

Recent studies have shown that computer-based instruction (CBI) has potential to help the Department of Defense deliver cost-effective education and training (4:18-19; 5:33-34; 16). One 1989 study conducted at the Air Force Institute of Technology found that CBI produced a 7% improvement in learning and a 67% reduction in time when compared to the results of teaching the same material by traditional classroom methods (21:57-58). These and similar experimental findings underscore the importance of further research to determine how to design and use CBI with maximum effectiveness.

Specific Issue

Whether instruction is delivered in a traditional classroom or by CBI, several elements interact to influence the learning process. As labeled by Gowin (12:24-25), these elements are:

governance--the social context by which the
educating process occurs.

1

curriculum content--the content of a lesson.

curriculum structure--the structure of a lesson.

teacher--the instrument that delivers the
instruction.

student--the person receiving the instruction.

When these elements are viewed in terms of Air Force education and training, some of them act as constants while others are variables in the learning situation. For example, Air Force regulations specify the types of knowledge that individuals must possess in order to perform specific jobs. Said another way, the content of each Air Force curriculum is a constant specified by Air Force needs. In addition, the fact that the Air Force provides education or training to supply the knowledge required by its members and civilian employees according to Air Force guidelines means that the governance or "social context" of the instruction is also a constant.

When CBI is used, the teacher is another constant. Unlike traditional classrooms, where a teacher's personality and style of teaching can assist or impede learning, CBI instruction exposes each student to the course content through the medium of words or graphic images displayed on a television monitor (in some cases enhanced by computer generated sound.) Thus, the delivery from classroom to classroom is unaffected by teacher style or personality.

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When governance, teacher, and curriculum content are held constant, the other two elements--the curriculum structure and the student--emerge as key variables in potential CBI instruction within the Air Force. The research project described in this report examined the interactions of these two variables. Specifically, it studied the learning effects produced by two different content structures on two randomly assigned groups of students.

Research Question

The primary question addressed in this research can be stated as follows:

> If the same body of content is arranged in a top-down (deductive) structure and a bottom-up (inductive) structure and presented to students by computer-based instruction, what (if any) differences occur in student learning (measured by performance testing), in course completion time, and in student attitude toward the learning experience?

Definition of Key Terms

The following definitions further explain the research project:

Top-down (Deductive) Structure: structure which presents material such that a general concept or idea is presented and subsequently broken down into lower level constructs which can detail, explain, identify, or demonstrate the original concept.

Bottom-up (Inductive) Structure: structure which is essentially the inverse of top-down, where lower level details or constructs are presented first and then summed (or lead) to a generalization.

Performance Testing: the use of objective (multiple-choice) test questions to measure student learning from the CBI experience.

Course Completion Time: that amount of time measured from the point when the student starts the CBI to the completion of the CBI.

Learner Attitude: an indication of whether students like or do not like the content structure of the CBI presentation.

II. Review of Literature

This chapter describes the theoretical literature that contributed to the research described in this report. Additional literature that supports the study's methodology is discussed in Chapter III.

Top-down and Bottom-up Structuring

As defined in Chapter I, top-down structure requires deductive reasoning processes, whereas bottom-up structure requires inductive reasoning. The more formal terms "deduction" and "induction" describe the learning process in the student's mind, while the less formal synonyms "top-down" and "bottom-up" describe the way a curriculum planner views the structure. The more formal terms are customary in the literature reviewed here.

In the Handbook of Research on Training, Henderson speaks primarily of inductive and deductive processes in structuring material for an educational application. Top-down structure, using his terminology, is referred to as "tell-and-do" structure, and "bottom-up" structure is referred to as a "heuristic" method. According to Henderson, applying the top-down or deductive structure requires the following steps:

1. Explicitly telling the student the item or concept to be learned (10:1014).

2. "Clarifying, if necessary, the meaning of the description used to express the knowledge" (10:1014).

3. Justifying or asserting the importance of the item to help student motivation in mastering the concept (10:1014).

4. "Clinching the understanding of the item (this is often done by having the student work problems based on the knowledge being taught" (10:1014).

5. "Making the transition to the next item being taught" (10:1014).

The bottom-up structure uses a different structure of content for presenting a concept. Henderson describes the steps in the following manner:

1. Presenting instances [or examples] of the item or concept to be taught in order to enable the student to form hypotheses (10:1014).

2. "Presenting evidence, perhaps even more instances, serving either to confirm or disconfirm the various hypotheses students state or appear to acting on" (10:1014).

3. "Stating or having a student state the item of knowledge [the concept, rule, or generalization] which is a warranted inference from Steps 1 and 2" (10:1014).

In a collection of research efforts concerned with how people organize their knowledge in the process of understanding and retaining new knowledge, Abelson and Black

identify top-down processing as one of the three main propositions on which schema theories are based (11:4). A schema, in their terms, is a knowledge structure, and their central hypothesis is that knowledge is organized in chunks or packages in an individual's mind. They define deductive or top-down structures as those in which the meaning lies above the text or explanation (with implication of moving down to assimilate the text). On the other hand, for inductive or bottom-up structuring, the meaning lies in the text (examples provided first), spreading upward to higher level generalizations (11:4).

Orwig, another author writing in this area, recommends similar approaches for applications using computerized instruction (19:43-44). The deductive method, which Orwig calls "RULEG" ("rule before example"), prescribes that a rule be taught first, followed by examples. This is the normal approach in top-down structuring.

Orwig uses the acronym "EGRULE" ("example before rule") to describe bottom-up or inductive structure. In EGRULE, examples are presented first, followed by the rules or concepts which the examples illustrate.

Orwig suggests the EGRULE structure should be used when the student is encountering new material. On the other hand, if the student is working with familiar material, the RULEG structure is, in Orwig's view, more effective than EGRULE (19:43-44).

Orwig's discussion suggests that the criterion which affects the choice of one or the other curriculum structure is whether or not the student has prior knowledge about material to be learned. This view is a popular one, promoted by such leading educators as David Ausebel, who once said, "The single most important factor influencing learning is what the learner already knows" (18:40). However, the literature indicates that other variables besides past knowledge may affect how individuals respond to either of the two structures. One of those variables is the way each learner's mind processes information. The field of cognitive science has explored this theory, which is discussed in the following paragraph.

Cognitive scientists, in general, view the human mind as a complex system that receives, stores, transfers, and transmits information (22:1). An important corollary assumption to this view is that a basic science of information processing is possible (22:5). This has led cognitive scientists to perform research in hopes of discovering general (explanatory) principles of information processing in humans. Through these efforts, however, they have recognized that the assumption that a general model is possible directly conflicts with the tremendous variability known to exist in human thought (22:5). Such evidence, which suggests that no two minds process the same way, has

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raised doubt as to whether principles of human information processing can be found to hold across all cultures (22:5).

Types and Characteristics of Effective CBI Programs

The vocabulary used to describe instruction "delivered" by computers is not standardized in the literature. Some authors use the acronym CAI to mean "computer aided" instruction or "computer assisted" instruction. Others use the acronym CBI (computer-based instruction) to signify any instruction that is delivered by means of a computer. For this research, the acronym CBI will be used throughout the following discussion of the literature, since it is a broad term that subsumes the other terms.

Types of CBI. Kemner-Richardson's work defines the following six types of CBI, classifying them by their uses and the ways students interact with them. The decision for selecting the type best suited for this research is discussed in Chapter III.

Informational. An informational CBI program treats the computer as a database containing information, text, graphics, and other forms of data. Informational programs are most often used as supplements to more conventional forms of instruction rather than as self-contained instruction (14:19).

Drill and Practice. Drill and practice CBI programs are designed to help individuals review, reinforce, or

relearn a skill. As with informational CBI, drill and
practice is most often used to supplement conventional
instruction methods (14:27).

Tutorial. Tutorial CBI programs use the computer to
present the complete instruction. Knowledge acquisition and
comprehension are the goals of tutorial CBI (14:27).

Simulation. Simulation CBI packages are designed to
provide students with practice in learning to handle job
related situations (14:22).

Inquiry. Inquiry CBI combines the characteristics
of informational and tutorial CBI. With this type of
program, students have more control over the program,
essentially selecting what they want to learn (14:24).

Intelligent. A technology not yet fully developed,
intelligent CBI establishes a dialogue between the student
and computer, much as a human teacher can understand and
answer student questions in a conventional classroom
(14:24).

Because this research project focuses on the effects
which different curriculum structures may have on students
in a CBI setting, it is important to review literature
related to effective use of CBI.

Characteristics of CBI. In a technical report completed
in 1986 for the US Navy, Hamel and Clark established human
factors guidelines for the development of computerized
instruction (13:1-20). In this comprehensive review of

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existing CBI design literature, the authors identified five
principles as the focal points for good computer
instructional design:

1. Brevity. This recommendation suggests that the
information a student must maintain in short term memory
or attend to during the instruction should be minimized
(13:3). The recommendation is based on the notion that
humans have a limited capacity to process quantities of
information. Design considerations here include
limiting the number of text lines per screen or "page"
to seven, and limiting as well the amount of highlighted
material on a page to no more than 10 percent of the
screen display (13:16).

2. Consistency. Task demands should be consistent
within a training system in order to develop user
expectations (13:3). Since students must develop a
correct mental model of the system they are working
with, they should spend most of their time learning the
material in the lesson, not in figuring out the CBI
system itself. Considerations include consistent use
and placement of labels, symbols, and instructions, and
consistent formatting of functionally similar screens
(13:17).

3. Flexibility. Flexibility is referred to using a
computer system's ability to accommodate individual
differences among students (13:4). While the focus here

is on computer program development which includes review
and branching (moving to different parts of the CBI at
will), considerations for self-pacing through the lesson
may also be an advantage (13:18).

4. Compatibility. This recommendation means minimizing
information processing between stimulus and response.
Additionally, input and output formats must be
compatible with each other and should be compatible with
established behavior patterns of the student using the
system (13:4). A minimum of translation, decoding, and
other forms of cognitive processing should be necessary
in order to understand the information presented and to
know how to respond when required. Considerations
include designs which provide instructions on how users
should respond, and using titles, not numbers, to label
screens (pages) of the lesson on the screen (13:19).

5. Responsiveness. This guideline suggests that
optimal timing of system responses to student input will
help students know where they are and what they have
done (13:5). Though the design focus is on interactive
instruction modes which use questions embedded in the
CBI (along with correct/incorrect feedback to student
responses), other considerations include the CBI taking
no more than five seconds to fill the screen (13:20).

An additional consideration in the development of CBI is the color scheme of the screen layout. Research performed at the Air Force Institute of Technology found that when presented with a number of color options, users preferred white text on a blue background (21:44).

Performance Testing

For the purpose of this research, performance testing entails having the student complete a quiz over material covered in CBI lessons. The following discussion pertains to general performance measurement regardless of the type of medium used to deliver the instruction.

It is important in an education setting to determine, in some systematic way, whether learners have been altered by a set of learning experiences. Testing can be viewed as a systematic sampling of an individual's characteristics at a given time under specified conditions (10:387), and although not an ideal performance measure, testing is the most widely used method to discover whether a student has mastered course content (7:144-146).

Of course, educators recognize the limitation of testing. According to Bloom,

> The rather intangible quality of education
> [learning], the difficulty of determining whether the
> teacher's efforts have had some effect, and the search
> for some tangible evidence of the consequences of
> instruction have frequently led to the use of
> examinations as a source of evidence and reassurance
> needed by the teacher. (10:393)

Nonetheless, Bloom indicates that the feedback from examinations may help teachers identify strengths and weaknesses in the curriculum and in the learning experience. In sum, examinations should not be considered an end in themselves but a process by which the educational process can become more effective (10:395).

The internal validity of tests is crucial if an accurate measure of student learning is to be achieved (7:150-51; 10:37-38; 24:11). Efforts to eliminate errors in construct validity are essential, but instructors should first ensure that performance measures are defined before developing lesson plans and instructional materials. In this way, they can design tests which focus more on performance objectives (content validity) than on the effects an instructor (whether human or CAI) has on the learning environment (10:37).

According to Wergin, one of the important issues facing test developers is how to maximize two criteria. The first, control, is the need to ensure comparability across students by requiring them to respond to identical test stimuli and assessing their responses equally and fairly. The other issue, relevance, pertains to congruence between the skills required to perform well on a test and the knowledge or skills required to accomplish learning objectives. Unfortunately, the two goals tend to be mutually exclusive since tests which score high in control (such as multiple

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choice tests) typically score low in relevance. As a result, the debate continues over the use of objective (verifiable truths) versus subjective (opinion oriented) tests for measuring learning performance (24:6-9).

Objective Testing. Should it appear that subjective testing using multiple choice questioning is the most appropriate performance measurement tool, several problems need to be avoided in developing multiple choice questions. Although Emory discussed the following problems in the context of developing multiple choice opinion surveys, these issues appear to be equally relevant in designing an examination for the purpose of determining the effect of CBI instruction. They are described below as problems to avoid.

1. The list of response choices may not be exhaustive. That is to say, respondents may want to give an answer that is not one of the choices presented. For example, a respondent may be looking for an answer which combines two of the choices offered and, as a result, considers both answers correct (8:219).

2. Alternatives may not be mutually exclusive. A respondent may see some of the answers as being equally plausible (8:219).

3. Alternatives offered for answering a question may not be reasonable (i.e., not possible answers to the question) (8:220).

4. The order of the possible answers may create
unintentional bias because the placement of correct
answers falls into a pattern (8:220).

5. Responses to questions may not represent a one-
dimensional scale. The efore, in practice, alternatives
should represent different aspects of the same
conceptual dimension (8:220).

Summary

This chapter has reviewed the literature in three
important areas. First, the characteristics which
differentiate inductive or bottom-up versus deductive or
top-down structures were identified. Then the types of CBI
were reviewed as possible candidates for use in the
research, along with human factors issues to be considered
in the development of an effective CBI program. Finally,
performance testing literature was reviewed to provide not
only the rationale for using performance testing as a
measure of learning, but also to establish guidance for
developing objective tests. The review of these three areas
has laid the foundation for developing both the CBI and
performance test for this research.

III. Methodology

As stated in Chapter I, the research described in this report sought to identify the correlation, if any, that exists between CBI curriculum structure and the variables of performance test, course completion time, and student attitude about the lesson structure.

The major steps of the methodology consisted of choosing the type of CBI approach to use, selecting the research population and course content for the study, developing the top-down and bottom-up versions of the course and related exam and attitude survey, administering the experimental sessions and collecting the results, and interpreting the results. This chapter describes the methods used to accomplish each of these steps.

Selecting the CBI Type

Two of the CBI types described in Chapter II were suitable candidates for this study: tutorial and inquiry. Both of these types are intended to present complete instructional packages to students who have no prior knowledge of the lesson content, and neither requires equipment or programming technology that was not available to the investigator. Of the two, tutorial CBI was selected. Tutorial is the more fundamental of the two candidates, and the research requirement to control the students' progress

through the lesson made the branching characteristic of inquiry CBI unsuitable.

A second reason why a tutorial approach is appropriate is that students needed to achieve what Krathwohl, Bloom, and Masia call a "knowledge" level of learning in order that their mastery could be measured by a post-course performance test. According to Krathwohl, et. al, the knowledge level

> involves the recall of specifics and universals, the recall of methods and processes, or the recall of a pattern, structure, or setting. For measurement purposes, the recall situation involves little more than bringing to mind the appropriate material. Although some alteration of the material may be required, this is a relatively minor part of the task. The knowledge objectives emphasize most the psychological processes of remembering. (15:185)

On the assumption that remembering is the foundation of all other levels of learning that involve conscious choices, and because of the time constraints imposed for completing the study, the knowledge level of learning applied in the tutorial mode was determined to be the best available choice.

In addition, to avoid making the tutorial CBI program merely an electronic page-turning exercise, questions were embedded in the text throughout the top-down and bottom-up structured lessons. These self-test questions anticipated the questions students would receive at the end of the lesson, and were developed in accordance with planned knowledge objectives and curriculum design theories (as reviewed in Chapter II) before programming began. Because

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it is the structure of the lesson, not the content, which
differentiates the two program structures, development of
only one set of embedded questions was necessary. These
questions were then inserted at the appropriate place in
each lesson structure.

Selecting the Research Population and Course Content

Selecting the research population and course content are
obviously interrelated activities, since content should be
appropriate for the learners who will study it. The
research population for the study consisted of Air Force
officers enrolled at the Air Force Institute of Technology.
This population was selected for both practical and
theoretical reasons. On the practical side, the population
was available to the investigator at the time it was needed.
In addition, the population consisted of individuals whose
general aptitude was known from the admission criteria used
by the Institute. This fact suggested theoretically that
strong differences in ability would not be a confounding
variable in the study's results. These students were also
enrolled in related courses of study, increasing the
likelihood of choosing content for the CBI course that would
have equal appeal to all members. And finally, the
participants' backgrounds were known, so that content could
be selected that would be new to them, thus minimizing the
influence of prior knowledge on the results.

The primary content of the course was material selected from the textbook used in AFIT course CMGT 523, Contract and Acquisition Management (2:13-1 to 13-20). This material consisted of topics in the areas of inspection, acceptance, and warranties in government contract administration. Additional literature sources were used to supplement the CMGT 523 text to enhance definitions and provide examples which demonstrate contract administration principles (3:551,583; 23:9-1 to 9-15).

Developing the CBI Lessons and Related Material

The following process was used to develop the CBI lessons, the performance test, and the attitude survey. Checkpoints were injected throughout this process to ensure that factors such as the consistency between the two lesson structures and internal validity of measurement devices prevailed.

CBI Development. The following steps were completed during the development of the CBI:

1. Once the learning material for the lesson had been selected, main concepts were identified as the learning objectives for the lesson. These concepts were formulated in a tree diagram so they could be viewed in the manner in which they would be presented to research participants.

2. Details surrounding the development and introduction of main concepts were added as the top-down and bottom-up lessons were written. Top-down or deductive and

bottom-up or inductive structuring techniques, as described in the literature review in Chapter II, were constantly reviewed for compliance during this step. Therefore, the focus at this point was to ensure that the curriculum structure, not the content of the learning material itself, was the differentiating factor between the two lesson forms. In addition, clear transitions from concept to concept were viewed as an important outcome. The completion of this step created a product which would be appropriate for use in a textbook on contract administration.

3. With the basic lesson versions in hand, the transfer process to computer instruction followed. The computer code was written in BASIC programming language for its ease of use and familiarity to the faculty member advising the project. During the transition to computer program form, an effort was made to streamline each lesson into a more bulletized fashion. This was done to eliminate extra wording which, though not necessarily detrimental in a textbook, could unnecessarily lengthen the CBI. This was especially important since the targeted length for the CBI, in either curriculum structure, was sixty minutes. Beginning with this step and continuing through the remainder of steps in the CBI development, each lesson was executed (run) on the computer and debugged as necessary.

In addition, the lessons were programmed so that students could not re-accomplish any portion of the CBI

prior to completing the performance test. This was done to add assurance that only curriculum structure would be the factor affecting the dependent variables of the research (performance test score, course completion time, and learner attitude about the lesson). Finally, Kemner-Richardson's guidelines for effective CBI, as discussed in Chapter II, were implemented wherever possible.

4. Once each lesson was coded, a final line-by-line comparison of the two program versions was completed to ensure that the content, and even emphasis on particular ideas and concepts, was comparable between them. Differences outside the desired result of curriculum structure were eliminated to prevent additional factors from affecting the dependent variables of the research.

5. At this point the introduction and end-of-lesson screens were developed. In addition, questions to be embedded in each lesson were developed and inserted where appropriate. As mentioned earlier only one set of nine embedded questions was required since the course material within each lesson was the same--only curriculum structure was different between lessons.

6. With both top-down and bottom-up CBI lessons complete, the next step involved error-checking to make sure both correct and incorrect keystrokes were adequately managed within the coded programs. Once each lesson was thoroughly checked out, a master copy of each was made. Six

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duplicate copies of each lesson, five primary and one
backup, were made for the conduct of the experiment. AFIT
computer resources in building 641 on Wright-Patterson AFB
were used to execute the experiment.

Appendices A and B contain the BASIC program for the
top-down lesson and bottom-up lesson respectively.

Experimental Design. A post-test-only control group
design was chosen for the research. Blocking techniques,
useful in eliminating the effects of confounding factors,
were not included in the design. This is because the
investigator felt any factors which might affect the
research had been accounted for and reasonably controlled.
Pretests were also assumed unnecessary considering, 1) the
investigator's extensive use of randomized processes
throughout the design of the experiment, and 2) the AFIT
selection criteria described earlier (which produces a
homogenous population of students from which to draw). As a
result, a single performance test was developed using
knowledge level objectives defined earlier in this chapter.

Performance Test Development. Emory's recommendations for
creating objective (multiple-choice) questions, outlined in
Chapter II, were the cornerstone of performance test development.
To ensure identical lesson content while producing the CBI, a
line-by-line analysis was done to ensure that answers to each
question were identically defined and highlighted within
each structure. The result of the performance test

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development effort was a twenty question multiple-choice test, attached in Appendix C.

Finally, a technique for randomly ordering the questions was chosen. Using the top-down lesson (the bottom-up structure could have been used just as well), questions were ordered based on where they were discussed from the beginning to the lesson's end. Using the middle of the lesson as a starting point, the question which lay closest to that middle was selected as the first item for the performance test. Then, selecting questions alternately from one side and then the other side of the middle of the material, the remainder of the questions were ordered. The result was a structure of question-asking which favored neither the top-down or bottom-up lesson structures, thus eliminating one more factor which could have affected the outcome of the research.

Attitude Survey Development. To collect user attitudes about the lessons, a summated scale survey, in particular the Likert Scale, was chosen for its appropriateness to the research design and ease of application. To develop the survey, the investigator followed Emory's recommendations for judging each statement in the survey. Each survey statement must, 1) be relevant to the attitude being studied, and 2) reflect both a favorable and unfavorable position on that attitude (8:256). A five point scale was

chosen for the survey, with attitude choices ranging as
shown below:

+-------------+-------------+-------------+-----------+

5   4   3   2   1

Strongly   Somewhat   Neutral   Somewhat   Strongly

Agree   Agree   Disagree   Disagree
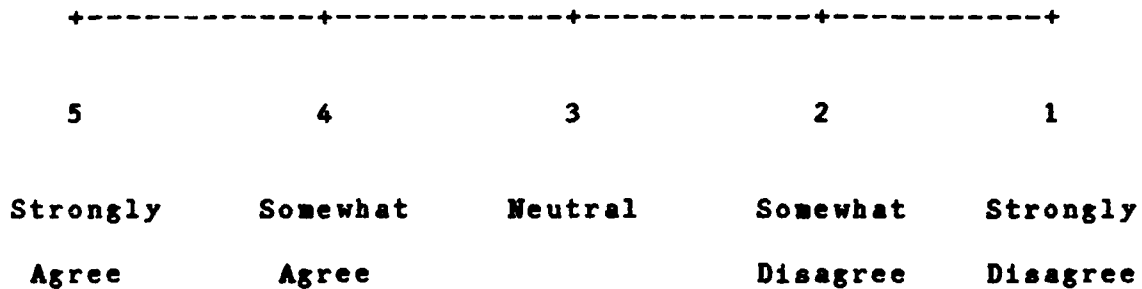
The statements for the survey were developed within the
four subject area categories identified below.

    1. Structure. This category sought feedback on the
curriculum structure of the program and the ease with
which the participant was able to learn using that
structure. An additional consideration for this subject
area was the participant's ability to complete the quiz.

    2. Content. This category considered the content
of each structured lesson as well as the adequacy in the
levels of detail (and definitions) used to help
participant's learn the material.

    3. User Friendliness. This category sought to
determine each participant's perception on the clarity
of the instruction, identify a preference or lack
thereof for CBI, and provide feedback on whether the
participant would like to take another course offered in
an identical manner.

4. Screen Appearance. This final category was designed to determine whether or not the participant liked the appearance (ease of reading screens, etc.) of the screens. This area was developed to determine if the appearance of the CBI hindered student performance.

The completed version of the attitude survey, located in Appendix D, contained sixteen scoring statements and two comment areas (where participants could provide additional feedback about the lesson).

Sample Experiment Session. Once the course, performance test, and attitude survey were complete, the next logical step appeared to be inviting participation in the research. However, before administering group experimental sessions in the manner described in the following paragraphs, a sample session was conducted using one volunteer student. This was done to obtain an estimate of how long it would take other students to complete the CBI, performance test, and attitude survey. The estimated times were then used to schedule computer resources and provide volunteers with reasonably accurate estimates of how long they could expect the experiment to last.

The bottom-up lesson was selected for the student since it was physically 13.2% (in terms of disk storage space) longer than the top-down lesson and would possibly provide an upper-ended time estimate for the exercise. The sample student completed the CBI portion in 26 minutes, the

performance test in 6 minutes, and the survey in 8 minutes for a total time of 39 minutes. This estimate proved to be very accurate during the actual conduct of the experiment. As a result, computer resources were better scheduled and students were left with positive impressions when they actually completed the session in less than the hour they were told to expect.

Administering the Experimental Sessions

The following steps were accomplished during the preparation and conduct of the research experiments.

Step 1. Scheduling Participants. Scheduling participants involved reserving the computer laboratory (room 315) in AFIT/LS and canvassing for volunteers.

Step 2. Random Assignment. Random assignment involved using a pseudorandom number generator function in MATHCAD Version 2.0 (1:96-97) to randomly assign a lesson structure to each computer terminal, a lesson structure to each volunteer, and a location within the computer laboratory where each volunteer would sit. Given that ten Zenith computer terminals were available at one time in the laboratory, five terminals were assigned to each of the two lesson structures.

Step 3. Experiment Set-up. Experiment set-up involved preparing the computer laboratory and ensuring both materials used and measurements taken for each of the participants were accurately tracked during the experiment.

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To meet this latter purpose, the researcher kept a journal which detailed where volunteers and specific experiment materials (computer disks, etc.) were located. In addition, cover sheets for booklets containing the performance test and survey were coded to indicate whether the results within the booklet were the result of top-down or bottom-up lesson execution. This code was transparent to the participants; the date form "July 19, 1990" was used for top-down participants while the form "19 Jul 90" was used for bottom-up participants. Once program disks were loaded into their designated computers, the booklets were put inside envelopes and placed beside the terminal. Each CBI lesson disk was then run through a final check to be sure it performed without error. Monitors were then cleared to reveal a blue screen, giving an identical appearance to all computer stations.

Step 4. Conduct. Conduct involved welcoming participants into the experimental setting, ensuring they were properly seated, and briefing them on conduct of the experiment. Once participants were given a signal to begin, an elapsed time was started and tracked in one-minute increments. These increments were written on a marker board at the front of the laboratory until the last participant completed the computer portion of the exercise. As soon as they finished their CBI lesson, participants were instructed to write this elapsed time on the cover of the booklet

located in the envelope beside their terminal. This data
was then used to assess the impact, if any, that lesson
structure had on course completion time.

Step 5. Data Collection. Data collection involved
collecting data provided by the participants and returning
the computer laboratory to its pre-experiment configuration.

Data Analysis

The initial stage in the data analysis involved
determining the type of data available from the experiment.
That is, which of the four common classifications was
appropriate: nominal, ordinal, interval, or ratio (8:87).
The scores from the performance testing and course
completion timing were treated as interval-level data.
However, classification of the Likert scale scores was not
quite as straightforward.

Some authorities hold that Likert scales produce ordinal
data only (8:258), while others hold that if a survey is
well enough prepared, distinctions about how much more or
less favorable a respondent feels about a topic can be
determined from this scale (9). This research was built on
the later argument, and as a result the data obtained from
the Likert scale survey was treated (assumed) as interval-
level data. This enabled the investigator to have the
option, before analyzing the data, of using either
parametric or non-parametric statistical test procedures.
However, parametric procedures require the data to be

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normally distributed, while non-parametric procedures are less restrictive and are often simultaneously valid for many different types of data distributions (5:592). Therefore, selecting the most appropriate procedure would depend, as the following paragraphs indicate, on the distributions of the research data.

The top-down and bottom-up data were organized into eighteen analysis areas: the performance test scores, the course completion times, and the sixteen scoreable statements of the attitude survey. A Wilk-Shapiro test for normality using STATISTIX (17:8.4), a statistical analysis programming tool, was performed for the top-down and bottom-up data in each set. Applying the criterion that the statistic produced by the Wilk-Shapiro test be must at least 0.9 in order to classify data as normally distributed, only two of the (36) distributions qualified. Further, none of these analysis areas had both data sets pass the normality test. This left, for instance, normally distributed top-down performance test data to be compared with bottom-up performance test data which was not normally distributed. Devore offers a solution to such situations, indicating that distribution-free procedures perform almost as well as t and F-tests used for normally distributed data, and can offer considerable improvement under non-normal conditions (5:592). For this reason the investigator chose to pursu non-parametric analysis for the research data. With this

decision, the investigator turned to deciding which non-parametric test was most appropriate.

As stated earlier, two sub-populations (out of the general AFIT population) were created by the post-test randomized design used to measure the effect of curriculum structure (a single factor). According to the literature, there are a number of non-parametric tests which can be used to analyze such designs (5:592). The key assumption in many of these tests is that observed scores (data values) are drawn from an underlying continuous, versus discrete, distribution; this assumption of an underlying continuum is especially important for those tests which require at least ordinal-level data (20:25). Proper classification of the data requires understanding the distinctions between continuous and discrete random variables. According to Siegel,

> A discrete variate [random variable] is one which can take on only a finite number of values; a continuous variate is one which can (but may not) take on a continuous infinity of values. (20:25)

By this definition, the performance test and course completion time data fit in the category of continuous distributions. The attitude survey results are also continuous because, once again referencing Siegel, even though the measurement points of the survey were predefined points on a (Likert) scale, it is reasonable to assume that an underlying continuum exists for that data (20:25).

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These descriptions of the experimental design, along with the assumption of an underlying continuum fit the criteria for application of the Kruskal-Wallis Test, a distribution-free analysis of variance (5:622). Therefore the Kruskal-Wallis Test was used to analyze each of the eighteen analysis areas described earlier.

In this analysis, the investigator did not initially assume a significance level (alpha) which might correlate with a level the reader would consider appropriate. Instead, the key outcome in any of the Kruskal-Wallis tests was the p-value. This value was then used to determine the smallest level of significance at which a null hypothesis could be rejected, thereby allowing the reader to determine the significance of the data. Later, the investigator used a p-value of 0.1 as a significance indicator for conclusions drawn in Chapter VI (Conclusions/Recommendations).

The results of using the analysis methods described above are reported in the next chapter.

IV. Results

Introduction

This chapter presents the raw data and corresponding descriptive statistics collected from the research experiments as described in Chapter III. As that chapter indicates, the primary data consisted of each participant's performance test scores, (CBI) course completion time, and attitude survey scores.

Three experimental sessions were conducted in order to accommodate the 24 students who volunteered to participate. Twelve students apiece were randomly assigned into both the top-down and bottom-up structured lessons. However, a malfunction of the video display during one of the bottom-up CBI lessons, which the participant did make the investigator aware of until after the experiment, was significant enough to adversely affect that participant's view of the lesson, thereby warranting elimination of that data from the results. This left the two randomly assigned populations uneven. To balance the populations for statistical analysis, the investigator randomly selected one top-down participants' data and excluded it from these results, leaving 11 participants in each lesson structure.

Performance Test and Course Completion Time Results

Table 1 provides performance test scores and timing data for each of the 22 participants. Completion times are in

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minutes, while test scores reflect a percentage, on a scale of 0-to-100, of correct responses to the 20-question quiz.

TABLE 1

CBI PERFORMANCE TEST AND COURSE
COMPLETION TIME RESULTS

STUDENT	CURRICULUM STRUCTURE	PERFORMANCE TEST SCORE (percent)	COMPLETION TIME (minutes)
1	B	80	25
2	B	60	19
3	B	90	18
4	B	90	17
5	B	75	23
6	B	90	19
7	B	90	23
8	B	90	21
9	B	85	17
10	B	70	25
11	B	80	21
12	T	95	20
13	T	90	27
14	T	80	22
15	T	80	17
16	T	90	13
17	T	65	22
18	T	90	19
19	T	80	19
20	T	80	19
21	T	75	18
22	T	65	19

B = Designator for the bottom-up curriculum structure
T = Designator for the top-down curriculum structure

To validate the time data, the investigator randomly chose two participants in each experiment session and monitored their CBI completion time for later comparison with the time they documented on their test booklets. In each case the participants recorded their times accurately.

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As Chapter III indicated, there were 16 survey items for each participant to score using the Likert Scale. Table 2 indicates the scores applied by each of the 22 participants.

TABLE 2

ATTITUDE SURVEY RESULTS

	SURVEY STATEMENT															
STUDENT	A	B	C	D	E	F	G	H	I	J	L	M	N	O	P	Q
1-B	3	4	4	4	3	4	4	4	4	3	4	4	4	2	4	4
2-B	3	2	3	3	2	4	4	4	4	3	4	3	3	4	3	2
3-B	3	5	4	4	4	4	5	4	5	4	4	4	4	2	5	5
4-B	2	3	4	4	4	4	5	5	5	4	4	4	4	2	5	4
5-B	3	4	4	2	4	5	5	5	5	5	M	M	M	M	M	M
6-B	2	4	5	4	5	2	5	5	5	4	5	5	5	2	5	5
7-B	3	5	5	4	5	3	5	5	5	5	5	4	5	2	5	5
8-B	M	4	5	4	4	5	4	5	5	4	4	5	4	2	4	4
9-B	3	2	3	4	4	5	3	5	5	3	5	5	5	2	3	3
10-B	3	4	4	2	5	3	5	5	5	5	4	3	4	3	5	5
11-B	2	3	4	3	4	2	4	5	5	3	5	4	4	3	4	4
12-T	3	4	4	3	4	4	4	5	5	4	M	4	4	2	4	5
13-T	3	4	4	4	4	4	4	4	4	4	4	3	4	2	4	4
14-T	3	4	4	4	4	4	5	3	5	4	4	4	4	3	5	5
15-T	2	5	4	5	4	3	4	5	5	4	4	5	5	3	4	4
16-T	2	3	4	4	4	5	4	4	5	4	4	4	4	3	4	4
17-T	3	4	4	3	4	2	4	4	4	4	4	3	4	3	4	4
18-T	1	5	4	4	4	3	5	5	5	4	4	4	5	2	4	4
19-T	3	4	4	4	4	4	4	4	4	4	M	M	M	M	M	M
20-T	1	4	4	4	4	1	5	5	5	4	5	4	3	4	4	4
21-T	3	4	4	4	3	1	4	4	5	2	4	3	5	3	4	4
22-T	3	4	4	4	4	3	4	5	5	4	4	4	4	3	4	4

B = Designator for the bottom-up curriculum structure
T = Designator for the top-down curriculum structure
M = Missing

The 16 statements are labeled as they appeared in the actual survey. Results from the scoring ranged from a high of 5 (strongly agree) to a low of 1 (strongly disagree).

Statements k and r do not appear in Table 2 since they were comment response items for the survey. Responses annotated "M" (for "missing") indicate where a participant, for unknown reasons, did not respond.

Survey Comments. The attitude survey gave each of the 22 participants 2 opportunities (items k and r) to write in comments about the CBI, performance test, and survey. Though 44 written responses were possible, only 5 responses were provided. While the comments are reproduced verbatim in Appendix E, the gist of each one is indicated below:

1. Too much information was presented in lesson paragraphs, making reading difficult.

2. Anticipation of concepts was not possible due to a lack of familiarity of the subject matter.

3. The CBI offered no advantage over reading a paper text, especially since computer graphics and an ability to back-track in the program were not provided.

4. Paper copy allows back-tracking if necessary. The program's use of paragraph structure and lists made the lesson seem less intimidating (than a screenful of text).

5. Highlighting main concepts, and a facility for back-tracking, would have improved the lesson.

Descriptive Statistics

The interactive statistical programming tool STATISTIX was used to calculate descriptive statistics on the data presented in the following paragraphs.

Performance Test and Course Completion Time. Table 3
shows the statistics which describe the performance test and
course completion time results. Eleven measurements for
each lesson structure are provided for each variable. Mean
scores for top-down and bottom-up test performance test
scores were 80.91 and 81.82 respectively. Course completion
time averages were 19.55 for the top-down lessons and 20.73
for bottom-up lessons.

TABLE 3

STATISTICS FOR PERFORMANCE TEST AND COURSE COMPLETION TIME

VARIABLE	CURRICULUM STRUCTURE	SAMPLE SIZE	MEAN	STD DEV	MEDIAN
PERFORMANCE	B	11	81.82	10.07	85
TEST SCORE	T	11	80.91	9.95	80
TIME (MIN)	B	11	20.73	2.97	21
	T	11	19.55	3.48	19

B = Designator for the bottom-up curriculum structure
T = Designator for the top-down curriculum structure

Attitude Survey. Before these statistics were
calculated, the investigator attempted to negate the sample
size imbalance caused by the non-response areas (labeled
"M") seen in Table 2. This was done by randomly selecting a
response in the larger set and removing that response from
the results. Specifically, one top-down response on item
"a" (the value 2), and one bottom-up response on item "l"
(the value 5) were deleted. Non-response areas "l through

q" by participants 5 and 19, occurring in bottom-up and top-down results respectively, were treated as though they balanced each other; therefore no random deletions were necessary in those instances. The results of this data handling are reported in Table 4.

TABLE 4

STATISTICS FOR ATTITUDE SURVEY RESPONSES

SURVEY QUESTION	SAMPLE SIZE B / T	MEAN B / T	STANDARD DEVIATION B / T	MEDIAN B / T
A	10 / 10	2.70 / 2.50	0.48 / 0.85	3 / 3
B	11 / 11	3.64 / 4.09	1.03 / 0.54	4 / 4
C	11 / 11	4.09 / 4.00	0.70 / 0.00	4 / 4
D	11 / 11	3.46 / 3.91	0.82 / 0.54	4 / 4
E	11 / 11	4.00 / 3.91	0.89 / 0.30	4 / 4
F	11 / 11	3.73 / 3.09	1.10 / 1.30	4 / 3
G	11 / 11	4.46 / 4.27	0.69 / 0.47	5 / 4
H	11 / 11	4.73 / 4.36	0.47 / 0.67	5 / 4
I	11 / 11	4.82 / 4.73	0.40 / 0.47	5 / 5
J	11 / 11	3.91 / 3.82	0.83 / 0.60	4 / 4
L	9 / 9	4.33 / 4.11	0.50 / 0.33	4 / 4
M	10 / 10	4.10 / 3.80	0.74 / 0.63	4 / 4
N	10 / 10	4.20 / 4.20	0.63 / 0.63	4 / 4
O	10 / 10	2.40 / 2.80	0.70 / 0.63	2 / 3
P	10 / 10	4.30 / 4.10	0.82 / 0.32	4 / 4
Q	10 / 10	4.10 / 4.20	0.99 / 0.42	4 / 4

B = Designator for the bottom-up curriculum structure
T = Designator for the top-down curriculum structure

The following chapter presents the analysis of the experimental results described in this chapter.

V. Analysis

This chapter analyzes the data presented in Chapter IV. The analysis consisted of establishing the normality of the data distributions, performing hypothesis tests, and identifying the effect the research variables might have on one another.

Data Distribution Analysis

A Wilk-Shapiro normality statistic was calculated for the top-down and bottom-up data pairs analyzed for each of the research variables.

Performance Test and Course Completion Time. Table 5 shows the results of the normality test performed for these data sets. This analysis indicates that only one data set in each qualifies as normally distributed (using the 0.9 statistic criteria from Chapter IV), thereby eliminating parametric test procedures from use later in this analysis.

TABLE 5

WILK-SHAPIRO NORMALITY OF PERFORMANCE TEST AND TIME DATA

DEPENDENT VARIABLE	CURRICULUM STRUCTURE	NORMALITY STATISTIC
PERFORMANCE TEST	B	0.8339
	T	0.9143
COURSE COMPLETION TIME	B	0.9398
	T	0.8907

B = Designator for the bottom-up curriculum structure
T = Designator for the top-down curriculum structure

Attitude Survey. Table 6 shows the results of the normality test performed for the attitude data. This analysis was done for each of the sixteen scored items of the survey. The statistic values range from a low of 0.3119 to a high of 0.9080. The value "M" for the top-down analysis in the third survey statement indicates that a condition of non-normality prevented calculation of the statistic. As the table indicates, only one top-down data set met the criteria for a normal distribution, leading the investigator to conclude that hypothesis tests with this data were best conducted with non-parametric (distribution-free) test procedures.

TABLE 6

WILK-SHAPIRO NORMALITY OF ATTITUDE SURVEY DATA

SURVEY STATEMENT	WILK-SHAPIRO STATISTIC	
	BOTTOM-UP	TOP-DOWN
A	0.6146	0.6396
B	0.8913	0.6944
C	0.8329	M
D	0.7045	0.6944
E	0.8158	0.3119
F	0.8996	0.9080
G	0.7606	0.5887
H	0.5887	0.7911
I	0.4827	0.5887
J	0.8487	0.3119
L	0.6424	0.3570
M	0.8484	0.7869
N	0.7869	0.7869
O	0.6439	0.7869
P	0.8051	0.3326
Q	0.8310	0.5095

Tables 5 and 6 demonstrate that none of the data pairs had both values meet the normality criteria. This result, along with the randomized design and the assumption that the data is continuous, led to the application of Kruskal-Wallis (non-parametric) statistical test procedures. That analysis is presented in the following paragraphs.

Kruskal-Wallis Hypothesis Testing

The null hypothesis evaluated for each of the (eighteen) data pairs identified in Tables 5 and 6 was stated as follows: the mean from the top-down distribution equals the mean from the bottom-up distribution. Said another way, the means came from the same distribution, indicating that curriculum structure did not cause a significant difference in the outcomes measured during the research. The alternate hypothesis stated that the means were not equal, leading one to conclude that the data created as a result of curriculum structure was significant.

The Kruskal-Wallis analysis was reported as p-value calculations in each of the tests performed. As Chapter III pointed out, the p-value establishes the smallest level at which a null hypothesis can be rejected. By reporting the results of the analysis in this manner, the reader was given the opportunity to set the data significance criteria as he or she saw fit. As for the investigator's criterion, a significance factor of 0.1 was applied in the analysis.

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Performance Test and Course Completion Time. Table 7 shows the Kruskal-Wallis analysis for performance test and course completion time data, the p-values of which were 0.8118 and 0.4645 respectively. Using a 0.1 significance level led the investigator to conclude that the null hypothesis, for both research variables, should not be rejected. The average scores from the performance test do not allow one to conclude, given 0.1 significance, that curriculum structure caused them to be significantly different from one another. Similar results were found in the analysis for course completion time.

TABLE 7

KRUSKAL-WALLIS ANALYSIS FOR

PERFORMANCE TEST AND COURSE COMPLETION TIME DATA

RESEARCH VARIABLE	MEAN VALUES BOTTOM-UP	TOP-DOWN	P-VALUE	SIGNIFICANT
PERFORMANCE TEST SCORE	80.91	81.82	0.8118	NO
COMPLETION TIME (min)	19.55	20.73	0.4645	NO

Attitude Survey. Table 8 shows the Kruskal-Wallis analysis for the Likert scale attitude survey. P-values for these tests ranged from a low of 0.1311 to a high of 0.9695. Further, a value marked "tied" appears in the table to indicate a test where too many ties occurred during the Kruskal-Wallis computations, thereby preventing the report

of a p-value in that instance. As with the previous test results, the attitude analysis indicates that the data was not statistically significant (at 0.1) for any of the survey statements.

TABLE 8

KRUSKAL-WALLIS ANALYSIS FOR THE ATTITUDE SURVEY

SURVEY ITEM	MEAN VALUES BOTTOM-UP	TOP-DOWN	P-VALUE	SIGNIFICANT
A	2.70	2.50	0.7784	NO
B	3.64	4.09	0.2828	NO
C	4.09	4.00	0.6218	NO
D	3.46	3.91	0.1881	NO
E	4.00	3.91	0.4504	NO
F	3.73	3.09	0.2478	NO
G	4.46	4.27	0.3498	NO
H	4.73	4.36	0.1715	NO
I	4.82	4.73	0.6192	NO
J	3.91	3.82	0.9695	NO
L	4.33	4.11	0.2705	NO
M	4.10	3.80	0.3347	NO
N	4.20	4.20	TIED	NO
O	2.40	2.80	0.1311	NO
P	4.30	4.10	0.3395	NO
Q	4.10	4.20	0.8662	NO

Additional Attitude Survey Analysis

While the results in Table 8 demonstrate that the survey data was not statistically significant, there are insights which can be gleaned from the way top-down and bottom-up participants either agreed, stayed neutral, or disagreed with the survey statements. Table 9 lists each survey statement and the number of participants within each lesson structure who responded in these three manners. Using the

Likert scale, agreeing answers were scored either 4 or 5, neutral answers were scored a 3, and disagreeing answers were scored either a 1 or 2. Dashes are used in the table to indicate where no response was recorded.

TABLE 9

SURVEY ANALYSIS BY RESPONSE TYPE

SURVEY ITEM	SAMPLE SIZE		% AGREE		% NEUTRAL		%DISAGREE	
	B	T	B	T	B	T	B	T
A	10	10	-	-	7	7	3	3
B	11	11	7	10	2	1	2	-
C	11	11	9	11	2	-	-	-
D	11	11	7	9	2	2	2	-
E	11	11	9	11	1	-	1	-
F	11	11	7	5	2	3	2	3
G	11	11	10	11	1	-	-	-
H	11	11	11	10	-	1	-	-
I	11	11	11	11	-	-	-	-
J	11	11	7	10	4	-	-	1
L	9	9	9	9	-	-	-	-
M	10	10	8	7	2	3	-	-
N	10	10	9	9	1	1	-	-
O	10	10	1	1	2	6	7	3
P	10	10	8	10	2	-	-	-
Q	10	10	8	10	1	-	1	-

B = Designator for the bottom-up curriculum structure
T = Designator for the top-down curriculum structure

Three areas in Table 9 are of particular note. First, survey items B through E all relate to attitudes about the structure of the lessons. Top-down participants agreed more often, possibly indicating they were more comfortable and felt learning was easier given the logic of their lesson structure compared to their bottom-up counterparts. This is

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interesting considering that 1) the Kruskal-Wallis test
from Table 7 indicated the performance test data was not
significant, and 2) the bottom-up participants averaged
slightly higher scores than top-down counterparts.

Second, top-down participants generally agreed more with
item J, which stated that concepts were covered in
appropriate detail in the lesson. This is noteworthy for
similar reasons as pointed out in the preceding paragraph,
and that despite this the bottom-up participants did as well
or better on the performance test than their counterparts.

Finally, when asked whether they would have learned the
material in the lesson better from a paper copy (item O),
bottom-up participants disagreed over two-to-one compared to
their top-down counterparts. While this feedback could
indicate how respondents would feel about an exact paper
copy of what they saw on their monitors, it might also
indicate they approved of the CBI/bottom-up curriculum
structure format.

Performance Test and Course Completion Time Comparison

The following analysis was done to determine what
effect, if any, might be seen when performance test measures
were collated with course completion times. Table 10
summarizes data first presented in Table 1 of Chapter IV.
Here, the total number of scores in relation to specified
performance test and course completion time ranges are
provided. Aside from a possible top-down outlier located in

the lowest time range, the bulk of the placements cluster in
the sixteen to twenty-four minute time range at scores which
range from 60 to 100. Much like the Kruskal-Wallis analyses
discussed earlier, there did not appear to be any
significant patterns within this comparison. That is, it
did not appear that participants within one lesson structure
tended to score in one performance test/completion time area
significantly more than the other structure.

TABLE 10

PERFORMANCE TEST AND COURSE COMPLETION TIME ANALYSIS

TIME RANGE (min)	PERFORMANCE TEST SCORING RANGE							
	60 - 69		70 - 79		80 - 89		90 - 100	
	B	T	B	T	B	T	B	T
13 - 15	-	-	-	-	-	-	-	1
16 - 18	-	-	-	1	1	1	2	-
19 - 21	1	1	-	-	1	2	2	2
22 - 24	-	1	1	-	-	1	1	-
25 - 27	-	-	1	-	1	-	-	1

B = Designator for the bottom-up curriculum structure
T = Designator for the top-down curriculum structure

The final chapter presents conclusions which can be
drawn from the results and analysis presented thus far. In
addition, recommendations for further research are also
provided.

VI. Conclusions and Recommendations

Introduction

This chapter summarizes the conclusions drawn from the analysis performed in the previous chapter, in effect answering the research question set forth in Chapter 1. That question, restated here, is as follows:

> If the same body of content is arranged in a top-down (deductive) structure and a bottom-up (inductive) structure and presented to students by computer-based instruction, what (if any) differences occur in student learning (measured by performance testing), in course completion time, and in student attitude toward the learning experience?

While the potential existed for curriculum structure to have made such differences, the statistical analysis proved otherwise for the body of material tested. Several important conclusions were drawn from this fact.

Conclusions

The outcome alluded to in the previous paragraph, that inductive and deductive structure produced similar results in learning, performance time, and user attitude, is the single most important outcome of this research. However, there may times when one or another of the three variables (performance test, course completion time, and student attitude) may be more important to an educator, in which case there are additional inferences which can be made.

This research assumes that military educators are most interested in those techniques which produce the highest

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degree of learning performance for their students. This
implies, then, that course completion times and student
attitudes, though important, play a secondary role to
student performance. Applying that criterion and the
results of this research leads one to conclude that the
bottom-up approach has a slight advantage over top-down
structure. However, an educator may want to consider all
three variables, using one variable as the primary objective
with the other two of lesser (but still essential)
importance. If such an approach is applied in instances
where (as in this research) students are unfamiliar with the
CBI learning material, then conclusions from the following
"if-then" scenarios, which this research supports, are
approaches educators may want to consider.

Scenario 1:

> IF student performance is of primary
> importance--
>
> AND IF course completion time is of
> lesser importance--
>
> AND IF student attitude is of least
> importance--
>
> THEN the bottom-up curriculum structure
> is the method of choice.

This conclusion is based heavily on performance test
results, outweighing the evidence which indicated that
average course completion times for the top-down structure
were lower than those for the bottom-up structure. This
time difference was a mere 1.18 minutes; a result that could

be partially due to the one minute increments used to
document the completion times. Further, it is difficult to
place much emphasis on any time advantage because the
bottom-up lesson was 13.2% longer than the top-down lesson.
Scenario 2:

> IF student performance is of primary
> importance--
>
> AND IF student attitude is of lesser
> importance--
>
> AND IF course completion is of least
> importance--
>
> THEN the bottom-up curriculum structure
> is the method of choice.

While the performance test result was the strongest
factor affecting this conclusion, another factor which
supported it was the attitude survey result which indicated
that bottom-up participants, by a margin of over two-to-one
over top-down participants, disagreed with the statement
that they would have learned the lesson better from a paper
copy. This may be an important realization for CBI
designers. However, when student attitude is the variable
of primary importance, and other key attitude survey results
are considered, a different conclusion is warranted, as seen
by the following scenario.

Scenario 3:

> IF student attitude is of primary
> importance--
>
> AND IF student performance is of lesser
> importance--
>
> AND IF course completion times are of
> least importance--
>
> THEN the top-down curriculum structure
> is the method of choice.

While the bottom-up participants indicated, by the two-to-one margin referenced earlier, that they would not have learned the lesson better from a paper copy, the top-down participants gave the strongest indications that they were generally more comfortable with the lesson, and felt they learned better, than those students randomly assigned to the bottom-up lesson. In addition, the average results within each structure for either the performance test (student learning) or course completion time were so close that the investigator felt they become non-players when student attitude is the primary educational objective.

The previous scenarios are obviously not meant to be exhaustive in nature, but are provided as a guide which the reader can use to determine an appropriate curriculum structure for a number of different applications. The recommendations of the following paragraphs are an outgrowth of those scenarios.

Recommendations

The comments provided by participants as part of their attitude survey responses indicate that an ability to back-track through previously covered material would have improved the CBI lessons. For obvious reasons, this research design could not permit backtracking since this would allow participants to restructure the material, when the "structure" of the material was the independent variable being tested. In addition, participants indicated that highlighting of main concepts would have also been an improvement. This research did not use highlighting because of the unknown effect it might have if not equally applied to both structures. As this feedback suggests, educators should make a note to include these aspects in their CBI when possible. Had such program design aspects been possible, participants using each structure might have been even more comfortable with their randomly assigned lesson structure.

As Chapter III pointed out, the bottom-up program was physically 13.2% longer than its top-down counterpart. This difference in length is due to the essence of the bottom-up structure, which relies more on examples in leading the student toward generalizations and rules of behavior. The full effect of this difference in program length could have caused not only the differences seen in average course completion time, but might have affected the other

51

performance measures as well. Judgments about such effects
are beyond the scope of this CBI research, suggesting an
area where further investigation should be performed.

Finally, this research was designed for participants
with little knowledge about the CBI course content. As the
results indicate, no statistically significant differences
were found which suggest that one curriculum structure
promotes different (better or worse) measurements in
comparison with the other. It would be valuable to know
what results would be obtained for situations where the
participants already had a depth of knowledge from which to
work. In a similar vein, it would also be valuable to
determine if the conclusions of this research apply to
learning applications at other than the "knowledge" level.
The investigator recommends further work in these areas as a
continuance of ongoing efforts to help educators design and
use computer-based instruction with maximum effectiveness.

Summary

The differences caused by top-down (deductive) and
bottom-up (inductive) curriculum structures were not
statistically significant in this research. This provides
educators an important result in that either structure has
been shown effective when the following learning variables
are measured: performance (amount of learning), the amount
of time to complete the learning session, and student
attitude about the learning experience.

However, educators may have their own agenda as to which of the three research variables are most important. For this reason several "if-then" scenarios are discussed to aid educators in selecting the best structure for their particular application.

Appendix A: Top-down Structured Lesson

```
10 REM THIS IS THE TOP-DOWN PROGRAM STRUCTURE
20 KEY OFF
30 COLOR 14,1
40 CLS
50 PRINT
60 PRINT"                              INTRODUCTION"
70 PRINT
80 PRINT
90 COLOR 15,1
100 PRINT"     Welcome to this presentation on government contracting."
110 PRINT"     The material you are about to review is based on subject"
120 PRINT"     matter extracted from the Federal Acquisition Regulation"
130 PRINT"     (FAR) and AFIT course CMGT 523, Contracting and Acquisition"
140 PRINT"     Management.  This material was chosen not only for its"
150 PRINT"     interest to AF managers but for its relevance to your"
160 PRINT"     career field in particular.  There are three parts to"
170 PRINT"     this presentation:"
180 PRINT
190 PRINT"          1.  The text portion using computer-assisted"
200 PRINT"              instruction (following these introductions),"
210 PRINT
220 PRINT"          2.  A written quiz (in the envelope beside your"
230 PRINT"              computer) over the learning material in step 1,"
240 PRINT
250 PRINT"          3.  A brief survey, following the written quiz, to"
260 PRINT"              ask for your feedback on this presentation."
270 PRINT
280 INPUT"                              To continue, press <ENTER>",P
290 CLS
300 PRINT
310 PRINT
320 PRINT
330 PRINT
340 PRINT"     The computer program itself is written like a text, but"
350 PRINT"     with a SELF-TEST QUESTION occasionally inserted to help"
360 PRINT"     you reinforce main points.  These questions, displayed"
370 PRINT"     with the same blue background you see here but with light"
380 PRINT"     blue text writing, will also give you a good idea of what"
390 PRINT"     to expect from the short quiz you will complete at the"
400 PRINT"     conclusion of this computer portion of the exercise."
410 PRINT
420 PRINT"     Your participation in this review is greatly appreciated."
430 PRINT"     Though your progress through the next portion will be"
440 PRINT"     timed, please work at a pace which is comfortable to you."
450 PRINT"     This is not a competition to see who finishes first."
460 PRINT
470 PRINT"     THANK YOU in advance for your efforts and feedback"
480 PRINT"     during this exercise."
490 PRINT
```

```
500 PRINT
510 PRINT
520 INPUT"                              To continue, press <ENTER>",P
530 CLS
540 PRINT
550 PRINT
560 COLOR 14,1
570 PRINT"                    Contract Administration"
580 PRINT
590 COLOR 15,1
600 PRINT"        Contract administration contains many activities,"
610 PRINT"        including those associated with assuring the government"
620 PRINT"        gets what it is entitled to under the terms of a contract."
630 PRINT"        Quality assurance measures are a primary means of making "
640 PRINT"        this happen."
650 PRINT
660 PRINT"        Quality assurance in government procurement is achieved"
670 PRINT"        through both inspection and warranty provisions set forth"
680 PRINT"        in government contracts.  Each of these provisions plays"
690 PRINT"        an important part in the quality process at specific points"
700 PRINT"        in the life cycle of the contract."
710 PRINT
720 PRINT"        Inspections are carried out prior to government"
730 PRINT"        acceptance of the good or service contracted.  Warranties"
740 PRINT"        provide protection after acceptance.  We'll discuss"
750 PRINT"        inspections first, and then warranties."
760 PRINT
770 PRINT
780 INPUT"                              To continue, press <ENTER>",P
790 CLS
800 PRINT
810 PRINT
820 PRINT
830 PRINT
840 COLOR 14,1
850 PRINT"                         Inspections"
860 PRINT
870 PRINT
880 COLOR 15,1
890 PRINT"        The primary guidance for inspection activities is the"
900 PRINT"        Federal Acquisition Regulation (FAR).  In a large sense,"
910 PRINT"        inspections provide the government its earliest opportunity"
920 PRINT"        to evaluate a contractor's performance.  As a result,"
930 PRINT"        inspections are considered the government's primary means"
940 PRINT"        of ensuring quality.  The intensity of an inspection"
950 PRINT"        program depends on two things:"
960 PRINT
970 PRINT"          1.  the contractor involved in the procurement, and"
980 PRINT
990 PRINT"          2.  the nature of the procured item (complexity, etc.)"
1000 PRINT
1010 PRINT
```

55

```
1020 PRINT
1030 PRINT
1040 INPUT"                        To continue, press <ENTER>",P
1050 CLS
1060 PRINT
1070 PRINT
1080 PRINT
1090 PRINT
1100 PRINT"        Although the government retains the right to determine"
1110 PRINT"the nature of its quality assurance programs, the FAR"
1120 PRINT"stipulates that the government shall rely on the"
1130 PRINT"contractor to perform all necessary inspections and tests."
1140 PRINT"The exceptions to this rule, as deemed necessary by the"
1150 PRINT"contracting officer, can occur at either of the following:"
1160 PRINT
1170 PRINT"    1.  any time the when government has a need to perform"
1180 PRINT"        such activities to check the contractor's internal"
1190 PRINT"        work processes, or"
1200 PRINT
1210 PRINT"    2.  in advance of accepting the contractor's offer of"
1220 PRINT"        the final product."
1230 PRINT
1240 PRINT
1250 PRINT
1260 PRINT
1270 PRINT
1280 INPUT"                        To continue, press <ENTER>",P
1290 PRINT
1300 CLS
1310 PRINT
1320 PRINT
1330 PRINT
1340 PRINT
1350 PRINT
1360 PRINT
1370 PRINT"        The FAR defines general inspection guidelines which"
1380 PRINT"apply to all contract categories, as well as specific"
1390 PRINT"guidelines for different contract types."
1400 PRINT
1410 PRINT"        The general guidelines are discussed below, in two"
1420 PRINT"categories:"
1430 PRINT
1440 PRINT"    1. the government's rights, and"
1450 PRINT
1460 PRINT"    2. requirements levied on the contractor by the"
1470 PRINT"        government."
1480 PRINT
1490 PRINT
1500 PRINT
1510 PRINT
1520 PRINT
1530 INPUT"                        To continue, press <ENTER>",P
```

```
1540 COLOR 11,1
1550 CLS
1560 PRINT
1570 COLOR 14,1
1580 PRINT"                        SELF-TEST QUESTION"
1590 COLOR 11,1
1600 PRINT
1610 PRINT
1620 PRINT"        Before continuing, indicate your answer to the following."
1630 PRINT
1640 PRINT
1650 PRINT"        Without exception, the FAR requires a contractor to"
1660 PRINT"        perform all necessary inspection activities."
1670 PRINT
1680 PRINT"            a.  True"
1690 PRINT"            b.  False"
1700 PRINT
1710 PRINT
1720 INPUT"        Select a or b, and press <ENTER> ",A$
1730 IF A$="A" THEN 1840
1740 IF A$="a" THEN 1840
1750 IF A$="B" THEN 1810
1760 IF A$="b" THEN 1810
1770 PRINT
1780 PRINT
1790 PRINT"        ("A$") is not a choice.  Try again."
1800 GOTO 1710
1810 PRINT
1820 PRINT"        Correct.  Let's continue."
1830 GOTO 1890
1840 PRINT
1850 PRINT"        Incorrect.  The correct answer is B.  The FAR provides"
1860 PRINT"                    contracting officers with several exceptions"
1870 PRINT"                    to the general guidance that a contractor"
1880 PRINT"                    perform all inspections and tests."
1890 PRINT
1900 INPUT"                                To continue, press <ENTER>",P
1910 COLOR 14,1
1920 CLS
1930 PRINT
1940 PRINT
1950 PRINT
1960 PRINT
1970 PRINT"                        Government Inspection"
1980 COLOR 15,1
1990 PRINT
2000 PRINT
2010 PRINT"        The FAR requires the contractor to provide and"
2020 PRINT"        maintain an inspection system acceptable to the government."
2030 PRINT"        Additionally, the government retains the right to inspect"
2040 PRINT"        and test the procured item/s called out in the contract to"
2050 PRINT"        the extent practicable.  However, this does not give the"
```

```
2060 PRINT"        government free reign to do whatever it pleases.  Three"
2070 PRINT"        areas of concern to be considered as the government plans"
2080 PRINT"        its inspection activities are time, place, and costs of"
2090 PRINT"        inspection.  Let's consider, separately, the ramifications"
2100 PRINT"        of each."
2110 PRINT
2120 PRINT
2130 PRINT
2140 PRINT
2150 PRINT
2160 INPUT"                              To continue, press <ENTER>",P
2170 CLS
2180 PRINT
2190 PRINT
2200 PRINT
2210 PRINT
2220 .RINT
2230 COLOR 14,1
2240 PRINT"                    Time of Inspection"
2250 COLOR 15,1
2260 PRINT
2270 PRINT
2280 PRINT"        While the FAR offers the government flexibility by"
2290 PRINT"        suggesting it can inspect at all...times, including the"
2300 PRINT"        period of manufacture, and in any event before acceptance,"
2310 PRINT"        it also opens the door for potential liabilities.  Such is"
2320 PRINT"        the case if the contractor is caused undue or unreasonable"
2330 PRINT"        delay.  Fortunately, the courts do not deem all delays"
2340 PRINT"        unreasonable; contractors must anticipate some"
2350 PRINT"        inspection-related delays during the preparation of their"
2360 PRINT"        contract proposals."
2370 PRINT
2380 PRINT
2390 PRINT
2400 PRINT
2410 PRINT
2420 INPUT"                              To continue, press <ENTER>",P
2430 CLS
2440 PRINT
2450 PRINT
2460 PRINT
2470 PRINT
2480 PRINT
2490 PRINT"        Also, while the FAR indicates inspection will, in"
2500 PRINT"        general, take place prior to government acceptance, a"
2510 PRINT"        provision for Certificate of Conformance may be applied."
2520 PRIN"         Such a certificate is offered by the contractor to the"
2530 PRINT"        government (like a guarantee of quality) and can be used"
2540 PRINT"        as the government's sole consideration for acceptance."
2550 PRINT"        Certificate's of Conformance are usually only considered"
2560 PRINT"        appropriate in those situations where either small losses"
2570 PRINT"        would be incurred or the contractor's reputation and past"
```

```
2580 PRINT"          performance warrant such an award.  However, even if this"
2590 PRINT"          certificate is used, the government still reserves the"
2600 PRINT"          right to inspect."
2610 PRINT
2620 PRINT
2630 PRINT
2640 PRINT
2650 PRINT
2660 INPUT"                                        To continue, press <ENTER>",P
2670 CLS
2680 PRINT
2690 PRINT
2700 PRINT
2710 COLOR 14,1
2720 PRINT"                        Place of Inspection"
2730 PRINT
2740 PRINT
2750 COLOR 15,1
2760 PRINT"              In general, the contract should indicate the location"
2770 PRINT"          of inspections.  The FAR offers five recommendations the"
2780 PRINT"          government should consider when choosing a location.  The"
2790 PRINT"          location is suitable--"
2800 PRINT
2810 PRINT"              a.  if use of any another place would cause"
2820 PRINT"                  uneconomical disassembly or destructive testing,"
2830 PRINT
2840 PRINT"              b.  if considerable loss would result from making and"
2850 PRINT"                  shipping unacceptable products,"
2860 PRINT
2870 PRINT"              c.  if special instruments, facilities, etc., are"
2880 PRINT"                  available only at the source,"
2890 PRINT
2900 PRINT
2910 PRINT
2920 INPUT"                                        To continue, press <ENTER>",P
2930 CLS
2940 PRINT
2950 PRINT
2960 PRINT
2970 PRINT
2980 PRINT
2990 PRINT
3000 PRINT
301u PRINT
3020 PRINT
3030 PRINT"              d.  if government inspection during contract"
3040 PRINT"                  performance is deemed essential, or"
3050 PRINT
3060 PRINT"              e.  if, for any other reasons, it is seen as in the"
3070 PRINT"                  best interests of the government."
3080 PRINT
3090 PRINT
```

```
3100 PRINT
3110 PRINT
3120 PRINT
3130 PRINT
3140 PRINT
3150 PRINT
3160 INPUT"                                To continue, press <ENTER>",P
3170 CLS
3180 COLOR 14,1
3190 PRINT
3200 PRINT
3210 PRINT
3220 PRINT
3230 PRINT
3240 PRINT
3250 PRINT"                        Costs of Inspection"
3260 COLOR 15,1
3270 PRINT
3280 PRINT
3290 PRINT"         If inspection is performed at the contractor's or"
3300 PRINT"    subcontractor's premises, the contractor will provide"
3310 PRINT"    facilities and assistance without additional charge.  If"
3320 PRINT"    inspection is conducted at other than contractor premises,"
3330 PRINT"    the government bears the expense.  The same applies if the"
3340 PRINT"    government requires special inspection equipment,"
3350 PRINT"    regardless of where the inspection occurs."
3360 PRINT
3370 PRINT
3380 PRINT
3390 PRINT
3400 PRINT
3410 PRINT
3420 INPUT"                                To continue, press <ENTER>",P
3430 COLOR 11,1
3440 CLS
3450 PRINT
3460 COLOR 14,1
3470 PRINT"                        SELF-TEST QUESTION"
3480 COLOR 11,1
3490 PRINT
3500 PRINT
3510 PRINT"    Complete the following statement."
3520 PRINT
3530 PRINT
3540 PRINT"    A Certificate of Conformance is submitted by:"
3550 PRINT
3560 PRINT
3570 PRINT"         a.  the contracting officer."
3580 PRINT"         b.  the contractor."
3590 PRINT"         c.  either a or b, depending upon the circumstance."
3600 PRINT
3610 PRINT
```

```
3620 INPUT"        Select a, b, or c, and press <ENTER> ",A$
3630 IF A$="A" THEN 3760
3640 IF A$="a" THEN 3760
3650 IF A$="B" THEN 3730
3660 IF A$="b" THEN 3730
3670 IF A$="C" THEN 3760
3680 IF A$="c" THEN 3760
3690 PRINT
3700 PRINT
3710 PRINT"        ("A$") is not a choice.  Try again."
3720 GOTO 3610
3730 PRINT
3740 PRINT"        Correct.  Let's continue."
3750 GOTO 3800
3760 PRINT
3770 PRINT"        Incorrect.  The correct answer is B.  The contractor"
3780 PRINT"                    submits a Certificate of Conformance for the"
3790 PRINT"                    government's consideration."
3800 PRINT
3810 INPUT"                               To continue, press <ENTER>",P
3820 COLOR 14,1
3830 CLS
3840 PRINT
3850 PRINT"                    Contractor Responsibility"
3860 PRINT
3870 PRINT
3880 COLOR 15,1
3890 PRINT"        In addition to establishing government inspection"
3900 PRINT"    rights, the FAR requires contractors to provide and"
3910 PRINT"    maintain an inspection system acceptable to the"
3920 PRINT"    government.  It further requires contractors to:"
3930 PRINT
3940 PRINT"        1.  control the quality of their supplies and services,"
3950 PRINT
3960 PRINT"        2.  tender for acceptance only supplies and services"
3970 PRINT"            which conform to contract requirements,"
3980 PRINT
3990 PRINT"        3.  ensure vendors have adequate quality control, and"
4000 PRINT
4010 PRINT"        4.  maintain records of inspection activities which"
4020 PRINT"            evidence the fact that supplies and services"
4030 PRINT"            conform to the contract, and furnish the"
4040 PRINT"            government such information as required."
4050 PRINT
4060 INPUT"                               To continue, press <ENTER>",P
4070 COLOR 11,1
4080 CLS
4090 PRINT
4100 COLOR 14,1
4110 PRINT"                    SELF-TEST QUESTION"
4120 COLOR 11,1
4130 PRINT
```

```
4140 PRINT
4150 PRINT"          Indicate your answer to the following."
4160 PRINT
4170 PRINT
4180 PRINT"          The FAR specifies that a contractor must only submit"
4190 PRINT"          products which conform to contract requirements."
4200 PRINT
4210 PRINT"              a.  True"
4220 PRINT"              b.  False"
4230 PRINT
4240 PRINT
4250 INPUT"          Select a or b, and press <ENTER> ",A$
4260 IF A$="A" THEN 4340
4270 IF A$="a" THEN 4340
4280 IF A$="B" THEN 4370
4290 IF A$="b" THEN 4370
4300 PRINT
4310 PRINT
4320 PRINT"          ("A$") is not a choice.  Try again."
4330 GOTO 4240
4340 PRINT
4350 PRINT"          Correct.  Let's continue."
4360 GOTO 4410
4370 PRINT
4380 PRINT"          Incorrect.  The correct answer is A.  The FAR mandates"
4390 PRINT"                      that a contractor only submit products which"
4400 PRINT"                      conform to the requirements of the contract."
4410 PRINT
4420 INPUT"                                        To continue, press <ENTER>",P
4430 COLOR 15,1
4440 CLS
4450 PRINT
4460 PRINT
4470 PRINT
4480 PRINT
4490 PRINT
4500 PRINT
4510 PRINT
4520 PRINT
4530 PRINT"          Should a contractor's system of inspection fail to"
4540 PRINT"          screen out defective items or practices, the courts have"
4550 PRINT"          ruled that the government has the right to decline further"
4560 PRINT"          inspections.  However, government actions to reject the"
4570 PRINT"          contractor's performance must follow specific guidelines."
4580 PRINT
4590 PRINT
4600 PRINT
4610 PRINT
4620 PRINT
4630 PRINT
4640 PRINT
4650 PRINT
```

```
4660 PRINT
4670 INPUT"                                    To continue, press <ENTER>",P
4680 CLS
4690 COLOR 14,1
4700 PRINT
4710 PRINT
4720 PRINT
4730 PRINT
4740 PRINT
4750 PRINT
4760 PRINT"                        Rejection and Correction"
4770 COLOR 15,1
4780 PRINT
4790 PRINT
4800 PRINT"           A contractor's work may be rejected if it does not"
4810 PRINT"     comply with the government's specifications.  There are six"
4820 PRINT"     key points about rejecting supplies and services which"
4830 PRINT"     apply to government contracts;"
4840 PRINT
4850 PRINT"        1.  Nonconformance most often results in rejection when"
4860 PRINT"            performance, durability, operational effectiveness,"
4870 PRINT"            appearance, or weight have been adversely affected."
4880 PRINT
4890 PRINT
4900 PRINT
4910 PRINT
4920 PRINT
4930 INPUT"                                    To continue, press <ENTER>",P
4940 CLS
4950 PRINT
4960 PRINT
4970 PRINT
4980 PRINT
4990 PRINT
5000 PRINT"        2.  The contractor must be given timely notice."
5010 PRINT
5020 PRINT"            Obviously this can mean a lot of things, but"
5030 PRINT"            the bottom line is that as soon as the government"
5040 PRINT"            knows it intends to reject, it should inform the"
5050 PRINT"            contractor.  Otherwise, an implied acceptance on"
5060 PRINT"            the part of the government can result.  Consider"
5070 PRINT"            the case where the government implicitly accepted"
5080 PRINT"            almost 36,000 eggs because it retained them for"
5090 PRINT"            more than two months after inspection had been"
5100 PRINT"            performed without communication of a rejection to"
5110 PRINT"            the contractor."
5120 PRINT
5130 PRINT
5140 PRINT
5150 PRINT
5160 PRINT
5170 INPUT"                                    To continue, press <ENTER>",P
```

```
5180 CLS
5190 PRINT
5200 PRINT"          3.  The FAR requires the government to include reasons"
5210 PRINT"              for its rejection when it notifies the contractor."
5220 PRINT"              The government's notification need not be in"
5230 PRINT"              writing unless the rejection is communicated at a"
5240 PRINT"              place other than the contractor's facilities, or if"
5250 PRINT"              the contractor continues to submit nonconforming"
5260 PRINT"              supplies or services."
5270 PRINT
5280 PRINT"          4.  Two options are available to the government in the"
5290 PRINT"              event the contractor's product is found to be"
5300 PRINT"              defective.  First, if the defects appear to be"
5310 PRINT"              repairable within the normal contract period, the"
5320 PRINT"              government must allow the contractor the"
5330 PRINT"              opportunity to make such corrections.  In addition,"
5340 PRINT"              if a defect is relatively minor and the contractor"
5350 PRINT"              delivered ahead of schedule believing the product"
5360 PRINT"              would be accepted, it must be given a reasonable"
5370 PRINT"              amount of time past the delivery date to make"
5380 PRINT"              corrections."
5390 PRINT
5400 PRINT
5410 INPUT"                        To continue, press <ENTER>",P
5420 CLS
5430 PRINT
5440 PRINT
5450 PRINT
5460 PRINT"          5.  If final inspection is performed (per the contract)"
5470 PRINT"              at a government facility, government rejection"
5480 PRINT"              would require the contractor to remove the"
5490 PRINT"              defective product unless authorized to complete"
5500 PRINT"              corrections-in-place.  If rejected items are not"
5510 PRINT"              removed promptly the government can terminate the"
5520 PRINT"              contract (unlikely in most situations) or remove,"
5530 PRINT"              replace, or repair the item at the contractor's"
5540 PRINT"              expense.  However, termination only applies if the"
5550 PRINT"              defects are judged not repairable within the"
5560 PRINT"              delivery schedule specified by the contract."
5570 PRINT
5580 PRINT"          6.  Should the government decide to accept defective"
5590 PRINT"              goods or services (which it can do in its own best"
5600 PRINT"              interest), it can require an equitable price"
5610 PRINT"              reduction from the contractor."
5620 PRINT
5630 PRINT
5640 PRINT
5650 INPUT"                        To continue, press <ENTER>",P
5660 COLOR 11,1
5670 CLS
5680 PRINT
5690 COLOR 14,1
```

```
5700 PRINT"                              SELF-TEST QUESTION"
5710 COLOR 11,1
5720 PRINT
5730 PRINT
5740 PRINT"          Indicate your answer to the following."
5750 PRINT
5760 PRINT
5770 PRINT"          A contractor can be authorized time beyond the delivery"
5780 PRINT"          date to make corrections to a product."
5790 PRINT
5800 PRINT"               a.  True"
5810 PRINT"               b.  False"
5820 PRINT
5830 PRINT
5840 INPUT"          Select a or b, and press <ENTER> ",A$
5850 IF A$="A" THEN 5930
5860 IF A$="a" THEN 5930
5870 IF A$="B" THEN 5960
5880 IF A$="b" THEN 5960
5890 PRINT
5900 PRINT
5910 PRINT"          ("A$") is not a choice.  Try again."
5920 GOTO 5830
5930 PRINT
5940 PRINT"          Correct.  Let's continue."
5950 GOTO 6030
5960 PRINT
5970 PRINT"          Incorrect.  The correct answer is A.  If the contractor"
5980 PRINT"                     delivers ahead of schedule and reasonably"
5990 PRINT"                     believes the product will be accepted, yet"
6000 PRINT"                     minor defects are found, it must be authorized"
6010 PRINT"                     time beyond the contract date to make"
6020 PRINT"                     corrections."
6030 PRINT
6040 INPUT"                                   To continue, press <ENTER>",P
6050 COLOR 15,1
6060 CLS
6070 PRINT
6080 PRINT
6090 PRINT
6100 PRINT
6110 PRINT
6120 PRINT
6130 PRINT
6140 PRINT
6150 PRINT
6160 PRINT"          Now let's assume the government and contractor"
6170 PRINT"          are progressing with a satisfactory inspection program,"
6180 PRINT"          and both sides are ready for final inspection and"
6190 PRINT"          acceptance under terms of the contract."
6200 PRINT
6210 PRINT
```

```
6220 PRINT
6230 PRINT
6240 PRINT
6250 PRINT
6260 PRINT
6270 PRINT
6280 PRINT
6290 INPUT"                              To continue, press <ENTER>",P
6300 CLS
6310 COLOR 14,1
6320 PRINT
6330 PRINT
6340 PRINT
6350 PRINT
6360 PRINT
6370 PRINT"                    Acceptance"
6380 COLOR 15,1
6390 PRINT
6400 PRINT
6410 PRINT"        In general, government acceptance can occur before,"
6420 PRINT"     at the time of, or even after delivery of the product."
6430 PRINT"     Inspecting for the purpose of acceptance is a critical"
6440 PRINT"     activity for the government.  The implications of"
6450 PRINT"     inspecting for acceptance at other than the point of final"
6460 PRINT"     destination could terminate the contractor's liability"
6470 PRINT"     before the government gets final assurance of the fit and"
6480 PRINT"     performance of the product.  There are two guidelines"
6490 PRINT"     which establish the policy for government acceptance."
6500 PRINT
6510 PRINT
6520 PRINT
6530 PRINT
6540 PRINT
6550 INPUT"                              To continue, press <ENTER>",P
6560 CLS
6570 PRINT
6580 PRINT
6590 PRINT
6600 PRINT
6610 PRINT
6620 PRINT
6630 PRINT
6640 PRINT"     1.  Implied acceptance is binding on the government,"
6650 PRINT"         and most frequently occurs as a result of the"
6660 PRINT"         government's use or retention of a contractor's"
6670 PRINT"         product, thereby interfering with the contractor's"
6680 PRINT"         ownership of that product.  For example, a court"
6690 PRINT"         ruled that one government agency gave an implied"
6700 PRINT"         acceptance when it used a boiler for over eighty"
6710 PRINT"         days without ever formally accepting that item."
6720 PRINT
6730 PRINT
```

66

```
6740 PRINT
6750 PRINT
6760 PRINT
6770 PRINT
6780 PRINT
6790 INPUT"                                    To continue, press <ENTER>",P
6800 CLS
6810 PRINT
6820 PRINT
6830 PRINT
6840 PRINT
6850 PRINT"      2.  The FAR provides that in the absence of at least"
6860 PRINT"          one of four ˉecognized exceptions, acceptance is"
6870 PRINT"          conclusive.  The four exceptions to conclusiveness"
6880 PRINT"          are:"
6890 PRINT
6900 PRINT"          a.  whenever latent defects are found,"
6910 PRINT
6920 PRINT"          b.  whenever fraud is involved,"
6930 PRINT
6940 PRINT"          c.  whenever gross mistakes amount to fraud, or"
6950 PRINT
6960 PRINT"          d.  whenever warranties are included in the"
6970 PRINT"              contract."
6980 PRINT
6990 PRINT
7000 PRINT
7010 PRINT
7020 PRINT
7030 INPUT"                                    To continue, press <ENTER>",P
7040 COLOR 11,1
7050 CLS
7060 PRINT
7070 COLOR 14,1
7080 PRINT"                        SELF-TEST QUESTION"
7090 COLOR 11,1
7100 PRINT
7110 PRINT
7120 PRINT"      Indicate your answer to the following."
7130 PRINT
7140 PRINT
7150 PRINT"      Interfering with the contractor's ownership of its product"
7160 PRINT"      can be seen as an implied acceptance of that product"
7170 PRINT"      by the government."
7180 PRINT
7190 PRINT"          a.  True"
7200 PRINT"          b.  False"
7210 PRINT
7220 PRINT
7230 INPUT"      Select a or b, and press <ENTER> ",A$
7240 IF A$="A" THEN 7320
7250 IF A$="a" THEN 7320
```

67

```
7260 IF A$="B" THEN 7350
7270 IF A$="b" THEN 7350
7280 PRINT
7290 PRINT
7300 PRINT"        ("A$") is not a choice.  Try again."
7310 GOTO 7220
7320 PRINT
7330 PRINT"        Correct.  Let's continue."
7340 GOTO 7410
7350 PRINT
7360 PRINT"        Incorrect.  The correct answer is A.  Courts of law have"
7370 PRINT"                   ruled that government interference with a"
7380 PRINT"                   contractor's ownership of (ability to control)"
7390 PRINT"                   a product can constitute an implied acceptance"
7400 PRINT"                   of that product."
7410 PRINT
7420 INPUT"                            To continue, press <ENTER>",P
7430 COLOR 15,1
7440 CLS
7450 PRINT
7460 PRINT
7470 PRINT
7480 PRINT
7490 PRINT
7500 PRINT
7510 PRINT
7520 PRINT
7530 PRINT
7540 PRINT"        Let's return to the four exceptions to conclusiveness,"
7550 PRINT"        latent defects, fraud, gross mistakes which amount to"
7560 PRINT"        fraud, and warranties, and consider each separately."
7570 PRINT
7580 PRINT
7590 PRINT
7600 PRINT
7610 PRINT
7620 PRINT
7630 PRINT
7640 PRINT
7650 PRINT
7660 PRINT
7670 INPUT"                            To continue, press <ENTER>",P
7680 CLS
7690 PRINT
7700 PRINT
7710 PRINT
7720 PRINT
7730 PRINT"        A latent defect is one which is hidden from knowledge"
7740 PRINT"        and sight, and could not be found through reasonable"
7750 PRINT"        inspection or care.  A more frequent occurrence is a patent"
7760 PRINT"        defect, which also remains hidden, but should have been"
7770 PRINT"        found through inspection activities.  For example, lack of"
```

```
7780 PRINT"          a specified hardness for a grinding wheel was not found to"
7790 PRINT"          be latent since a test would have uncovered the deficiency."
7800 PRINT"          On the other hand, a case where 16 of almost 12,000 bolts"
7810 PRINT"          were found to be undersized was ruled as latent in that a"
7820 PRINT"          reasonable sample inspection would not likely have"
7830 PRINT"          uncovered those defects.  At any rate, the burden of proof"
7840 PRINT"          for latency rests with the government, and experience has"
7850 PRINT"          shown this to be a substantial burden indeed."
7860 PRINT
7870 PRINT
7880 PRINT
7890 PRINT
7900 PRINT
7910 INPUT"                          To continue, press <ENTER>",P
7920 CLS
7930 PRINT
7940 PRINT
7950 PRINT
7960 PRINT
7970 PRINT
7980 PRINT
7990 PRINT"          In cases of fraud, the government is once again faced"
8000 PRINT"          with substantial burden of proof that its acceptance was"
8010 PRINT"          induced by a deliberate misrepresentation of the facts"
8020 PRINT"          with an intent to mislead, resulting in damages to the"
8030 PRINT"          government.  More often than not, when the government has"
8040 PRINT"          evidence to support allegations of fraud, it tends to"
8050 PRINT"          prosecute under statutes calling for civil and criminal"
8060 PRINT"          penalties against the contractor.  If successful, the"
8070 PRINT"          government receives double damages."
8080 PRINT
8090 PRINT
8100 PRINT
8110 PRINT
8120 PRINT
8130 PRINT
8140 PRINT
8150 INPUT"                          To continue, press <ENTER>",P
8160 CLS
8170 PRINT
8180 PRINT
8190 PRINT
8200 PRINT
8210 PRINT
8220 PRINT
8230 PRINT
8240 PRINT"          Gross mistakes also result in overturning government"
8250 PRINT"          acceptance.  Though such instances have the appearance of"
8260 PRINT"          fraud and produce similar results, the key distinction is"
8270 PRINT"          that gross mistakes are not intentional acts.  An example"
8280 PRINT"          of such a case is one where a contractor incorrectly"
8290 PRINT"          certified that particular contract items were identical to"
```

```
8300 PRINT"        ones previously tested and approved by the government."
8310 PRINT
8320 PRINT
8330 PRINT
8340 PRINT
8350 PRINT
8360 PRINT
8370 PRINT
8380 PRINT
8390 INPUT"                              To continue, press <ENTER>",P
8400 CLS
8410 PRINT
8420 PRINT
8430 PRINT
8440 PRINT
8450 PRINT
8460 PRINT
8470 PRINT
8480 PRINT"        The last of the four exceptions to government"
8490 PRINT"        acceptance involves warranties.  Warranties, as we are"
8500 PRINT"        about to investigate in detail, extend the contractor's"
8510 PRINT"        liability for its product past the time of acceptance by"
8520 PRINT"        the government.  The government pays the contractor for"
8530 PRINT"        such an extension as specified by a contract and therefore,"
8540 PRINT"        should a defect arise after acceptance, the contractor"
8550 PRINT"        has the responsibility to correct the deficiency."
8560 PRINT
8570 PRINT
8580 PRINT
8590 PRINT
8600 PRINT
8610 INPUT"                              To continue, press <ENTER>",P
8620 COLOR 11,1
8630 CLS
8640 PRINT
8650 COLOR 14,1
8660 PRINT"                    SELF-TEST QUESTION"
8670 COLOR 11,1
8680 PRINT
8690 PRINT
8700 PRINT"        Complete the following statement."
8710 PRINT
8720 PRINT
8730 PRINT"        The burden of proof for latency, fraud, and gross"
8740 PRINT"        mistakes:"
8750 PRINT
8760 PRINT
8770 PRINT"            a.  rests on the contractor."
8780 PRINT"            b.  rests on the government."
8790 PRINT"            c.  is the responsibility of a civil court of law."
8800 PRINT
8810 PRINT
```

```
8820 INPUT"       Select a, b, or c, and press <ENTER> ",A$
8830 IF A$="A" THEN 8960
8840 IF A$="a" THEN 8960
8850 IF A$="B" THEN 8930
8860 IF A$="b" THEN 8930
8870 IF A$="C" THEN 8960
8880 IF A$="c" THEN 8960
8890 PRINT
8900 PRINT
8910 PRINT"       ("A$") is not a choice.  Try again."
8920 GOTO 8810
8930 PRINT
8940 PRINT"       Correct.  Let's continue."
8950 GOTO 9000
8960 PRINT
8970 PRINT"       Incorrect.  The correct answer is B.  The burden of proof"
8980 PRINT"                   in any of these three instances rests with"
8990 PRINT"                   the government."
9000 PRINT
9010 INPUT"                                   To continue, press <ENTER>",P
9020 COLOR 14,1
9030 CLS
9040 PRINT
9050 PRINT
9060 PRINT
9070 PRINT
9080 PRINT
9090 PRINT
9100 PRINT"                         Warranties"
9110 COLOR 15,1
9120 PRINT
9130 PRINT
9140 PRINT"       The FAR defines a warranty as a promise or affirmation"
9150 PRINT"    given by a contractor to the government regarding the"
9160 PRINT"    nature, usefulness, or conditions of the supplies or"
9170 PRINT"    performance of services furnished under a contract.  There"
9180 PRINT"    are two types of warranties which are applicable to"
9190 PRINT"    government contracting:  express and implied.  Let's take"
9200 PRINT"    a look at each of these separately."
9210 PRINT
9220 PRINT
9230 PRINT
9240 PRINT
9250 PRINT
9260 PRINT
9270 INPUT"                                   To continue, press <ENTER>",P
9280 CLS
9290 PRINT
9300 PRINT
9310 COLOR 14,1
9320 PRINT"                         Express Warranties"
9330 PRINT
```

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```
9340 PRINT
9350 COLOR 15,1
9360 PRINT"          Express warranties are ones which physically appear in"
9370 PRINT"     a contractual agreement.  Recent changes in acquisition"
9380 PRINT"     policy require these warranties be included where weapon"
9390 PRINT"     system production costs exceed $100,000 per item or"
9400 PRINT"     $10 million for the total system.  Though it may seem that"
9410 PRINT"     the government might always include such warranties in its"
9420 PRINT"     contracts, the government tends to exercise caution.  If"
9430 PRINT"     express warranties are used, their duration must be"
9440 PRINT"     clearly spelled out in the contract.  The FAR sets forth"
9450 PRINT"     five factors which the government must consider before"
9460 PRINT"     including express warranty provisions in a contract:"
9470 PRINT
9480 PRINT"          1.  The nature and use of the supplies or services it"
9490 PRINT"              wishes to procure (factors such as complexity and"
9500 PRINT"              the potential for hidden defects apply here),"
9510 PRINT
9520 PRINT
9530 INPUT"                              To continue, press <ENTER>",P
9540 CLS
9550 PRINT
9560 PRINT
9570 PRINT
9580 PRINT
9590 PRINT
9600 PRINT
9610 PRINT"          2.  The dollar costs associated with the contractor'
9620 PRINT"              agreeing to ext'   its liability,"
9630 PRINT
9640 PRINT"          3.  Whether the government has the resources to"
9650 PRINT"              administer and enforce a warranty,"
9660 PRINT
9670 PRINT"          4.  Whether or not the contracted item is normally"
9680 PRINT"              warranted in the trade, and"
9690 PRINT
9700 PRINT"          5.  The potential for reducing government inspection"
9710 PRINT"              in light of a warranty."
9720 PRINT
9730 PRINT
9740 PRINT
9750 PRINT
9760 PRINT
9770 INPUT"                              To continue, press <ENTER>",P
9780 COLOR 11,1
9790 CLS
9800 PRINT
9810 COLOR 14,1
9820 PRINT"                    SELF-TEST QUESTION"
9830 COLOR 11,1
9840 PRINT
9850 PRINT
```

```
9860 PRINT"        Indicate your answer to the following."
9870 PRINT
9880 PRINT
9890 PRINT"        The decision to include an express warranty in a contract,"
9900 PRINT"        according to the FAR, need not include consideration of"
9910 PRINT"        the government's cost of enforcing the warranty."
9920 PRINT
9930 PRINT"           a.  True"
9940 PRINT"           b.  False"
9950 PRINT
9960 PRINT
9970 INPUT"        Select a or b, and press <ENTER> ",A$
9980 IF A$="A" THEN 10090
9990 IF A$="a" THEN 10090
10000 IF A$="B" THEN 10060
10010 IF A$="b" THEN 10060
10020 PRINT
10030 PRINT
10040 PRINT"        ("A$") is not a choice.  Try again."
10050 GOTO 9960
10060 PRINT
10070 PRINT"        Correct.  Let's continue."
10080 GOTO 10140
10090 PRINT
10100 PRINT"        Incorrect.  The correct answer is B.  Warranty enforcement"
10110 PRINT"                   costs are among many factors the government"
10120 PRINT"                   must consider before expressly requiring a"
10130 PRINT"                   warranty in a contract."
10140 PRINT
10150 INPUT"                                To continue, press <ENTER>",P
10160 COLOR 14,1
10170 CLS
10180 PRINT
10190 PRINT
10200 PRINT
10210 PRINT"                        Implied Warranties"
10220 COLOR 15,1
10230 PRINT
10240 PRINT
10250 PRINT"        Implied warranties do not physically appear in the"
10260 PRINT"        contract but are recognized by law as protection to the"
10270 PRINT"        buyer for the useful nature of a purchased good."
10280 PRINT
10290 PRINT"        To illustrate, consider an appliance purchase for a"
10300 PRINT"        television or toaster.  Most warranties which accompany"
10310 PRINT"        such products include a statement indicating the purchaser"
10320 PRINT"        may have additional rights depending on the state in which"
10330 PRINT"        that buyer lives.  Such statements indicate the existence"
10340 PRINT"        of implied warranties to protect consumers.  These"
10350 PRINT"        warranties may even extend the manufacturer's liability"
10360 PRINT"        past the period explicitly stated in the warranty clause"
10370 PRINT"        itself."
```

```
10380 PRINT
10390 PRINT
10400 PRINT
10410 INPUT"                                        To continue, press <ENTER>",P
10420 CLS
10430 PRINT
10440 PRINT
10450 PRINT
10460 PRINT
10470 PRINT
10480 PRINT
10490 PRINT
10500 PRINT
10510 PRINT"         Further, under government contracts, the Uniform"
10520 PRINT" Commercial Code (UCC) states implied warranties are"
10530 PRINT" applicable unless specifically excluded by language written"
10540 PRINT" into the contract.  On numerous occasions, Boards of"
10550 PRINT" Contract Appeals have relied on UCC principles of implied"
10560 PRINT" warranties in resolving government contract disputes."
10570 PRINT
10580 PRINT
10590 PRINT
10600 PRINT
10610 PRINT
10620 PRINT
10630 PRINT
10640 PRINT
10650 INPUT"                                        To continue, press <ENTER>",P
10660 CLS
10670 PRINT
10680 PRINT
10690 PRINT
10700 PRINT
10710 PRINT
10720 PRINT
10730 PRINT"         There are two types of implied warranties which"
10740 PRINT" require further illustration."
10750 PRINT
10760 PRINT"         The first type of implied warranty, merchantability,"
10770 PRINT" refers to the requirement that goods are appropriate for"
10780 PRINT" the purpose for which they are normally sold.  An example"
10790 PRINT" might be for a bucket's implied ability to hold water."
10800 PRINT" Should the government desire to waive this type of"
10810 PRINT" warranty, it may do so either orally or in writing."
10820 PRINT
10830 PRINT
10840 PRINT
10850 PRINT
10860 PRINT
10870 PRINT
10880 PRINT
10890 INPUT"                                        To continue, press <ENTER>",P
```

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```
10900 CLS
10910 PRINT
10920 PRINT
10930 PRINT
10940 PRINT
10950 PRINT
10960 PRINT
10970 PRINT"           The second type, fitness for a particular purpose, can"
10980 PRINT"      only be waived in writing. Warranties for fitness suggest"
10990 PRINT"      a buyer who is relying on the judgment of the seller to"
11000 PRINT"      select suitable goods.  That is, goods will in fact be fit"
11010 PRINT"      for the buyer's purpose.  For example, a salesman might"
11020 PRINT"      tell a customer that a particular solvent will remove oil"
11030 PRINT"      stains on a driveway.  Should the solvent, which is"
11040 PRINT"      normally used for other applications, not perform as the"
11050 PRINT"      salesman promised, the customer has grounds for getting"
11060 PRINT"      his or her money back from the sale."
11070 PRINT
11080 PRINT
11090 PRINT
11100 PRINT
11110 PRINT
11120 PRINT
11130 INPUT"                           To continue, press <ENTER>",P
11140 COLOR 11,1
11150 CLS
11160 PRINT
11170 COLOR 14,1
11180 PRINT"                    SELF-TEST QUESTION"
11190 COLOR 11,1
11200 PRINT
11210 PRINT
11220 PRINT"     Complete the following statement."
11230 PRINT
11240 PRINT
11250 PRINT"     According to the UCC, implied warranties are applicable:"
11260 PRINT
11270 PRINT
11280 PRINT"          a.  unless waived by the contracting officer."
11290 PRINT"          b.  unless a Certificate of Conformance is submitted"
11300 PRINT"              by the contractor."
11310 PRINT"          c.  unless excluded by written notice in the contract."
11320 PRINT
11330 PRINT
11340 INPUT"      Select a, b, or c, and press <ENTER> ",A$
11350 IF A$="A" THEN 11480
11360 IF A$="a" THEN 11480
11370 IF A$="B" THEN 11480
11380 IF A$="b" THEN 11480
11390 IF A$="C" THEN 11450
11400 IF A$="c" THEN 11450
11410 PRINT
```

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```
11420 PRINT
11430 PRINT"        ("A$") is not a choice.  Try again."
11440 GOTO 11330
11450 PRINT
11460 PRINT"        Correct.  Let's continue."
11470 GOTO 11520
11480 PRINT
11490 PRINT"        Incorrect.  The correct answer is C.  Implied warranties"
11500 PRINT"                    are applicable unless specifically excluded"
11510 PRINT"                    in the written contract."
11520 PRINT
11530 INPUT"                                     To continue, press <ENTER>",P
11540 COLOR 14,1
11550 CLS
11560 PRINT
11570 PRINT"                        Warranty Breaches"
11580 COLOR 15,1
11590 PRINT
11600 PRINT
11610 PRINT"        Options available to an individual who is the victim of"
11620 PRINT"        a warranty breach (default) are somewhat similar to those"
11630 PRINT"        the government might take against a contractor.  Should a"
11640 PRINT"        breach occur, the government contracting officer has"
11650 PRINT"        two options:"
11660 PRINT
11670 PRINT"            1.  the contractor may be required to correct or"
11680 PRINT"                replace nonconforming supplies (or parts), or"
11690 PRINT
11700 PRINT"            2.  the government may retain the nonconformables and"
11710 PRINT"                require the contractor to make an equitable"
11720 PRINT"                adjustment in price."
11730 PRINT
11740 PRINT"        In either case, the FAR stipulates that the"
11750 PRINT"        contractor's obligation to repair, replace, or adjust"
11760 PRINT"        price will include appropriate labor and material costs."
11770 PRINT
11780 PRINT
11790 INPUT"                                     To continue, press <ENTER>",P
11800 CLS
11810 PRINT
11820 PRINT
11830 PRINT
11840 COLOR 14,1
11850 PRINT"                        Concluding Remarks"
11860 PRINT
11870 COLOR 15,1
11880 PRINT"        Given the conclusiveness of acceptance and the"
11890 PRINT"        difficulties the government can have in proving claims"
11900 PRINT"        against a contractor, it is easy to see why the government"
11910 PRINT"        places such high priority on inspection programs.  Further,"
11920 PRINT"        the government's reliance on inspections as the primary"
11930 PRINT"        means of ensuring product quality has minimized the role"
```

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```
11940 PRINT"        of warranties for many acquisitions.  However, when system"
11950 PRINT"        complexity or other factors suggest appreciable risk, the"
11960 PRINT"        government turns to warranties for continued assurance of"
11970 PRINT"        product quality after acceptance.  These two critical"
11980 PRINT"        mechanisms, inspection and warranty, are the government's"
11990 PRINT"        tools for ensuring it receives what it bargains for when"
12000 PRINT"        it makes purchases under contractual agreements."
12010 PRINT
12020 PRINT
12030 PRINT
12040 PRINT
12050 INPUT"                              To continue, press <ENTER>",P
12060 COLOR 11,1
12070 CLS
12080 PRINT
12090 COLOR 14,1
12100 PRINT"                       SELF-TEST QUESTION"
12110 COLOR 11,1
12120 PRINT
12130 PRINT
12140 PRINT"        Indicate your answer to the following."
12150 PRINT
12160 PRINT
12170 PRINT"        If a product has a defect and the contractor breaches the"
12180 PRINT"        warranty agreement covering the product, the government may"
12190 PRINT"        require the contractor to adjust the product's price."
12200 PRINT
12210 PRINT
12220 PRINT"           a.  True"
12230 PRINT"           b.  False"
12240 PRINT
12250 PRINT
12260 INPUT"        Select a or b, and press <ENTER> ",A$
12270 IF A$="A" THEN 12350
12280 IF A$="a" THEN 12350
12290 IF A$="B" THEN 12380
12300 IF A$="b" THEN 12380
12310 PRINT
12320 PRINT
12330 PRINT"        ("A$") is not a choice.  Try again."
12340 GOTO 12250
12350 PRINT
12360 PRINT"        Correct.  Let's continue."
12370 GOTO 12430
12380 PRINT
12390 PRINT"        Incorrect.  The correct answer is A.  The government may"
12400 PRINT"                    require a contractor to make an equitable"
12410 PRINT"                    adjustment in price should the contractor"
12420 PRINT"                    breach a warranty."
12430 PRINT
12440 INPUT"                              To continue, press <ENTER>",P
12450 CLS
```

```
12460 COLOR 14,1
12470 PRINT
12480 PRINT"                              END OF LESSON"
12490 PRINT
12500 PRINT
12510 COLOR 15,1
12520 PRINT"          You have completed the computerized text portion of"
12530 PRINT"     this exercise.  Before proceeding to the quiz, please do"
12540 PRINT"     the following:"
12550 PRINT
12560 PRINT"          1.  Open the quiz envelope and remove the quiz."
12570 PRINT
12580 PRINT"          2.  Write the elapsed time shown on the blackboard on"
12590 PRINT"              the cover of your quiz."
12600 PRINT
12610 PRINT"          3.  On the computer keyboard, type the word SYSTEM"
12620 PRINT"              and press the <ENTER> key."
12630 PRINT
12640 PRINT"          4.  Turn off your monitor by depressing the ON/OFF"
12650 PRINT"              button at the front of your color monitor."
12660 PRINT
12670 PRINT"          5.  Open the quiz and answer the questions."
12680 PRINT
12690 PRINT
12700 END
```

Appendix B: Bottom-up Structured Lesson

```
10 REM THIS IS THE BOTTOM-UP STRUCTURED PROGRAM
20 KEY OFF
30 COLOR 14,1
40 CLS
50 PRINT
60 PRINT"                                    INTRODUCTION"
70 PRINT
80 PRINT
90 COLOR 15,1
100 PRINT"        Welcome to this presentation on government contracting."
110 PRINT"        The material you are about to review is based on subject"
120 PRINT"        matter extracted from the Federal Acquisition Regulation"
130 PRINT"        (FAR) and AFIT course CMGT 523, Contracting and Acquisition"
140 PRINT"        Management.  This material was chosen not only for its"
150 PRINT"        interest to AF managers but for its relevance to your"
160 PRINT"        career field in particular.  There are three parts to"
170 PRINT"        this presentation:"
180 PRINT
190 PRINT"            1.  The text portion using computer-assisted"
200 PRINT"                instruction (following these introductions),"
210 PRINT
220 PRINT"            2.  A written quiz (in the envelope beside your"
230 PRINT"                computer) over the learning material in step 1,"
240 PRINT
250 PRINT"            3.  A brief survey, following the written quiz, to"
260 PRINT"                ask for your feedback on this presentation."
270 PRINT
280 INPUT"                                    To continue, press <ENTER>",P
290 CLS
300 PRINT
310 PRINT
320 PRINT
330 PRINT
340 PRINT"        The computer program itself is written like a text, but"
350 PRINT"        with a SELF-TEST QUESTION occasionally inserted to help"
360 PRINT"        you reinforce main points.  These questions, displayed"
370 PRINT"        with the same blue background you see here but with light"
380 PRINT"        blue text writing, will also give you a good idea of what"
390 PRINT"        to expect from the short quiz you will complete at the"
400 PRINT"        conclusion of this computer portion of the exercise."
410 PRINT
420 PRINT"        Your participation in this review is greatly appreciated."
430 PRINT"        Though your progress through the text portion will be"
440 PRINT"        timed, please work at a pace which is comfortable to you."
450 PRINT"        This is not a competition to see who finishes first."
460 PRINT
470 PRINT"        THANK YOU in advance for your efforts and feedback during"
480 PRINT"        this exercise."
490 PRINT
```

```
500 PRINT
510 PRINT
520 PRINT
530 INPUT"                                    To continue, press <ENTER>",P
540 COLOR 15,1
550 CLS
560 COLOR 14,1
570 PRINT
580 PRINT
590 PRINT
600 PRINT
610 PRINT
620 PRINT"                   Purchasing Goods and Services"
630 COLOR 15,1
640 PRINT
650 PRINT
660 PRINT"         Buying products and services is a part of everyday"
670 PRINT"         life. Most purchases are planned, especially when the"
680 PRINT"         cost of the goods or services is an appreciable part of an"
690 PRINT"         individual's income. Further, most people seek to maximize"
700 PRINT"         their purchasing power by getting the most for their"
710 PRINT"         dollar. As a result, human nature leads consumers to"
720 PRINT"         demand that a manufacturer provide some assurance that its"
730 PRINT"         products will function as advertised for a specified amount"
740 PRINT"         of time. Product warranties provide such assurances."
750 PRINT
760 PRINT
770 PRINT
780 PRINT
790 PRINT
800 INPUT"                                    To continue, press <ENTER>",P
810 CLS
820 PRINT
830 PRINT
840 PRINT
850 PRINT
860 PRINT
870 PRINT
880 PRINT"         Since most consumers are not able to witness the"
890 PRINT"         manufacturing process, the assurance of quality through"
900 PRINT"         product warranties can determine whether or not a product"
910 PRINT"         is selected by the consumer. Warranties are the consumer's"
920 PRINT"         avenue for recourse should the purchased good not perform"
930 PRINT"         as promised. Producers who do not warrant their products"
940 PRINT"         can find themselves losing an appreciable portion of their"
950 PRINT"         market as a result. However, such reliance on warranties"
960 PRINT"         is not necessarily the case when the government makes"
970 PRINT"         purchases through contracts."
980 PRINT
990 PRINT
1000 PRINT
1010 PRINT
```

```
1020 PRINT
1030 PRINT
1040 INPUT"                              To continue, press <ENTER>",P
1050 CLS
1060 PRINT
1070 PRINT
1080 PRINT
1090 PRINT
1100 PRINT
1110 COLOR 14,1
1120 PRINT"                         Warranties"
1130 PRINT
1140 PRINT
1150 COLOR 15,1
1160 PRINT"        Much as we consider the warranty to be a manufacturer's"
1170 PRINT"   assurance of quality, the Federal Acquisition Regulation"
1180 PRINT"   (FAR) defines a warranty as a promise or affirmation given"
1190 PRINT"   by a contractor to the government regarding the nature,"
1200 PRINT"   usefulness, or conditions of the supplies or performance of"
1210 PRINT"   services furnished under the contract. Written warranties"
1220 PRINT"   on such things as appliances and cars provide the everyday"
1230 PRINT"   consumer some degree of confidence in a purchase. Such a"
1240 PRINT"   warranty which physically appears in a contract is called"
1250 PRINT"   an express warranty."
1260 PRINT
1270 PRINT
1280 PRINT
1290 PRINT
1300 INPUT"                              To continue, press <ENTER>",P
1310 CLS
1320 PRINT
1330 PRINT
1340 COLOR 14,1
1350 PRINT"                    Express Warranties"
1360 COLOR 15,1
1370 PRINT
1380 PRINT
1390 PRINT"        Recent changes in acquisition policy require that"
1400 PRINT"   express warranties, whose durations must be clearly"
1410 PRINT"   spelled out in the contract, be included where weapon"
1420 PRINT"   system production costs exceed $100,000 per item or"
1430 PRINT"   $10 million for the total system."
1440 PRINT
1450 PRINT"        Though it might seem that the government would always"
1460 PRINT"   include express warranties in a contract, in reality the"
1470 PRINT"   government exercises caution before doing so. The FAR"
1480 PRINT"   sets forth five factors which the government must"
1490 PRINT"   consider before including express warranty provisions"
1500 PRINT"   in a contract."
1510 PRINT
1520 PRINT"        1. The nature and use of the supplies or services it"
1530 PRINT"              wishes to procure (factors such as complexity and"
```

```
1540 PRINT"                    the potential for hidden defects apply here),"
1550 PRINT
1560 INPUT"                              To continue, press <ENTER>",P
1570 CLS
1580 PRINT
1590 PRINT
1600 PRINT
1610 PRINT
1620 PRINT
1630 PRINT
1640 PRINT"        2.  The dollar costs associated with the contractor"
1650 PRINT"            agreeing to extend its liability,"
1660 PRINT
1670 PRINT"        3.  Whether or not the government has the resources"
1680 PRINT"            to administer and enforce a warranty,"
1690 PRINT"
1700 PRINT"        4.  Whether or not the contracted item is normally"
1710 PRINT"            warranted in the trade, and"
1720 PRINT
1730 PRINT"        5.  The potential for reducing government inspection"
1740 PRINT"            in light of a warranty."
1750 PRINT
1760 PRINT
1770 PRINT
1780 PRINT
1790 PRINT
1800 INPUT"                              To continue, press <ENTER>",P
1810 CLS
1820 COLOR 11,1
1830 CLS
1840 PRINT
1850 COLOR 14,1
1860 PRINT"                      SELF-TEST QUESTION"
1870 COLOR 11,1
1880 PRINT
1890 PRINT
1900 PRINT"    Indicate your answer to the following."
1910 PRINT
1920 PRINT
1930 PRINT"    The decision to include express warranties in a contract,"
1940 PRINT"    according to the FAR, need not include consideration of"
1950 PRINT"    the cost of enforcing the warranty."
1960 PRINT
1970 PRINT"        a.  True"
1980 PRINT"        b.  False"
1990 PRINT
2000 PRINT
2010 INPUT"      Select a or b, and press <ENTER> ",A$
2020 IF A$="A" THEN 2130
2030 IF A$="a" THEN 2130
2040 IF A$="B" THEN 2100
2050 IF A$="b" THEN 2100
```

```
2060 PRINT
2070 PRINT
2080 PRINT"        ("A$") is not a choice.  Try again."
2090 GOTO 2000
2100 PRINT
2110 PRINT"        Correct.  Let's continue."
2120 GOTO 2180
2130 PRINT
2140 PRINT"        Incorrect.  The correct answer is B.  Warranty enforcement"
2150 PRINT"                   costs are among many factors the government"
2160 PRINT"                   must consider before expressly requiring a"
2170 PRINT"                   warranty in a contract."
2180 PRINT
2190 INPUT"                               To continue, press <ENTER>",P
2200 COLOR 14,1
2210 CLS
2220 PRINT
2230 PRINT
2240 PRINT
2250 PRINT"                         Implied Warranties"
2260 COLOR 15,1
2270 PRINT
2280 PRINT
2290 PRINT"        Implies warranties do not physically appear in the"
2300 PRINT"        contract but are recognized by law as protection to the"
2310 PRINT"        buyer for the useful nature of a purchased good."
2320 PRINT
2330 PRINT"        To illustrate, consider an appliance purchase for a"
2340 PRINT"        television or toaster.  Most warranties which accompany"
2350 PRINT"        such products include a statement indicating the purchaser"
2360 PRINT"        may have additional rights depending on the state in which"
2370 PRINT"        that buyer lives.  Such statements indicate the existence"
2380 PRINT"        of implied warranties to protect consumers.  These"
2390 PRINT"        warranties may even extend the manufacturer's liability"
2400 PRINT"        past the period stated by an express warranty."
2410 PRINT
2420 PRINT
2430 PRINT
2440 PRINT
2450 INPUT"                               To continue, press <ENTER>",P
2460 CLS
2470 PRINT
2480 PRINT
2490 PRINT
2500 PRINT
2510 PRINT
2520 PRINT
2530 PRINT"        Further, under government contracts, the Uniform"
2540 PRINT"        Commercial Code (UCC) states implied warranties are"
2550 PRINT"        applicable unless specifically excluded by language written"
2560 PRINT"        into the contract.  On numerous occasions, Boards of"
2570 PRINT"        Contract Appeals have relied on UCC principles of implied"
```

```
2580 PRINT"       warranties in resolving government contract disputes."
2590 PRINT
2600 PRINT"          There are two types of implied warranties which"
2610 PRINT"       require further illustration."
2620 PRINT
2630 PRINT
2640 PRINT
2650 PRINT
2660 PRINT
2670 PRINT
2680 PRINT
2690 INPUT"                               To continue, press <ENTER>",P
2700 CLS
2710 PRINT
2720 PRINT
2730 PRINT
2740 PRINT
2750 PRINT
2760 PRINT
2770 PRINT
2780 PRINT"          When purchasing an item for its generally advertised"
2790 PRINT"       purpose, like a hammer for driving in nails, an implied"
2800 PRINT"       warranty of merchantability is in effect.  Such a warranty"
2810 PRINT"       requires that goods are appropriate for the purpose for"
2820 PRINT"       which they are normally sold."
2830 PRINT
2840 PRINT"          If the government wants to waive an implied warranty"
2850 PRINT"       of merchantability in its contracts, it can do so either"
2860 PRINT"       orally or in writing."
2870 PRINT
2880 PRINT
2890 PRINT
2900 PRINT
2910 PRINT
2920 PRINT
2930 INPUT"                               To continue, press <ENTER>",P
2940 CLS
2950 PRINT
2960 PRINT
2970 PRINT
2980 PRINT
2990 PRINT
3000 PRINT
3010 PRINT
3020 PRINT
3030 PRINT"          Now suppose the salesperson who sells hammers tells"
3040 PRINT"       buyers, when asked, that the hammer is also ideal for"
3050 PRINT"       scraping ice off windshields during winter months.  Here"
3060 PRINT"       an implied warranty called fitness for a particular purpose"
3070 PRINT"       is in effect.  Such a warranty relies on the judgement of"
3080 PRINT"       the seller to select suitable goods.  Warranties for"
3090 PRINT"       fitness can only be waived in writing."
```

84

```
3100 PRINT
3110 PRINT
3120 PRINT
3130 PRINT
3140 PRINT
3150 PRINT
3160 PRINT
3170 INPUT"                                        To continue, press <ENTER>",P
3180 COLOR 11,1
3190 CLS
3200 PRINT
3210 COLOR 14,1
3220 PRINT"                           SELF-TEST QUESTION"
3230 COLOR 11,1
3240 PRINT
3250 PRINT
3260 PRINT"      Complete the following statement."
3270 PRINT
3280 PRINT
3290 PRINT"      According to the UCC, implied warranties are applicable:"
3300 PRINT
3310 PRINT
3320 PRINT"          a.  unless waived by the contracting officer."
3330 PRINT"          b.  unless a Certificate of Conformance is submitted"
3340 PRINT"              by the contractor."
3350 PRINT"          c.  unless excluded by written notice in the contract."
3360 PRINT
3370 PRINT
3380 INPUT"      Select a, b, or c, and press <ENTER> ",A$
3390 IF A$="A" THEN 3520
3400 IF A$="a" THEN 3520
3410 IF A$="B" THEN 3520
3420 IF A$="b" THEN 3520
3430 IF A$="C" THEN 3490
3440 IF A$="c" THEN 3490
3450 PRINT
3460 PRINT
3470 PRINT"      ("A$") is not a choice.  Try again."
3480 GOTO 3370
3490 PRINT
3500 PRINT"      Correct.  Let's continue."
3510 GOTO 3560
3520 PRINT
3530 PRINT"      Incorrect.  The correct answer is C.  Implied warranties"
3540 PRINT"                  are applicable unless specifically excluded"
3550 PRINT"                  in the written contract."
3560 PRINT
3570 INPUT"                                        To continue, press <ENTER>",P
3580 COLOR 14,1
3590 CLS
3600 PRINT
3610 PRINT"                            Warranty Breaches"
```

```
3620 COLOR 15,1
3630 PRINT
3640 PRINT
3650 PRINT"          Options available to an individual who is the victim of"
3660 PRINT"     a warranty breach (default) are somewhat similar to those"
3670 PRINT"     the government might take against a contractor.  Should a"
3680 PRINT"     breach (default) occur, the government contracting officer"
3690 PRINT"     has two options."
3700 PRINT
3710 PRINT"          1.  the contractor may be required to correct or"
3720 PRINT"              replace nonconforming supplies (or parts), or"
3730 PRINT
3740 PRINT"          2.  the government may retain the nonconformables and"
3750 PRINT"              require the contractor to make an equitable"
3760 PRINT"              adjustment in price."
3770 PRINT
3780 PRINT"          In either case, the FAR stipulates that the"
3790 PRINT"     contractor's obligation to repair, replace, or adjust"
3800 PRINT"     price will include appropriate labor and material costs."
3810 PRINT
3820 PRINT
3830 INPUT"                              To continue, press <ENTER>",P
3840 COLOR 11,1
3850 CLS
3860 PRINT
3870 COLOR 14,1
3880 PRINT"                    SELF-TEST QUESTION"
3890 COLOR 11,1
3900 PRINT
3910 PRINT
3920 PRINT"     Indicate your answer to the following."
3930 PRINT
3940 PRINT
3950 PRINT"     If a product has a defect and the contractor breaches the"
3960 PRINT"     warranty agreement covering the product, the government may"
3970 PRINT"     require the contractor to adjust the product's price."
3980 PRINT
3990 PRINT"          a.  True"
4000 PRINT"          b.  False"
4010 PRINT
4020 PRINT
4030 INPUT"     Select a or b, and press <ENTER> ",A$
4040 IF A$="A" THEN 4120
4050 IF A$="a" THEN 4120
4060 IF A$="B" THEN 4150
4070 IF A$="b" THEN 4150
4080 PRINT
4090 PRINT
4100 PRINT"     ("A$") is not a choice.  Try again."
4110 GOTO 4020
4120 PRINT
4130 PRINT"     Correct.  Let's continue."
```

```
4140 GOTO 4200
4150 PRINT
4160 PRINT"        Incorrect. The correct answer is A.  The government may"
4170 PRINT"                 require a contractor to make an equitable"
4180 PRINT"                 adjustment in price should the contractor"
4190 PRINT"                 breach a warranty."
4200 PRINT
4210 INPUT"                           To continue, press <ENTER>",P
4220 COLOR 15,1
4230 CLS
4240 PRINT
4250 PRINT
4260 PRINT
4270 PRINT
4280 PRINT
4290 PRINT"        The preceding discussion highlights the implications"
4300 PRINT"    of both express and implied warranties.  However, as noted"
4310 PRINT"    earlier, the emphasis on warranties is greater for the"
4320 PRINT"    individual than for the government because the latter has"
4330 PRINT"    an insight into the development of a product that we, as"
4340 PRINT"    individual buyers, do not obtain.  As a result, though"
4350 PRINT"    important for many government programs and even mandated"
4360 PRINT"    under certain conditions, warranties are considered the"
4370 PRINT"    government's second line of defense when it makes a"
4380 PRINT"    purchase under a contract.  The government's active"
4390 PRINT"    involvement in the development process is its primary means"
4400 PRINT"    of ensuring quality from a contractor."
4410 PRINT
4420 PRINT
4430 PRINT
4440 PRINT
4450 PRINT
4460 INPUT"                           To continue, press <ENTER>",P
4470 CLS
4480 PRINT
4490 PRINT
4500 COLOR 14,1
4510 PRINT"                        Inspection"
4520 PRINT
4530 COLOR 15,1
4540 PRINT"        Given the opportunity, an individual will investigate"
4550 PRINT"    the functionality and esthetics (if applicable) of a"
4560 PRINT"    product before purchasing.  Test drives and expert"
4570 PRINT"    (mechanic) opinion, for example, are ways to ensure we"
4580 PRINT"    make intelligent car buying decisions.  Often, however,"
4590 PRINT"    an individual's ability to really inspect an item is"
4600 PRINT"    limited such that he or she ends up relying more on"
4610 PRINT"    warranties for protection should something go wrong with"
4620 PRINT"    the purchase.  This is contrary to how the government"
4630 PRINT"    operates;  it uses inspection as its primary means of"
4640 PRINT"    ensuring quality.  The amount of government inspection"
4650 PRINT"    depends on two things:"
```

```
4660 PRINT
4670 PRINT"          1.  the contractor involved in the procurement, and"
4680 PRINT
4690 PRINT"          2.  the nature of the purchase (complexities, etc.)."
4700 PRINT
4710 PRINT
4720 INPUT"                              To continue, press <ENTER>",P
4730 CLS
4740 PRINT
4750 PRINT
4760 PRINT
4770 PRINT
4780 PRINT"          Whether an individual buying a product, or the"
4790 PRINT"      government acting in a proprietary manner on a system"
4800 PRINT"      acquisition, the contractor is held responsible for"
4810 PRINT"      operating and maintaining adequate inspection programs."
4820 PRINT"      The FAR specifies that the government shall rely on the"
4830 PRINT"      contractor to perform all necessary inspections and tests."
4840 PRINT"      The exceptions to this rule, as deemed necessary by the"
4850 PRINT"      contracting officer, can occur at either of the following;"
4860 PRINT
4870 PRINT"          1.  any time when the government has a need to perform"
4880 PRINT"              such activities to check the contractor's internal"
4890 PRINT"              work processes, and"
4900 PRINT
4910 PRINT"          2.  in advance of accepting the contractor's offer of"
4920 PRINT"              the final product."
4930 PRINT
4940 PRINT
4950 PRINT
4960 INPUT"                              To continue, press <ENTER>",P
4970 COLOR 11,1
4980 CLS
4990 PRINT
5000 COLOR 14,1
5010 PRINT"                    SELF-TEST QUESTION"
5020 COLOR 11,1
5030 PRINT
5040 PRINT
5050 PRINT"      Before continuing, indicate your answer to the following."
5060 PRINT
5070 PRINT
5080 PRINT"      Without exception, the FAR requires a contractor to perform"
5090 PRINT"      all necessary inspection activities."
5100 PRINT
5110 PRINT"          a.  True"
5120 PRINT"          b.  False"
5130 PRINT
5140 PRINT
5150 INPUT"      Select a or b, and press <ENTER> ",A$
5160 IF A$="A" THEN 5270
5170 IF A$="a" THEN 5270
```

```
5180 IF A$="B" THEN 5240
5190 IF A$="b" THEN 5240
5200 PRINT
5210 PRINT
5220 PRINT"        ("A$") is not a choice.  Try again."
5230 GOTO 5140
5240 PRINT
5250 PRINT"        Correct.  Let's continue."
5260 GOTO 5310
5270 PRINT
5280 PRINT"        Incorrect.  The correct answer is B.  The FAR provides"
5281 PRINT"                    contracting officers with several exceptions"
5282 PRINT"                    to the general guidance that a contractor"
5283 PRINT"                    perform all inspections and tests."
5310 PRINT
5320 INPUT"                                To continue, press <ENTER>",P
5330 COLOR 15,1
5340 CLS
5350 PRINT
5360 PRINT
5370 PRINT
5380 PRINT
5390 PRINT
5400 PRINT
5410 PRINT
5420 PRINT
5430 PRINT
5440 PRINT"        Now let's turn from our comparison of individual"
5450 PRINT"        versus government perspectives and consider a scenario"
5460 PRINT"        where two program managers approach the inspection"
5470 PRINT"        requirements of their respective programs differently."
5480 PRINT
5490 PRINT
5500 PRINT
5510 PRINT
5520 PRINT
5530 PRINT
5540 PRINT
5550 PRINT
5560 PRINT
5570 INPUT"                                To continue, press <ENTER>",P
5580 CLS
5590 PRINT
5600 PRINT
5610 PRINT
5620 PRINT
5630 COLOR 14,1
5640 PRINT"                        Government Inspection"
5650 PRINT
5660 PRINT
5670 COLOR 15,1
5680 PRINT"        Capt A is the program manager for an Electro, Inc."
```

```
5690 PRINT"          contract.  He has conducted weekly visits to Electro's"
5700 PRINT"          facility to check progress on an electronic sensing device"
5710 PRINT"          Electro is building for a major fighter acquisition"
5720 PRINT"          contract.  To stage the activity, A typically calls his"
5730 PRINT"          contractor counterpart to arrange a mutually agreeable"
5740 PRINT"          time for him and the rest of the government team to visit"
5750 PRINT"          Electro's local plant.  An upcoming inspection, which"
5760 PRINT"          includes a demonstration of device functions completed thus"
5770 PRINT"          far, as well as a review of Electro's inspection associated"
5780 PRINT"          documentation, is scheduled to take no more than two hours."
5790 PRINT
5800 PRINT
5810 PRINT
5820 PRINT
5830 INPUT"                              To continue, press <ENTER>",P
5840 CLS
5850 PRINT
5860 PRINT
5870 PRINT
5880 PRINT
5890 PRINT"          Capt B, managing an identical program at Electro,"
5900 PRINT"          handles his inspections differently.  He visits the"
5910 PRINT"          Electro facility daily asking questions, making"
5920 PRINT"          suggestions, and requesting special demonstrations of the"
5930 PRINT"          device as it develops.  One day, while working several"
5940 PRINT"          short suspenses for his boss, he realizes he won't have"
5950 PRINT"          time to make the hour-long drive to the contractor's plant."
5960 PRINT"          Calling his counterparts at Electro, he requests they bring"
5970 PRINT"          the device, along with appropriate test equipment, to the"
5980 PRINT"          military base so he and the rest of the government team can"
5990 PRINT"          complete their daily monitoring.  This request will cause"
6000 PRINT"          Electro to spend several hours disassembling, packing,"
6010 PRINT"          and reassembling the unit."
6020 PRINT
6030 PRINT
6040 PRINT
6050 PRINT
6060 PRINT
6070 INPUT"                              To continue, press <ENTER>",P
6080 CLS
6090 PRINT
6100 PRINT
6110 PRINT
6120 PRINT
6130 PRINT
6140 PRINT
6150 PRINT
6160 PRINT"          Electro complies and a week later sends the"
6170 PRINT"          government contracting officer a bill for the inspection"
6180 PRINT"          conducted at the base.  Further, an additional amount is"
6190 PRINT"          billed for what Electro claims are unnecessary delays to"
6200 PRINT"          their progress due to excessive oversight and inspection by"
```

90

```
6210 PRINT"          the government.  In Electro's estimation, such delays will"
6220 PRINT"          cause them to miss their product delivery date by one week."
6230 PRINT
6240 PRINT
6250 PRINT
6260 PRINT
6270 PRINT
6280 PRINT
6290 PRINT
6300 PRINT
6310 INPUT"                              To continue, press <ENTER>",P
6320 CLS
6330 PRINT
6340 PRINT
6350 PRINT
6360 PRINT
6370 PRINT
6380 PRINT
6390 PRINT
6400 PRINT
6410 PRINT"          This scenario, though somewhat simplistic given the"
6420 PRINT"          complexities which can surround a contract, does highlight"
6430 PRINT"          several important concerns the government must consider in"
6440 PRINT"          the performance of inspections.  These concerns are for"
6450 PRINT"          the time, place, and cost of government inspection.  Let's"
6460 PRINT"          consider each of these concerns separately."
6470 PRINT
6480 PRINT
6490 PRINT
6500 PRINT
6510 PRINT
6520 PRINT
6530 PRINT
6540 PRINT
6550 INPUT"                              To continue, press <ENTER>",P
6560 COLOR 14,1
6570 CLS
6580 PRINT
6590 PRINT
6600 PRINT"                         Time of Inspection"
6610 PRINT
6620 PRINT
6630 COLOR 15,1
6640 PRINT"          The FAR states the government has the right to inspect"
6650 PRINT"          at all...times, including the period of manufacture, and"
6660 PRINT"          in any event before acceptance.  However, caution must"
6670 PRINT"          be exercised.  The government can be exposed to potential"
6680 PRINT"          liability if it causes undue or unnecessary delay in"
6690 PRINT"          the contractor's performance.  Though we don't know"
6700 PRINT"          Electro's performance history or a myriad of other issues,"
6710 PRINT"          it's easy to see that the extent of Capt B's inspection"
6720 PRINT"          process could lead to a delay claim by the contractor."
```

```
6730 PRINT"        Fortunately, the courts do not consider all delays"
6740 PRINT"        unreasonable;  contractors must anticipate some inspection"
6750 PRINT"        related delays in preparing contract proposals."
6760 PRINT
6770 PRINT"            Also, while the FAR indicates inspection will, in"
6780 PRINT"        general, take place prior to government acceptance, a"
6790 PRINT"        provision for Certificate of Conformance may be applied."
6800 PRINT
6810 INPUT"                                To continue, press <ENTER>",P
6820 CLS
6830 PRINT
6840 PRINT
6850 PRINT
6860 PRINT
6870 PRINT
6880 PRINT
6890 PRINT
6900 PRINT"            Certificate's of Conformance, offered by the"
6910 PRINT"        contractor for acceptance by the government (like a"
6920 PRINT"        guarantee of quality) can be used as the sole"
6930 PRINT"        consideration for acceptance and is generally allowed"
6940 PRINT"        only in those situations where either small losses would"
6950 PRINT"        be incurred or the contractor's reputation and past"
6960 PRINT"        performance warrant such an award.  However, even if this"
6970 PRINT"        certificate is used, the government still reserves the"
6980 PRINT"        right to inspect."
6990 PRINT
7000 PRINT
7010 PRINT
7020 PRINT
7030 PRINT
7040 PRINT
7050 INPUT"                                To continue, press <ENTER>",P
7060 COLOR 11,1
7070 CLS
7080 PRINT
7090 COLOR 14,1
7100 PRINT"                    SELF-TEST QUESTION"
7110 COLOR 11,1
7120 PRINT
7130 PRINT
7140 PRINT"        Complete the following statement."
7150 PRINT
7160 PRINT
7170 PRINT"        A Certificate of Conformance is submitted by:"
7180 PRINT
7190 PRINT
7200 PRINT"            a.  the contracting officer."
7210 PRINT"            b.  the contractor."
7220 PRINT"            c.  either a or b, depending upon the circumstance."
7230 PRINT
7240 PRINT
```

```
7250 INPUT"        Select a, b, or c, and press <ENTER> ",A$
7260 IF A$="A" THEN 7390
7270 IF A$="a" THEN 7390
7280 IF A$="B" THEN 7360
7290 IF A$="b" THEN 7360
7300 IF A$="C" THEN 7390
7310 IF A$="c" THEN 7390
7320 PRINT
7330 PRINT
7340 PRINT"        ("A$") is not a choice.  Try again."
7350 GOTO 7240
7360 PRINT
7370 PRINT"        Correct.  Let's continue."
7380 GOTO 7430
7390 PRINT
7400 PRINT"        Incorrect.  The correct answer is B.  The contractor"
7410 PRINT"                    submits a Certificate of Conformance for the"
7420 PRINT"                    government's consideration."
7430 PRINT
7440 INPUT"                            To continue, press <ENTER>",P
7450 COLOR 14,1
7460 CLS
7470 PRINT
7480 PRINT
7490 PRINT"                        Place of Inspection"
7500 PRINT
7510 PRINT
7520 COLOR 15,1
7530 PRINT"        The FAR requires each contract to specify the place or"
7540 PRINT"        places where the government reserves the right to perform"
7550 PRINT"        inspection.  The FAR offers five recommendations for the"
7560 PRINT"        location of inspections at a specific source:"
7570 PRINT
7580 PRINT"        1.  if use of any other place would cause"
7590 PRINT"            uneconomical disassembly or destructive testing,"
7600 PRINT
7610 PRINT"        2.  if considerable loss would result from making and"
7620 PRINT"            shipping unacceptable products,"
7630 PRINT
7640 PRINT"        3.  if special instruments, facilities, etc., are"
7650 PRINT"            available only at the source,"
7660 PRINT
7670 PRINT
7680 PRINT
7690 PRINT
7700 INPUT"                            To continue, press <ENTER>",P
7710 CLS
7720 PRINT
7730 PRINT
7740 PRINT
7750 PRINT
7760 PRINT
```

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```
7770 PRINT
7780 PRINT
7790 PRINT
7800 PRINT"          4.  if government inspection during contract"
7810 PRINT"              performance is deemed essential, or"
7820 PRINT
7830 PRINT"          5.  if, for any other reason, it is seen as in the"
7840 PRINT"              best interest of the government."
7850 PRINT
7860 PRINT
7870 PRINT
7880 PRINT
7890 PRINT
7900 PRINT
7910 PRINT
7920 PRINT
7930 PRINT
7940 INPUT"                              To continue, press <ENTER>",P
7950 COLOR 14,1
7960 CLS
7970 PRINT
7980 PRINT
7990 PRINT
8000 PRINT
8010 PRINT
8020 PRINT
8030 PRINT"               Costs of Inspection"
8040 PRINT
8050 PRINT
8060 COLOR 15,1
8070 PRINT"          If inspection is performed at the contractor's or"
8080 PRINT"     subcontractor's premises, the contractor will provide"
8090 PRINT"     facilities and assistance without added charge.  If"
8100 PRINT"     conducted at other than contractor premises, the"
8110 PRINT"     government bears the expense.  The government also pays"
8120 PRINT"     whenever it requires special inspection equipment,"
8130 PRINT"     regardless of where the activity occurs."
8140 PRINT
8150 PRINT
8160 PRINT
8170 PRINT
8180 PRINT
8190 PRINT
8200 INPUT"                              To continue, press <ENTER>",P
8210 CLS
8220 PRINT
8230 PRINT
8240 PRINT
8250 PRINT
8260 PRINT
8270 PRINT"          We should remember, at this point, the two purposes"
8280 PRINT"     Capt A set out to accomplish with his inspection.  Not"
```

```
8290 PRINT"          only did his team witness a demonstration of the"
8300 PRINT"          functionality of the device, they also reviewed Electro's"
8310 PRINT"          inspection documentation.  This review of documentation"
8320 PRINT"          is in keeping with the FAR requirement which states a"
8330 PRINT"          contractor shall provide and maintain an inspection"
8340 PRINT"          system acceptable to the government.  It further requires"
8350 PRINT"          the contractor to do four things:"
8360 PRINT
8370 PRINT"          1.  control the quality of its supplies and services,"
8380 PRINT
8390 PRINT
8400 PRINT
8410 PRINT
8420 PRINT
8430 PRINT
8440 INPUT"                              To continue, press <ENTER>",P
8450 CLS
8460 PRINT
8470 PRINT
8480 PRINT
8490 PRINT
8500 PRINT
8510 PRINT
8520 PRINT"          2.  tender for acceptance only supplies and services"
8530 PRINT"              which conform to contract requirements,"
8540 PRINT
8550 PRINT"          3.  ensure vendors have adequate quality control, and"
8560 PRINT
8570 PRINT"          4.  maintain records of inspection activities which"
8580 PRINT"              evidence the fact that supplies and services"
8590 PRINT"              conform to the contract, and furnish the"
8600 PRINT"              government such information as required."
8610 PRINT
8620 PRINT
8630 PRINT
8640 PRINT
8650 PRINT
8660 PRINT
8670 PRINT
8680 INPUT"                              To continue, press <ENTER>",P
8690 COLOR 11,1
8700 CLS
8710 PRINT
8720 COLOR 14,1
8730 PRINT"                    SELF-TEST QUESTION"
8740 COLOR 11,1
8750 PRINT
8760 PRINT
8770 PRINT"          Indicate your answer to the following."
8780 PRINT
8790 PRINT
8800 PRINT"          The FAR specifies that a contractor must only submit"
```

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```
8810 PRINT"        products which conform to contract requirements."
8820 PRINT
8830 PRINT"             a.  True"
8840 PRINT"             b.  False"
8850 PRINT
8860 PRINT
8870 INPUT"        Select a or b, and press <ENTER> ",A$
8880 IF A$="A" THEN 8960
8890 IF A$="a" THEN 8960
8900 IF A$="B" THEN 8990
8910 IF A$="b" THEN 8990
8920 PRINT
8930 PRINT
8940 PRINT"        ("A$") is not a choice.  Try again."
8950 GOTO 8860
8960 PRINT
8970 PRINT"        Correct.  Let's continue."
8980 GOTO 9030
8990 PRINT
9000 PRINT"        Incorrect.  The correct answer is A.  The FAR mandates"
9010 PRINT"                    that a contractor only submit products which"
9020 PRINT"                    conform to the requirements of the contract."
9030 PRINT
9040 INPUT"                               To continue, press <ENTER>",P
9050 COLOR 15,1
9060 CLS
9070 PRINT
9080 PRINT
9090 PRINT
9100 PRINT
9110 PRINT
9120 PRINT
9130 PRINT
9140 PRINT
9150 PRINT"        Should a contractor's system of inspection fail to"
9160 PRINT"        screen defective items or practices, courts have ruled"
9170 PRINT"        the government has the right to decline any further"
9180 PRINT"        inspections.  However, government actions to reject a"
9190 PRINT"        contractor's performance must follow specific guidelines."
9200 PRINT
9210 PRINT
9220 PRINT
9230 PRINT
9240 PRINT
9250 PRINT
9260 PRINT
9270 PRINT
9280 PRINT
9290 INPUT"                               To continue, press <ENTER>",P
9300 COLOR 14,1
9310 CLS
9320 PRINT
```

```
9330 PRINT
9340 PRINT
9350 PRINT
9360 PRINT
9370 PRINT
9380 PRINT"                    Rejection of Goods/Services"
9390 PRINT
9400 PRINT
9410 COLOR 15,1
9420 PRINT"          Now that we've established both government and"
9430 PRINT"     contractor responsibilities for inspections, let's return"
9440 PRINT"     to our program managers.  Consider a point in time where"
9450 PRINT"     each manager has just completed final inspection four (4)"
9460 PRINT"     weeks ahead of the contract delivery date.  Unfortunately,"
9470 PRINT"     both devices failed in their ability to resist electronic"
9480 PRINT"     jamming (interference) as required by the government"
9490 PRINT"     developed and approved product specification."
9500 PRINT
9510 PRINT
9520 PRINT
9530 PRINT
9540 PRINT
9550 INPUT"                    To continue, press <ENTER>",P
9560 CLS
9570 PRINT
9580 PRINT
9590 PRINT
9600 PRINT
9610 PRINT
9620 PRINT
9630 PRINT"          While present at the contractor's facility (just after"
9640 PRINT"     inspection), Capt A immediately told Electro he intended"
9650 PRINT"     to reject the device, citing the specification to which"
9660 PRINT"     the product did not conform.  Since final inspection for"
9670 PRINT"     acceptability had occurred ahead of schedule, Electro"
9680 PRINT"     asked A's permission to correct the defect and retest for"
9690 PRINT"     acceptance no later than the originally contracted"
9700 PRINT"     delivery date.  Since the defect appeared repairable"
9710 PRINT"     within the remaining contract time, Capt A agreed to"
9720 PRINT"     Electro's request."
9730 PRINT
9740 PRINT
9750 PRINT
9760 PRINT
9770 PRINT
9780 PRINT
9790 INPUT"                    To continue, press <ENTER>",P
9800 CLS
9810 PRINT
9820 PRINT
9830 PRINT
9840 PRINT
```

```
9850 PRINT
9860 PRINT
9870 PRINT"            On the other hand Capt B, though recognizing the"
9880 PRINT"       defect, gave no indication that the government might reject"
9890 PRINT"       the device.  Instead, he asked Electro to transport the"
9900 PRINT"       device out to the base.  There, Capt B intended to have his"
9910 PRINT"       team of engineers further analyze the item without"
9920 PRINT"       contractor interference to see if the government should"
9930 PRINT"       consider accepting the item despite its obvious defect."
9940 PRINT"       The contracted delivery date passed and Capt B had still"
9950 PRINT"       not communicated any sort of rejection to Electro for the"
9960 PRINT"       nonconforming product."
9970 PRINT
9980 PRINT
9990 PRINT
10000 PRINT
10010 PRINT
10020 PRINT
10030 INPUT"                            To continue, press <ENTER>",P
10040 CLS
10050 PRINT
10060 PRINT
10070 PRINT
10080 PRINT
10090 PRINT
10100 PRINT
10110 PRINT
10120 PRINT"       Six (6) key points about rejecting defective supplies"
10130 PRINT"     or services need to be underlined from the above passages:"
10140 PRINT
10150 PRINT"       1.  Nonconformance most often results in rejection"
10160 PRINT"           when performance, durability, operational"
10170 PRINT"           effectiveness, appearance, or weight have been"
10180 PRINT"           adversely affected."
10190 PRINT
10200 PRINT
10210 PRINT
10220 PRINT
10230 PRINT
10240 PRINT
10250 PRINT
10260 PRINT
10270 INPUT"                            To continue, press <ENTER>",P
10280 CLS
10290 PRINT
10300 PRINT
10310 PRINT
10320 PRINT
10330 PRINT
10340 PRINT"       2.  Notice of rejection must be given to the"
10350 PRINT"           contractor within a reasonable time.  However,"
10360 PRINT"           reasonable time can mean many things and should be"
```

```
10370 PRINT"              specified in the contract.  If not specified,"
10380 PRINT"              courts have ruled that the government should"
10390 PRINT"              inform the contractor of its intent to reject the"
10400 PRINT"              contractor's product as soon as the government"
10410 PRINT"              makes such a determination.  Otherwise, as in"
10420 PRINT"              Capt B's case, an implied acceptance of the"
10430 PRINT"              contractor's product can be assumed on the"
10440 PRINT"              government's behalf."
10450 PRINT
10460 PRINT
10470 PRINT
10480 PRINT
10490 PRINT
10500 PRINT
10510 INPUT"                          To continue, press <ENTER>",P
10520 CLS
10530 PRINT
10540 PRINT
10550 PRINT
10560 PRINT
10570 PRINT
10580 PRINT
10590 PRINT"    3.  Reasons for the government's rejection must be"
10600 PRINT"        given to the contractor.  This notice does not"
10610 PRINT"        need to be in writing unless--"
10620 PRINT
10630 PRINT"        a.  the rejection is communicated at a place"
10640 PRINT"            other than the contractor's facilities,"
10650 PRINT
10660 PRINT"        b.  contractor performance is inexcusably late, or"
10670 PRINT
10680 PRINT"        c.  the contractor continues to submit"
10690 PRINT"            nonconforming products."
10700 PRINT
10710 PRINT
10720 PRINT
10730 PRINT
10740 PRINT
10750 INPUT"                          To continue, press <ENTER>",P
10760 COLOR 11,1
10770 CLS
10780 PRINT
10790 COLOR 14,1
10800 PRINT"              SELF-TEST QUESTION"
10810 COLOR 11,1
10820 PRINT
10830 PRINT
10840 PRINT"    Indicate your answer to the following."
10850 PRINT
10860 PRINT
10870 PRINT"    Interfering with the contractor's ownership of its product"
10880 PRINT"    can be seen as an implied acceptance of that product"
```

```
10890 PRINT"       by the government."
10900 PRINT
10910 PRINT"            a.  True"
10920 PRINT"            b.  False"
10930 PRINT
10940 PRINT
10950 INPUT"       Select a or b, and press <ENTER> ",A$
10960 IF A$="A" THEN 11040
10970 IF A$="a" THEN 11040
10980 IF A$="B" THEN 11070
10990 IF A$="b" THEN 11070
11000 PRINT
11010 PRINT
11020 PRINT"       ("A$") is not a choice.  Try again."
11030 GOTO 10940
11040 PRINT
11050 PRINT"       Correct.  Let's continue."
11060 GOTO 11130
11070 PRINT
11080 PRINT"       Incorrect.  The correct answer is A.  Courts of law have"
11090 PRINT"                   ruled that government interference with a"
11100 PRINT"                   contractor's ownership of (ability to control)"
11110 PRINT"                   a product can constitute an implied acceptance"
11120 PRINT"                   of that product."
11130 PRINT
11140 INPUT"                               To continue, press <ENTER>",P
11150 COLOR 15,1
11160 CLS
11170 PRINT
11180 PRINT
11190 PRINT
11200 PRINT
11210 PRINT
11220 PRINT
11230 PRINT"            4.  Numerous options are available to the government in"
11240 PRINT"                the event the contractor's product is found to be"
11250 PRINT"                defective.  As seen above, if defects are deemed"
11260 PRINT"                repairable within the normal contract period, the"
11270 PRINT"                government must allow the contractor the"
11280 PRINT"                opportunity to make such corrections.  In addition,"
11290 PRINT"                if the contractor delivers ahead of schedule and"
11300 PRINT"                reasonably believes the product will be accepted,"
11310 PRINT"                it is authorized a reasonable amount of time"
11320 PRINT"                beyond the delivery date to make corrections."
11330 PRINT
11340 PRINT
11350 PRINT
11360 PRINT
11370 PRINT
11380 INPUT"                               To continue, press <ENTER>",P
11390 CLS
11400 PRINT
```

100

```
11410 PRINT
11420 PRINT
11430 PRINT"           5.  If final inspection is performed (per the contract)"
11440 PRINT"               at a government facility, government rejection"
11450 PRINT"               would require the contractor to remove the"
11460 PRINT"               defective product unless authorized to complete"
11470 PRINT"               corrections-in-place.  If rejected items are not"
11480 PRINT"               removed promptly the government can terminate the"
11490 PRINT"               contract (unlikely in most situations) or remove,"
11500 PRINT"               replace, or repair the item at the contractor's"
11510 PRINT"               expense.  However, termination only applies if the"
11520 PRINT"               defects are judged not repairable within the"
11530 PRINT"               delivery schedule specified by the contract."
11540 PRINT
11550 PRINT"           6.  Should the government decide to accept defective"
11560 PRINT"               goods or services (which it can do in its own best"
11570 PRINT"               interest), it can require an equitable price"
11580 PRINT"               reduction from the contractor."
11590 PRINT
11600 PRINT
11610 PRINT
11620 INPUT"                                To continue, press <ENTER>",P
11630 COLOR 11,1
11640 CLS
11650 PRINT
11660 COLOR 14,1
11670 PRINT"                       SELF-TEST QUESTION"
11680 COLOR 11,1
11690 PRINT
11700 PRINT
11710 PRINT"      Indicate your answer to the following."
11720 PRINT
11730 PRINT
11740 PRINT"      A contractor can be authorized time beyond the delivery"
11750 PRINT"      date to make corrections to a product."
11760 PRINT
11770 PRINT"           a.  True"
11780 PRINT"           b.  False"
11790 PRINT
11800 PRINT
11810 INPUT"       Select a or b, and press <ENTER> ",A$
11820 IF A$="A" THEN 11900
11830 IF A$="a" THEN 11900
11840 IF A$="B" THEN 11930
11850 IF A$="b" THEN 11930
11860 PRINT
11870 PRINT
11880 PRINT"       ("A$") is not a choice.  Try again."
11890 GOTO 11800
11900 PRINT
11910 PRINT"       Correct.  Let's continue."
11920 GOTO 12000
```

```
11930 PRINT
11940 PRINT"          Incorrect.  The correct answer is A.  If the contractor"
11950 PRINT"                      delivers ahead of schedule and reasonably"
11960 PRINT"                      believes the product will be accepted, yet"
11970 PRINT"                      minor defects are found, the contractor must"
11980 PRINT"                      be authorized time beyond the contract date"
11990 PRINT"                      to make corrections."
12000 PRINT
12010 INPUT"                                To continue, press <ENTER>",P
12020 COLOR 15,1
12030 CLS
12040 PRINT
12050 PRINT
12060 PRINT
12070 PRINT
12080 PRINT
12090 PRINT
12100 PRINT
12110 PRINT
12120 PRINT
12130 PRINT"     So far we have only considered the rejection of goods"
12140 PRINT" or services.  Let's consider the other possibility--for"
12150 PRINT" acceptance of the contractor's performance."
12160 PRINT
12170 PRINT
12180 PRINT
12190 PRINT
12200 PRINT
12210 PRINT
12220 PRINT
12230 PRINT
12240 PRINT
12250 PRINT
12260 INPUT"                                To continue, press <ENTER>",P
12270 CLS
12280 PRINT
12290 PRINT
12300 PRINT
12310 COLOR 14,1
12320 PRINT"                    Acceptance of Goods/Services"
12330 COLOR 15,1
12340 PRINT
12350 PRINT
12360 PRINT"     In general, government acceptance can occur before, at"
12370 PRINT" the time of, or even after deliver of the product.  In"
12380 PRINT" addition, acceptance can occur implicitly, demonstrated in"
12390 PRINT" our example when Capt B failed to reject the nonconforming"
12400 PRINT" electronic device within a reasonable time.  His actions"
12410 PRINT" were just as binding as if he had explicitly accepted the"
12420 PRINT" item by forwarding written notice of that fact through his"
12430 PRINT" contracting officer."
12440 PRINT
```

```
12450 PRINT"            To summarize, whether acceptance is explicit or"
12460 PRINT"        implicit, the result is the same:  aside from the four"
12470 PRINT"        specific exceptions we are about to consider, acceptance"
12480 PRINT"        is conclusive."
12490 PRINT
12500 PRINT
12510 PRINT
12520 INPUT"                              To continue, press <ENTER>",P
12530 CLS
12540 PRINT
12550 PRINT
12560 PRINT
12570 PRINT"            A contractor is not liable for defects which the"
12580 PRINT"        government should have discovered during the inspection"
12590 PRINT"        process.  Such defects, called patent defects, often"
12600 PRINT"        result when the government does not exercise its right to"
12610 PRINT"        inspect.  However, not all defects are detectable.  For"
12620 PRINT"        example, a frequent problem in software acquisitions is"
12630 PRINT"        that while test programs ensure all required functions are"
12640 PRINT"        achievable, every conceivable route through software loops"
12650 PRINT"        is not traversed.  As a result, defects often crop up after"
12660 PRINT"        acceptance when the government begins using the product."
12670 PRINT
12680 PRINT"            This first exception, called a latent defect, remains"
12690 PRINT"        hidden from knowledge and sight, and is not found through"
12700 PRINT"        reasonable inspection or care.  Unlike the patent defect"
12710 PRINT"        first described, latent defects everturn the conclusiveness"
12720 PRINT"        of government acceptance."
12730 PRINT
12740 PRINT
12750 PRINT
12760 INPUT"                              To continue, press <ENTER>",P
12770 CLS
12780 PRINT
12790 PRINT
12800 PRINT
12810 PRINT
12820 PRINT
12830 PRINT
12840 PRINT
12850 PRINT"            Another condition which negates government acceptance"
12860 PRINT"        is one where a contractor deliberately misrepresents (or"
12870 PRINT"        conceals) the facts with an intent to mislead, resulting in"
12880 PRINT"        damages to the government.  Such cases, called fraud, occur"
12890 PRINT"        infrequently and are extremely difficult to prove.  When"
12900 PRINT"        the government has evidence of fraud it usually pursues"
12910 PRINT"        criminal as well as civil actions against the contractor."
12920 PRINT"        If successful, the government receives double damages."
12930 PRINT
12940 PRINT
12950 PRINT
12960 PRINT
```

```
12970 PRINT
12980 PRINT
12990 PRINT
13000 INPUT"                                        To continue, press <ENTER>",P
13010 CLS
13020 PRINT
13030 PRINT
13040 PRINT
13050 PRINT
13060 PRINT
13070 PRINT"        Consider a situation where a contractor incorrectly"
13080 PRINT"    certified contr...t items as identical to ones previously"
13090 PRINT"    [government] approved.  In a similar event another"
13100 PRINT"    contractor failed to tell the government about a change"
13110 PRINT"    in material for a previously approved component."
13120 PRINT
13130 PRINT"        In both cases the contractor committed what looked"
13140 PRINT"    like fraud, but without an intent to deliberately mislead"
13150 PRINT"    the government.  This type of error is called a"
13160 PRINT"    gross mistake by the contractor and, like fraud, overturns"
13170 PRINT"    the conclusiveness of government acceptance.  However,"
13180 PRINT"    the government's burden of proof for gross mistakes, as"
13190 PRINT"    well as for fraud and latent defects, is significant."
13200 PRINT
13210 PRINT
13220 PRINT
13230 PRINT
13240 INPUT"                                        To continue, press <ENTER>",P
13250 CLS
13260 PRINT
13270 PRINT
13280 PRINT
13290 PRINT
13300 PRINT
13310 PRINT
13320 PRINT
13330 PRINT
13340 PRINT"        The final condition which can overturn government"
13350 PRINT"    acceptance is when warranties, (our discussion at the"
13360 PRINT"    beginning of this session), are explicitly provided for in"
13370 PRINT"    the contract.  As we saw earlier, warranties assure the"
13380 PRINT"    government has an avenue for recourse with the contractor"
13390 PRINT"    after acceptance has occurred."
13400 PRINT
13410 PRINT
13420 PRINT
13430 PRINT
13440 PRINT
13450 PRINT
13460 PRINT
13470 PRINT
13480 INPUT"                                        To continue, press <ENTER>",P
```

```
13490 COLOR 11,1
13500 CLS
13510 PRINT
13520 COLOR 14,1
13530 PRINT"                        SELF-TEST QUESTION"
13540 COLOR 11,1
13550 PRINT
13560 PRINT
13570 PRINT"      Complete the following statement."
13580 PRINT
13590 PRINT
13600 PRINT"      The burden of proof for latency, fraud, and gross mistakes"
13610 PRINT"      mistakes:"
13620 PRINT
13630 PRINT
13640 PRINT"          a.  rests on the contractor."
13650 PRINT"          b.  rests on the government."
13660 PRINT"          c.  is the responsibility of a civil court of law."
13670 PRINT
13680 PRINT
13690 INPUT"      Select a, b, or c, and press <ENTER> ",A$
13700 IF A$="A" THEN 13830
13710 IF A$="a" THEN 13830
13720 IF A$="B" THEN 13800
13730 IF A$="b" THEN 13800
13740 IF A$="C" THEN 13830
13750 IF A$="c" THEN 13830
13760 PRINT
13770 PRINT
13780 PRINT"      ("A$") is not a choice.  Try again."
13790 GOTO 13680
13800 PRINT
13810 PRINT"      Correct.  Let's continue."
13820 GOTO 13870
13830 PRINT
13840 PRINT"      Incorrect.  The correct answer is B.  The burden of proof"
13850 PRINT"                  in any of these three instances rests with"
13860 PRINT"                  the government."
13870 PRINT
13880 INPUT"                              To continue, press <ENTER>",P
13890 COLOR 14,1
13900 CLS
13910 PRINT
13920 PRINT
13930 PRINT
13940 PRINT"                          Concluding Remarks"
13950 PRINT
13960 PRINT
13970 COLOR 15,1
13980 PRINT"         Given the conclusiveness of acceptance and the"
13990 PRINT"      difficulties the government can have in proving claims"
14000 PRINT"      against a contractor, it is easy to see why the government"
```

```
14010 PRINT"      places such high priority on inspection programs.  Further,"
14020 PRINT"      the government's reliance on inspections as the primary"
14030 PRINT"      means of ensuring product quality has minimized the role"
14040 PRINT"      of warranties for many acquisitions.  However, when system"
14050 PRINT"      complexity or other factors suggest appreciable risk, the"
14060 PRINT"      government turns to warranties for continued assurance of"
14070 PRINT"      product quality after acceptance.  These two critical"
14080 PRINT"      mechanisms, inspection and warranty, are the government's"
14090 PRINT"      tools for ensuring it receives what it bargains for when"
14100 PRINT"      it makes purchases under contractual agreements."
14110 PRINT
14120 PRINT
14130 PRINT
14140 INPUT"                        To continue, press <ENTER>",P
14150 COLOR 14,1
14160 CLS
14170 PRINT
14180 PRINT"                        END OF LESSON"
14190 PRINT
14200 PRINT
14210 COLOR 15,1
14220 PRINT"      You have completed the computerized text portion of"
14230 PRINT"      this exercise.  Before proceeding to the quiz, please do"
14240 PRINT"      the following:"
14250 PRINT
14260 PRINT
14270 PRINT"      1.  Open the quiz envelope and remove the quiz."
14280 PRINT
14290 PRINT"      2.  Write the elapsed time shown on the blackboard on"
14300 PRINT"          the cover of your quiz."
14310 PRINT
14320 PRINT"      3.  On the computer keyboard, type the word SYSTEM and"
14330 PRINT"          press the <ENTER> key."
14340 PRINT
14350 PRINT"      4.  Turn off your monitor by depressing the ON/OFF"
14360 PRINT"          button at the front of your color monitor."
14370 PRINT
14380 PRINT"      5.  Open the quiz and answer the questions."
14390 PRINT
14400 END
```

Appendix C: End of Lesson Quiz

DIRECTIONS: Please circle the letter of the response which best answers or completes the following statements.

1. Though the terms in a contract can specify otherwise, government acceptance of a contractor's product can occur:

   a. prior to delivery of the product.
   b. at the time of delivery of the product.
   c. after delivery of the product.
   d. all of the above.

2. Government acceptance of contractor products:

   a. is not conclusive since the government has the discretion to return items despite its earlier acceptance.
   b. is conclusive, except for patent defects, fraud, gross mistakes, or warranties.
   c. is conclusive, except for latent defects, fraud, gross mistakes, or warranties.
   d. is not implied when government use or retention of the product interferes with the contractor's ownership.

3. Considering final inspection at a government facility, if a contractor's product is found defective and is not promptly removed, replaced, or corrected, the government:

   a. may terminate the contract for default.
   b. may remove or replace the defective product at the contractor's expense.
   c. both a and b.

4. A defect existing at the time of the government's acceptance which could have been discovered is a latent defect.

   a. True
   b. False

5. If the government elects to reject a defective product:

    a. it must allow the contractor to correct that defect
        if it can be repaired within the normal contract
        period.
    b. it is under no obligation to give a contractor the
        opportunity to correct the defect.
    c. it must notify the contractor no later than on the
        day of final product delivery.

6. In a contract dispute where the government submits that
    a defect is latent, the contractor might argue that the
    defect is, instead, patent.

    a. True
    b. False

7. The government's notice of rejection for nonconforming
    products does not have any specific format, but must
    always be in writing.

    a. True
    b. False

8. Express warranties:

    a. must have their duration spelled out in the
        contract.
    b. are required for contracts whose total costs exceed
        $1 million.
    c. need not physically appear in the contract when the
        contractor offers a Certificate of Conformance.

9. Implied acceptance by the government can result when
    timely notice of rejection is not given to the
    contractor.

    a. True
    b. False

10. The FAR indicates that resources for enforcing a
    warranty must be considered in the government's
    decision to include an express warranty in a contract.

    a. True
    b. False

11. The FAR specifies that a contractor must offer only
    those products which conform to contract requirements.

    a. True
    b. False

12. Since they are not specifically referenced in a
     contract, implied warranties are not binding on the
     contractor.

     a. True
     b. False

13. Unless otherwise stated in the contract, when the
     government conducts an inspection on the premises of a
     contractor or its subcontractor, the costs of the
     inspection are borne by:

     a. both the government and contractor, shared equally.
     b. the contractor only.
     c. the government only.

14. The Uniform Commercial Code has been applied to
     government contracts:

     a. by Boards of Contract Appeals.
     b. to substantiate implied warranties.
     c. when the government seeks criminal charges against
         a contractor.

15. FAR recommendations for choosing the place of
     inspection include:

     a. the amount of inspection performed to date.
     b. the requirements for special instruments available
         only at a specific location.
     c. availability of government TDY funds.
     d. supporting the best interests of the contractor.

16. An example of implied warranty of merchantability would
     be:

     a. the use of a microwave oven to warm food.
     b. the use of a ticket to reserve a particular seat
         assignment at a Cincinnati Reds baseball game.
     c. neither a or b.
     d. both a and b.

17. A Certificate of Conformance is submitted by the
     contractor to the government:

     a. to document the government's acceptance at a final
         inspection.
     b. when small losses would be incurred if the product
         should prove to be defective.
     c. when costs are below a threshold established by the
         FAR.
     d. none of the above.

18. The implied warranty of fitness for a particular
    purpose may be excluded from the contract either orally
    or in writing.

    a. True
    b. False

19. Exceptions to the FAR requirement that the contractor
    perform all inspections and tests are approved by:

    a. the government project manager.
    b. the contractor's program office.
    c. the government contracting officer.

20. When a contractor defaults on a warranty, the decision
    to accept an equitable price reduction rests with:

    a. the government contracting officer.
    b. the Boards of Contract Appeals.
    c. the government project manager.

Appendix D: Attitude Survey

Part A. Please circle the appropriate response or fill in
the blank as required.

```
AGE:   24 to 29
       30 to 35
       36 to 40
       41 to 45
       other:_____
```

```
SEX:   Male  or  Female
```

EXPERIENCE: Please indicate your current AFSC:_____.

Part B. Please use the five point Likert scale provided
below to evaluate the following statements.

```
5   Strongly Agree
4   Somewhat Agree
3   Neutral
2   Somewhat Disagree
1   Strongly Disagree
```

		(+)				(-)
a.	The structure of the program would be improved if the concepts or topics were presented in reverse order..........	5	4	3	2	1
b.	The program made it easy for me to distinguish main points from supporting details.......................	5	4	3	2	1
c.	The organization of the lesson prepared me to answer the quiz..........	5	4	3	2	1
d.	I could anticipate topics or concepts as I progressed through the lesson......	5	4	3	2	1
e.	The structure and order of presentation made it easy to learn the text material.	5	4	3	2	1
f.	The content of this course applies to my future career field...............	5	4	3	2	1
g.	Concepts were appropriately defined when they were introduced in the lesson......	5	4	3	2	1
h.	Using questions in the text is an aid to learning...............................	5	4	3	2	1

(+)   (−)

i. The lesson's instructions were easy
    to understand and execute................   5   4   3   2   1

j. Concepts were covered with the
    appropriate level of detail.............   5   4   3   2   1

k. If you answered 1 or 2 to the previous
    item, please specify areas of inadequate
    detail in the space below.

l. The end of lesson quiz was clear
    in both the questions asked and
    and responses provided..................   5   4   3   2   1

m. I would welcome taking another
    CBI lesson like this one................   5   4   3   2   1

n. In general, CBI is a good method for
    presenting learning material............   5   4   3   2   1

o. I would have learned the material
    in this lesson better from a
    paper copy..............................   5   4   3   2   1

p. Visually, the screens were attractive
    and uncluttered.........................   5   4   3   2   1

q. Visually, the screens were
    easy to read............................   5   4   3   2   1

r. If you answered 1 or 2 to the previous item,
    please indicate why in the space below.

Appendix E: Comments to the Attitude Survey

Participant comments to the attitude survey are provided below. The survey statements requesting these comments, as well as the scored statements preceding them, are provided to assist the reader in putting the responses in the appropriate context.

Response Area 1

Survey Item j: Concepts were covered with the appropriate level of detail.

Survey Item k: If you answered 1 or 2 to the previous item, please specify areas of inadequate detail in the space below.

Participant Responses to Item k:

1. Too much information in each paragraph. Long paragraphs made reading hard and retention difficult unless one reread the entire paragraph or portions of it.

2. I probably could not anticipate topics or concepts because the subject is not familiar to me.

Response Area 2

Survey Item q: Visually, screens were easy to read.

Survey Item r: If you answered 1 or 2 to the previous item, please indicate why in the space below.

Participant Responses to Item r:

1. Reading off a computer screen has no advantage over reading off a piece of paper. In fact, there was little or no ability to back-track if you didn't understand something. Taking advantage of a computer's ability to present graphics would have helped.

2. Paper copy allows for rereading if necessary. Use of only one paragraph or a list definitely made it easier and not intimidating (i.e., seeing a screenful).

3. Provide facility to back-up in lesson to review previous material (i.e., back-page). It would make the main points stand out more to put them in a different color.

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Vita

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13. ABSTRACT (Maximum 200 words) Recent experiments emphasize the need for further research to determine how to design and use computer-based instruction (CEI) with maximum effectiveness. This research addresses that need by investigating the differences caused by top-down or deductive and bottom-up or inductive curriculum (lesson) structuring in self-paced CBI. Three research variables were measured to investigate these differences: student learning (measured by performance testing), CBI course completion time, and student attitude toward the learning experience. Computer programs, written for each curriculum structure using BASIC programming language, were administered to students at the Air Force Institute of Technology in post-test randomized design experiments. Descriptive statistics and nonparametric tests were used to analyze these results. The nonparametric tests showed that the data was not statistically significant (at 0.1) for any of the three variables. This key finding indicated that CBI educators can use either curriculum structure with almost equal effect. In addition, the differences which resulted were used to develop scenarios where one variable was seen as the primary objective with the other two of lesser (but still essential) importance. Such an analysis offers guidance to CBI educators seeking the structure which maximizes their particular learning objective.

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