

THE EFFECTIVENESS OF COMPUTER ASSISTED  
INSTRUCTION (CAI) IN BASIC TEXTILES CLASSES

by

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## TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION . . . . .	1
Objectives of the Study . . . . .	2
Hypothesis . . . . .	2
Definitions . . . . .	3
Assumptions and Limitations . . . . .	4
II. REVIEW OF LITERATURE . . . . .	5
History of Computer Assisted Instruction . . . . .	5
Description of Computer Assisted Instruction . . . . .	7
Drill and Practice Computer Assisted Instruction . . . . .	8
The Computer in Textiles and Clothing Education . . . . .	9
Pros and Cons of CAI . . . . .	10
III. PROCEDURE . . . . .	17
IV. RESULTS AND DISCUSSION . . . . .	23
V. CONCLUSIONS. . . . .	28
REFERENCES CITED . . . . .	31
REFERENCE NOTES . . . . .	34
APPENDIX A - Student Consent Statement . . . . .	35
APPENDIX B - Practice Units . . . . .	37
APPENDIX C - Programming Examples . . . . .	71
APPENDIX D - Instructions for Computer Use . . . . .	75
APPENDIX E - Student Version of Computer Quiz . . . . .	77
APPENDIX F - Student Attitude Questionnaire . . . . .	83

## LIST OF TABLES

Table	Page
1 CAI Generated Question . . . . .	21
2 Analysis of Variance Data . . . . .	25
3 Results of Student Attitude Questionnaire . . . . .	26

## CHAPTER I

### INTRODUCTION

Joseph Marie Jacquard introduced an automated loom in 1801 which controlled each individual warp yarn by a system of punched cards (Joseph, 1972). This gave Herman Hollerith the idea to use similar punched cards in the calculation of the 1890 census. These two inventions are said to have been the forerunners to the first large-scale electronic computer which was developed in 1946 (Stolurow, 1971). With a hand in the history of the development of such an influential piece of equipment, it seems only fitting that textiles and clothing educators utilize the computer as an educational tool.

Stolurow (1971) defined Computer Assisted Instruction (CAI) as a way of individualizing instruction by using the capabilities of the computer to provide interactive experiences. Ellinger and Franklin (1976) described CAI as an aid to the instructor in the introduction and/or reinforcement of important course concepts. They also suggested that the computer is a tool which can save an instructor valuable time which could be spent with students, and on other aspects of a course. Anastasio (1972) expressed the opinion that a CAI program is potentially a text, teacher, remedial specialist, an audiovisual specialist, a guidance counselor, and an administrator (p. 26) all rolled into one. Vinsonhaler and Bass (1972, p. 29) stated that "in controlled studies applying drill and practice to language arts and mathematics, there seems

to be rather strong evidence for the effectiveness of CAI over traditional instruction where effectiveness is measured by standardized achievement tests."

These descriptions and opinions, plus the facts that the computer can give immediate reinforcement to a student's response, and can act as an unbiased and patient evaluator, make CAI theoretically a very attractive teaching tool; one at least worthy of a test for its effectiveness in textiles and clothing education. A review of CAI literature disclosed that controlled studies have been undertaken to measure the effectiveness of CAI in mathematics, the sciences, language arts, business, economics, humanities, and many other areas, but little is known about the applicability of CAI to courses in introductory textiles.

#### Objectives

This study was designed to implement CAI in Basic Textiles classes at Kansas State University by developing practice questions for the first six weeks of the textile classes and programming the questions in a drill and practice mode using a course author language in A Programming Language (APL). The purpose of the study was to measure the difference in test scores between an experimental group of students utilizing CAI, and a control group using a traditional pencil and paper homework method for answering the practice questions, and to evaluate student attitudes regarding the instructional method they used.

#### Hypothesis

This study was designed to test the null hypothesis that there will be no significant difference between competencies of students,

as measured by their test scores, in a control group completing their homework in a traditional pencil and paper manner, and students in an experimental CAI group.

#### Definitions

- CAI (Computer Assisted Instruction) is defined by Stolurow in the Encyclopedia of Education (p. 390) as a way of individualizing instruction by using the capabilities of the computer to provide interactive experiences.
- Computer is defined as an electronic device capable of accepting information, applying prescribed processes, and supplying information. It typically consists of input and output devices, storage, arithmetic-logical units, and a control unit. It accomplishes its functions in a sequence defined by a program (Stolurow, 1971, p. 390).
- Terminal refers to the typewriter device which provides the mechanism for communication between the student and information stored by the instructor.
- CAL/APL (Computer Assisted Learning/A Programming Language) is an English based CAI programming language designed for non-programmers. (Maccauley, 1971, p. iv).
- Practice unit is the term used by the researcher to refer to the weekly set of objective questions required as homework for both the control and experimental students. Each practice unit corresponds to the laboratory topic for the same week.
- Control group refers to the students who completed the practice units in a traditional pencil and paper homework method.

- Experimental group refers to the students who utilized the computer for completion of their weekly practice units.
- Drill and practice is defined by Vinsonhaler and Bass (1972, p. 30) as a CAI system designed to assist a learner in maintenance and improvement of a skill.

#### Assumptions of the Study

- The sample used for this study is representative of students enrolled in other semesters at Kansas State University in the basic textiles course.
- The results of this study are representative of an entire semester of CAI use.
- The instructors and the examinations written are representative of other semesters for the same course at Kansas State University.
- The instructors will present an unbiased attitude about CAI to their students.
- The content of the practice units agrees with the goals of the class and is helpful to the students in preparation for exams.
- No adverse effects on the learning process of the students will occur due to the study.

#### Limitations of the Study

- The practice units were restricted to objective questions by the CAI programming language.
- The inability to make the computer terminals more available to students.

## CHAPTER II

### REVIEW OF LITERATURE

#### History of CAI

In the 1920's, S. L. Pressy invented a teaching machine which automatically gave and scored a test. Through his labor saving effort, he discovered that the students were benefitting by being immediately informed of the accuracy of their response. Several other teaching machines were developed by others, including machines with branching capabilities in case students had difficulty with a particular concept. Then, in the 1950's, B. F. Skinner, who had devoted many years to researching the psychology of learning, introduced a theory which supported use of the earlier teaching machines (Kay, 1964). These developments set the stage for the introduction of the computer to education.

The first large-scale computer, ENIAC, was built in 1946 (Stolurow, 1971). It was not until 1959 however, that the computer was first demonstrated as an instructional tool (Hall, 1971). In 1966, IBM introduced the first computer actually designed for use in instruction (Hall, 1971). By this time, the potential for using computers in education was being realized. There is still little agreement concerning a uniform definition of CAI. As an example of this disagreement, Stolurow (1971, p. 394) divided CAI into seven modes:

- 1) Problem solving. The student must know a computer language and write a program to solve his problem.
- 2) Inquiry. Information can be stored and data retrieved when needed.
- 3) Drill and practice. Questions or problems are stored and presented to the student upon his request.
- 4) Simulation. A laboratory exercise or real-life experience can be set up with which students can interact.
- 5) Gaming. This mode is very similar to simulation in that the student has a great deal of control over input.
- 6) Tutorial. In this mode, dialogue is used extensively. The questions asked can be based on student aptitude or personality determined from previous tests, or on student preference, area of interest, or previous response history.
- 7) Self-teaching. Allows review, exploration and browsing, and a student may even ask questions or use the computer for problem solving.

Bell (1972, p. 26) preferred to list three general relations of computers to instruction. The computer can act as, 1) the object of instruction, 2) the manager of instruction, and 3) the medium of instruction. He then further divided use of the computer as the medium of instruction into four modes:

- 1) Tutorial mode. The computer asks a question and the student responds.



- 2) Inquiry mode. The computer presents a problem and references the student may consult for assistance. The student is able to obtain information from the computer to use in answering the original problem.
- 3) Simulation mode. The computer is an information processor and a problem solver.
- 4) Problem-solving mode. The student solves problems by learning a programming language and writing programs to solve his particular problem.

#### Description of CAI

With the variety of uses outlined above for CAI, and the realization that CAI is a formative technology, it is understandable that there are a variety of definitions for CAI. A comprehensive definition in the Encyclopedia of Education describes CAI as a way of individualizing instruction by using the capabilities of the computer to provide interactive experiences (Stolurow, 1971). A design of the information to be imparted to students must be drawn up. The design should include sequencing of information (Schoen, 1974), positive reinforcement of students' accomplishments, and some humor. The design may include references to special learning aids to assist students with difficult concepts. The instructional design must be programmed into the computer and the program must be written in a precise language with a carefully defined set of characters. There are many CAI languages in existence which are based on the English language for easy use by nonprogrammers. The CAI languages often work well with only certain computer systems, however. The

CAI languages are similar, but each has its own individual characteristics (Stolurow, 1971).

The stored instructional program is communicated to students through input/output devices referred to as terminals. A terminal must have a means of presenting material to the student and must provide a method by which the student can respond to the material. The most common terminal types are hardcopy typewriter terminals, and cathode ray tubes (CRT) which present material on a screen resembling a television. The student makes responses by typing on the keyboard, or, in the case of the CRT, may also touch the screen with a lightpen. Terminals are often connected to the computer through telephone lines. This is called teleprocessing. When the student using the terminal makes a response, the computer evaluates the response and transmits a message to the student before presenting the next block of information (Stolurow, 1971).

Hardcopy terminals are advantageous in that the student may retain a copy of the CAI session. The CRT is helpful for testing, however, no permanent copy of the test is generated. This may be useful if an instructor prefers that students do not keep copies of the tests.

It is possible to program the computer to store information about each student and his or her areas of difficulty with the subject matter. This information can be called for by the instructor, and can be used to modify the class structure or to give students personal attention.

#### Drill and Practice Computer Assisted Instruction

Drill and practice is one of the CAI modes defined by Stolurow (1971, p. 394) as the use of the computer to guide, control, and

monitor a task by repetition. The goal of drill and practice is the development of a predetermined level of proficiency in a skill (Salisbury, 1971, p. 48). Nold (1975) indicated that the computer is well suited for drill and practice CAI because it is patient and unbiased, but drill and practice is definitely not the only role CAI should take. Nold also suggested that drill and practice is well suited to certain student needs, but warns that drill and practice programs should incorporate creativity and humor. Bell (1974) has not been supportive of the drill and practice mode. He is supportive of other CAI modes, but believes that drill and practice and immediate reinforcement can inhibit the development of problem solving skills.

#### The Computer in Textiles and Clothing Education

A review of research in the Clothing and Textiles section of the American Home Economics Association Research Abstracts indicated that educators in textiles and clothing did a great deal of research with programmed instruction, but did not pursue CAI with equal vigor. This literature search revealed the following applications of computers in textiles and clothing education:

- Individual testing by computer in a clothing selection course was tested at Oklahoma State University in 1970 for master's thesis research by Winellen Wilkins. The computer generated testing proved successful and future research was planned (Wilkins and Sisler, 1971).
- Linda K. Good researched the feasibility of computer generated testing via the cathode ray tube in a basic clothing construction course at Oklahoma State University in 1972. The study revealed

that the computer generated testing was successful, but time consuming to set up and costly to maintain (Good, 1972).

-Computer Assisted Instruction in a Profitable Merchandising Analysis class at Oklahoma State University was studied in 1975 by Theresa L. Smith Shell (Smith Shell, 1975).

-At a workshop on computer use in Home Economics sponsored by the American Home Economics Association in 1972, participants wrote programs relating to American Indian Dress, stain removal, new fibers, and fabric finishes (Magrabi, 1972), but it is not know if any of these programs have been put to use.

-Permanent, full-scale use of CAI in clothing and textiles is in operation at Nebraska University. An interview with Dr. Joan Laughlin in the Department of Textiles, Clothing, and Design, revealed that CAI has been used since the 1974 - 1975 school year in both fashion merchandising classes and introductory textiles classes. The CAI in the textiles classes at Nebraska is in conjunction with the textile laboratory. A booklet with background information on specific topics is placed at each computer terminal. The students follow the information in the booklet, then answer practice questions which are generated and evaluated by the computer (Laughlin, Note 1).

#### Pros and Cons of CAI

At the 1972 workshop on computer use in Home Economics, Gordon Bivens described the purpose of the workshop as "to keep Home Economics growing and at the cutting edge of educational developments" (Magrabi, 1972, p. 25). At the same workshop, Ernest Anastasio

listed six problems with computer use in education (Magrabi, 1972, p. 26):

- 1) Production and distribution of instructional materials
- 2) Not enough positive proof of the effectiveness of CAI
- 3) Cost
- 4) Not yet a great enough understanding of the instructional process
- 5) Hesitance about the prospect of restructuring the traditional role of the instructor
- 6) Need for more technical research and development in computer hardware and software.

While realistically listing these problems, Anastasio also stated "the computer is potentially a text, a teacher, a remedial specialist, an audiovisual specialist, a guidance counselor, and an administrator" (p. 26). A review of opinions concerning the six problems Anastasio listed regarding CAI may indicate the reason behind this apparent contradiction.

The first problem Anastasio listed was production and distribution of instructional materials. Anderson (1974) observed that if educators do not develop good CAI materials, no one will promote the use of CAI, but if no one promotes CAI, there will not be a market for CAI materials. Frances Gailey (1973) in a review of literature for a study entitled An analysis of development/use time ratios for a computer assisted instruction unit on basic household electricity, found that estimated figures for preparation time of CAI materials to student use time ranged from 25 - 200 preparation hours to one hour

of student on-line time. This is almost out of the question for instructors with a full class load. It takes not only the expertise of an educator in the subject matter area, but also a CAI technologist to develop a CAI program. Also, most CAI programs may be difficult to transfer from one computer to another (Watson, 1971). Watson advocated the integration of CAI technology into the teacher education curricula for all disciplines. Another attempt at overcoming the problems of production and distribution of CAI materials is the development of CAI languages which are English language based. This makes it possible for nonprogrammers to program CAI material and shortens the time required for programming (Koffman, 1974).

The second problem Anastasio listed was that there is not enough positive proof of the effectiveness of CAI. There are a wide variety of opinions concerning this problem. Mesthene (1970) is opposed to CAI until it can be determined that CAI's effect will not be the dehumanization and standardization of the American educational system. He believes "There is more to education than the promotion of efficiency or the imparting of occupational skills. Education also has the functions of socializing individuals, of shaping their values, of preparing for citizenship, of conserving traditions, and of imparting some sense of awe before the wonders of the universe" (p. 391). Nold (1975) emphasized the fact that computers and television do not control our minds by their own violation (p. 269). She challenged humanists to utilize the computer to "perpetuate the good and wondrous in man" (p. 269).

For those educators who are not concerned with the adverse

dehumanizing effects feared with CAI, another consideration is whether there are benefits to its use. "It has yet to be proven that instruction based on individual differences where numerous branches and tracts are constructed all leading to the same instructional goal, is more effective in terms of learning, retention, or time to criterion than simpler instructional systems" (Watson, 1971 p. 83). Kysilka, Edwards, Norton, Taylor, Weiss, and Dusseldorp (1975) concluded from a review of CAI research that when CAI was provided in addition to traditional classroom instruction, the CAI supplementation method was always the most successful. They added however, that CAI aids in speeding the learning process, but there is evidence that students learning by traditional methods may retain more. Vinsonhaler and Bass (1972) reviewed ten studies on CAI drill and practice and found strong evidence for the effectiveness of CAI over traditional instruction when effectiveness was measured by standardized achievement tests. The factors responsible for this success is unknown however. Vinsonhaler and Bass suggested three possibilities for CAI's success:

- 1) the novelty of instructional technique,
- 2) a change in teacher behavior (CAI requires organization and evaluation of class content), and
- 3) a change in student behavior (students spend more time with material).

Hall (1971) believed that CAI is effective because it allows frequent and active responding by students, frequent feedback, positive reinforcement, and individualization in that students must



master predetermined criterion levels.

Hess and Tenezakis (1973) discovered through their research with CAI that students had a more favorable image of the computer than of the teacher. Students rated the computer as high in expertise, high in fairness, and low in mistake making. Results of a three year study of innovative teaching methods sponsored by the U.S. Office of Education led to the warning that "Educational innovation will not necessarily produce dramatic effects on student achievement. Educational quality is not synonymous with innovation and individualization" (Topeka Daily Capital, 1976).

Educators have been successful at minimizing the tedious and repetitious activity of scoring homework and tests by implementing CAI (Christopher, 1974). Hill and Furst (1969) suggested that utilizing a computer could lead to a more effective learning environment because the instructors could spend more time leading discussions, working with individual students or small groups, and developing laboratory work where applicable.

Cost is the third problem listed by Anastasio. The cost of CAI depends entirely upon the system being used and has historically been too high to be justified for many institutions. Technology may, however, solve this problem in the near future. The new miniaturized computers and time sharing capabilities make CAI much more economically feasible (Turner, 1973).

Anastasio's fourth problem of not a great enough understanding of the instructional process relates to problem two, i.e., there is little more known about individual differences in learning than



thirty years ago (Watson, 1971). A greater understanding of learning behavior could lead to more effective use of CAI.

Hesitance about restructuring the traditional role of the teacher is a real and relevant problem presented by CAI. Hicks (1970) saw CAI as an outlet for an instructor's creative interests in education. Instances of CAI failure have been blamed on unimaginative and dull programming (Nold, 1975). This implies such responsibility that many instructors do not wish to author their own CAI programs. If an instructor adapts a commercial program however, there must still be a change in the instructor role. A computer cannot be substituted for a teacher, just as books and films alone cannot be substituted. But, a good teacher should make use of available resources; one of which is the computer (Nold, 1975). The computer is not a total instructional system (Watson, 1971). Kopstein (1970) believed that CAI could potentially change the role of the instructor from the traditional role to one of instructional design and strategy. This role would require a higher level of professionalism than implied by current certification practices. Kopstein feared however, that "mediocre teaching talent will feel most threatened by CAI and act defensively" (p. 52). This concept may lead eventually to the failure of CAI because of the belief that education is doing fine without it (Christopher, 1974). With the use of CAI, instructors will have more free time to guide the learning of students in ways that only a human being can (Hill and Furst, 1970).

Anastasio's final CAI problem deals with the need for technical research and development in computer hardware and software. This problem is closely related to that of production and distribution of

instructional material. Authors would be more likely to prepare materials if computer hardware and software were more suited to CAI (Stolurow, 1971).

The varied opinions previously stated present the current dilemma with CAI. Kopstein (1970) was afraid that instructors might rush into use of CAI for professional recognition without carefully weighing the problems involved and without waiting for the problems to be resolved. He predicted that this may lead to failure of CAI because the instructors are likely to fail in their implementation of CAI.

The delay involved in solving CAI problems may, however, be worthwhile. It has been said that the "future of education will be changed more by computers than by any other force" (Adams, 1971, p. 8). The truth of this statement may be observed in the development of a mobile CAI laboratory in Pennsylvania making college classes more accessible to rural teachers (Hall, Cartwright, and Mitzell (1974). Other examples include research projects measuring the social effects of CAI (Marshall and Maguire, 1971), and studies determining personality traits which affect student success with CAI (Majer, 1970).

## CHAPTER III

### PROCEDURE

A six week study measuring the effectiveness of Computer Assisted Instruction (CAI) in basic textiles classes was implemented in the spring semester, 1977, by the Department of Clothing, Textiles, and Interior Design at Kansas State University.

Basic Textiles is required for all Clothing, Textiles, and Interior Design majors at Kansas State University, and is an elective of other Home Economics majors. Eighty to one hundred and twenty students enroll in Basic Textiles each semester. Most of these students are sophomores. The class usually consists of four sections which meet twice a week for a one hour lecture, and once a week for a two hour laboratory. In the spring semester, 1977, one instructor taught two of the sections and two other instructors taught the other two sections. Each instructor had a graduate teaching assistant to assist with the laboratory.

Each week, the students were required to hand in a write-up of the weekly lab experiments, plus their answers to a set of questions which corresponded to the topic of the laboratory.

The participants in this study were the students enrolled in Basic Textiles at Kansas State University spring semester, 1977. All of the students were given a written explanation of the study and asked to sign a consent statement if they were willing to participate in the study. The consent form may be found in Appendix A.

Each of the four sections of Basic Textiles was divided into a control group and an experimental group by pairing students with grade point averages (GPA) as nearly equal as possible. The GPA's were obtained from the student consent statements. Pairing of students was performed to insure that students of approximately the same achievement levels were compared.

To implement this study, practice questions covering the topics of the first six textile laboratories were developed by the researcher. The questions were then reviewed by the three basic textiles instructors whose classes would be involved in the study, and revised according to the suggestions of the three instructors. Content for the practice questions (referred to as practice units) was drawn from experience of the researcher, departmental test files, textile reference texts (Corbman, 1975; Harries and Harries, 1974; Hollen and Saddler, 1973; Joseph, 1972; Labarth, 1975; Lyle, 1976; Pankowski and Pankowski, 1972; Textile Handbook, 1979; Wingate, 1976) and consultation with Dr. Theresa Perenich, Head of the Department of Clothing, Textiles, and Interior Design (Perenich, Note 2). The practice units covered the following topics:

Practice Unit 1 - Textile Labeling and Legislation

Practice Unit 2 - Textile Standards and Textile Testing

Practice Unit 3 - Textile Finishing

Practice Unit 4 - Applied Design

Practice Unit 5 - Weaves

Practice Unit 6 - Detergency

The complete practice units appear in Appendix B and the correct answers are starred.

The control group in each class was issued a practice unit in printed form in the laboratory each week. The students answered the questions on their own time and handed them in with their laboratory write-up for grading and recording. The scored questions were returned to the students the following week. The experimental group utilized the computer to answer their practice units. Both the control and experimental groups received 10 points for completing the units regardless of their actual score.

The practice units were programmed by the researcher with the use of the CAL/APL Author's Manual prepared by Thomas Macauley of the Information Services and Computer Facility of the Coast Community College District, California, 1969, and with the aid of a computing center consultant. An example of the program of each type of objective question used in the practice units (multiple choice, true-false, and fill in the blank) is seen in Appendix C.

The computer system at Kansas State University is an IBM S/370 Model 158 central processing unit. (For more information concerning the computing facilities at Kansas State University, see Introducing the Kansas State Computing Center, 1975, available from the Computing Center, Room 10 Cardwell Hall, Kansas State University, Manhattan, KS 66506.) The available CAI language at Kansas State University is CAL/APL (Computer Assisted Learning/A Programming Language). CAL/APL is an English language based system designed for nonprogrammers. It provides the ability to (Macauley, 1971): 1) enter drill and practice questions and present the material; 2) evaluate student responses, prompt them to try again if they answer incorrectly, and

give the correct answer with reasons why the answer is correct; and  
3) calculate a student's score upon completion of a unit.

The input output devices used were two IBM 2741 communications terminals, which are interactive hardcopy typewriter terminals connected to the central computer by dialed telephone lines. These terminals were installed in the Department of Clothing, Textiles, and Interior Design for student use to alleviate overcrowding of existing facilities, to eliminate possible problems due to inaccessibility of existing terminals to students, and to eliminate the unfamiliar atmosphere of the on-campus remote computing labs. The terminals were available for student use weekdays from 9:30 a.m. - 5:00 p.m. and 6:30 p.m. - 10:00 p.m.

An orientation program was prepared for use in a demonstration session for the experimental group. A demonstration was given to the experimental group in each class. Each student in the experimental group also was given an instruction sheet on the use of the computer (Appendix D). A poster highlighting the computer procedure was posted in the computer terminal room, and a list of instructors who could assist with any problems the students might have was posted at each terminal.

An example of a CAI practice unit question appears in Table 1. The starred lines are those typed by the student. As soon as a student signed on to the computer, the terminal typed a question and waited for the student to respond. The computer then evaluated the student response and generated a positive statement if the response was correct. If the response was incorrect, the terminal typed the

correct answer and a brief explanation of why it is correct. All multiple choice questions give the student a second chance to respond with the correct answer. An entire practice unit may be seen in Appendix E.

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Table 1

CAI Generated Question

14) Phosphates are:

- A) The most successful detergent builders used so far
- B) The sole determinants in eutrophication of lakes
- C) Harmful to flame retardant finishes
- D) All of the above

\*C

No, go ahead and try again

\*B

No, the right answer is A. Phosphates are the most successful detergent builders used to date.

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During the course, each instructor independently prepared two tests covering the subject matter in the six units. An analysis of variance was used to compare the test scores of the control group with the experimental group within each section. The level of significance used was 0.05. Data from 80 students (40 experimental

and 40 control) were available upon completion of the study.

The students also completed an attitude questionnaire (Appendix F). The students were asked to rate the method which they used to complete the practice units on a scale from 1 to 5. A rating of one indicated extreme dislike of the method and a rating of five indicated a highly favorable attitude toward the method. Students were also asked for any additional comments on the experience. The questionnaire asked for a general attitude of both groups to the method they used for completing the practice units.

For purposes of this study, it was assumed that the sample of students used was representative of basic textiles students enrolled in other semesters at Kansas State University, and that the results of this study are representative of an entire semester of CAI use. It has also been assumed that the instructors and their examinations are similar to those given in other semesters at Kansas State University, and that the content of the practice units agreed with the goals of the class and was helpful to the students in preparation for exams. In addition, it was assumed that no adverse effects on the learning process of the students would occur due to the study, and that the instructors would present an unbiased attitude regarding CAI.

Limitations of the study included a restriction to objective questions due to the programming language, and the inability to make the computer terminals more available to students.



## CHAPTER IV

### RESULTS AND DISCUSSION

#### Results

The purpose of this study was to measure the difference in competencies, as determined by test scores, of an experimental group of students utilizing Computer Assisted Instruction (CAI) and a control group using a traditional homework method, and to evaluate student attitudes toward the method they used. Test scores of the students were compared by an analysis of variance. Student attitudes were determined by evaluating student responses to an attitude questionnaire.

Results of an analysis of variance on the mean student test scores indicated that, at a 0.05 level of significance, there was no significant difference between the scores of the control group and the experimental group. One hundred percent of the students participating in the study returned the attitude questionnaires. Student responses on the questionnaires indicated attitudes about the method used on a scale from 1 to 5.

- 1 = extremely disliked the method
- 2 = disliked the method
- 3 = no feeling one way or the other
- 4 = liked the method
- 5 = liked the method very much

An evaluation of student responses showed that only four

students out of forty in the experimental group rated the method lower than four. Five students out of the forty subjects in the control group rated the traditional homework method lower than four.

#### Discussion

It was hypothesized that there would be no significant difference between competencies, as measured by test scores, of students in the control group, and students in the experimental CAI group. Results of this study (summarized in Tables 2 and 3) suggested that there was no reason to reject this hypothesis. No difference was discernable between the effectiveness of either group.

Student attitudes regarding both methods were very positive. Seventeen of the forty experimental subjects rated CAI as 5, and twenty of the forty control subjects rated the take-home method as 5.

The student comments pertaining to the practice units themselves were very positive. Students in both the experimental and control groups commented that the practice units provided a good study aid for tests and assured that they keep up with the material week by week. Six students remarked that the lectures and text did not contain all the information required to answer the questions. All six of these students were in the control group, and five were from one lecture section. Two students commented that they did not spend much time on the questions because they received 10 points regardless of their actual score, and because they felt this was such a small part of their total class grade.

The CAI group was positive about using the computer because it gave them a second chance to answer the multiple choice questions, it immediately confirmed the validity of the responses, and it

Table 2  
Analysis of Variance Data

Source	degrees of freedom	sum of squares	mean squares	F
<u>Main Plot</u>				
Instructor	3	4003.52	1334.50	12.134*
Pairs + Instructors	36	3959.02	109.972	-
<u>Sub Plot</u>				
Experimental vs. Control	1	66.98	66.98	1.075
Instructor x Experimental vs. Control	3	451.57	150.52	2.416
Subplot Error	36	2242.62	62.29	-

\* .05 level of significance

Table 3  
Results of Student Attitude Questionnaire

Section	CAI rating				
	5	4	3	2	1
1	*****	*****	*	-	-
2	***	*****	-	-	-
3	***	*	-	***	-
4	*****	*****	-	-	-
Section	Control rating				
	5	4	3	2	1
1	*****	****	****	-	-
2	****	****	-	-	-
3	***	****	-	-	-
4	*****	****	-	*	-

explained why the answer was correct. However, thirty-five percent of the CAI group indicated that waiting in line, and technical problems with the computer caused problems. These were the reasons given for the four ratings out of forty lower than 4 given to the CAI method. Four CAI students had difficulty fitting time in their schedules to go to the terminals, and one of the students felt rushed by the computer. Frequently, there was a 3 to 5 minute pause after a student signed on the computer before the practice unit began to function. One student experienced slowness between her responses and generation of the following question. Of the forty students involved in CAI, two students remarked that using the computer was fun and recommended continuance of CAI.

## CHAPTER V

### CONCLUSIONS

The findings of this experiment failed to support definite conclusions about which method, CAI or traditional homework, is more effective in basic textiles classes when effectiveness is measured by comparing student test scores. It can be concluded that there is little distinction between CAI and traditional homework in promoting learning. Both instructional approaches appear to be effective methods with high acceptance among students.

Based on discussions with faculty members whose students participated in this study, and from the high rate of positive comments from the students in both groups on the practice units, it may be assumed that the benefit of the study was the development of the practice units, and not the method of presentation. From an observation of the potential of CAI however, the researcher believes that CAI can be used successfully in departments of textiles and clothing, especially since the cost of CAI is decreasing. A CAI system can perform scoring and grading for the instructor, and provide educational benefits for the student.

In a planning session for this research with Dr. Tom Gallagher, Director of the Computing Center, it was determined that seven one hour sessions could be scheduled on each terminal during the day. This totaled 70 possible one hour sessions a week at a minimum with two terminals. Only forty students used the terminals, and each

practice unit required approximately half an hour. Two terminals appeared to be more than sufficient to prevent lines at the terminals, especially since the terminals additionally were available at least three hours every evening. Perhaps a method of scheduling time would prevent waiting for a terminal. The slowness of the terminals could be solved with the availability of technology, interest, and funds.

The problem occurring with material not being covered in lecture could be rectified if an individual instructor were responsible for CAI content. In fact, CAI could be very helpful in reinforcing or even introducing material in classes where there is not enough time allotted to present additional material.

Discussions with students who used CAI led the researcher to believe that the attitude of the instructor toward CAI greatly influenced the student's attitude toward CAI. Students whose lecture instructors had a very positive attitude toward CAI seemed more patient and understanding when technical difficulties occurred with the terminal or computer. The researcher also believes that the "mysteriousness and awe inspiration" often connected with computers by those with little exposure to them should be dispelled by the instructor utilizing CAI. Students appear to have greater success with the mechanics (for example signing on) of using the computer if they feel they have control of the situation and are not fearful of damaging the computer. Presumably, understanding that the computer is merely a tool reduces anxiety.

If an instructor is creative, realistic about his or her students, and is realistic about what to expect from CAI, it may be a

beneficial instructional tool. In specific relation to textiles and clothing, a new direction for CAI would be the development of a CAI program in the simulation mode for use in textile laboratories; especially advanced classes. The computer has the ability to simulate conditions that would not be feasible, nor possible, to reproduce in a laboratory situation.



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APPENDIX A

Student Consent Statement

The four sections of Basic Textiles will be involved in a six week research project this semester. The research involves computer assisted instruction. Your class will be divided into two groups chosen randomly by the experimenter. The only difference between the two groups will be the method by which your required homework questions will be completed. Neither group will receive any more privilege or burden than the other group. Any personal information collected about you will be kept strictly confidential and will be coded for reference in any resulting publication of the research.

If you have any questions concerning the study at this time or during the six week span of the study, please feel free to discuss them with your lab or lecture instructor.

To give your consent to participate in this study, please complete the information below and return the form to your instructor.

Thank you

-----  
Name

-----  
G.P.A.

(as close as you  
can remember)

-----  
Year

-----  
Social Security No.

Lecture Instructor:   \_\_\_ Cabradilla  
                              \_\_\_ Munson  
                              \_\_\_ Ordoñez

I agree to participate in this study on the condition that I may withdraw my participation at any time.

-----  
Your Signature

**APPENDIX B**

**Practice Units**

## UNIT 1 - TEXTILE LABELING AND LEGISLATION

There is only one answer for each question unless specifically indicated in the question.

- 1) The Fur Products Labeling Act (FPLA) became effective in 1951 and was amended in 1969. Which of the following is NOT required to appear on labels which accompany textile products containing fur fibers?
  - A) Whether or not the item contains damaged, used, dyed, or bleached fiber
  - \*B) Care procedures
  - C) Name of the fur bearing animal, and its country of origin
  
- 2) The Fur Products Labeling Act prohibits labeling of fur products with fictitious names. Does it also prohibit the use of bleached fibers in new fur products?
  - \*A) No
  - B) Yes
  
- 3) The Wool Products Labeling Act (WPLA) was passed in 1939, and amended in 1965. It was enacted to protect consumers from the unrevealed presence of substitutes and mixtures in wool products. Which of the following is NOT required by the WPLA?
  - A) percentage of each fiber type present
  - B) classification of wool fiber (reused, reprocessed, or wool)
  - C) elimination of false or deceptive labels on wool products
  - \*D) country of origin and animal name
  
- 4) Can a product be labeled wool if it does not come from a sheep?
  - A) No
  - \*B) Yes
  
- 5) Are wool carpets, rugs, and upholstery fabrics included in the Wool Products Labeling Act?
  - \*A) No
  - B) Yes

The Wool Products Labeling Act classifies wool fibers as new wool, reprocessed wool, or reused wool. Match these terms with the correct definitions in the next three questions.

A - new wool

B - reprocessed wool

C - reused wool

\*\*The questions marked by a double asterisk have been taken in part or fully from Textiles Decision Making For The Consumer by Harries & Harries, 1974, McGraw-Hill Inc. They are used with permission of McGraw-Hill Book Company.



- 6) B Composed of wool fibers that have previously been made into textile products but have never been used by the ultimate consumer.
- 7) A Composed entirely of wool fibers that are being processed for the first time.
- 8) C Composed of wool fibers that have been rewoven from materials which have been used by consumers.
- 9) Of the three categories of wool, (new wool, reprocessed wool, and reused wool), which is usually considered to be of the highest quality?
- \*A) new wool
  - B) reused wool
  - C) reprocessed wool
- 10) Would a product labeled wool necessarily be more durable than a product labeled reprocessed wool?
- A) Yes
  - \*B) No
- 11) Is fabric labeled virgin wool necessarily better quality than fabric labeled wool?
- \*A) No
  - B) Yes
- 12) Would a label on a wool product which stated "part wool" be in compliance with the Wool Products Labeling Act?
- \*A) No
  - B) Yes
- 13) The symbol in figure 1 is:
- \*A) a registered certification mark of the Wool Bureau Inc. to promote products of 100% high quality new wool
  - B) used to designate virgin wool and is specifically defined under the Wool Products Labeling Act.
  - C) required to appear on all garments constructed of 100% wool
  - D) a manufacturer's trademark
- \*\*14) Is the following statement true or false? The WOOLBLEND mark was introduced to provide consumer identification with blended wool products meeting certain quality and performance specifications.
- \*A) True
  - B) False

- 15) The Textile Fiber Products Identification Act (TFPIA) officially established categories and definitions of:
- A) care procedures
  - B) natural fibers
  - \*C) manmade fibers
  - D) trade names
- 16) The names of manmade fibers specified by the TFPIA are called:
- \*A) generic names
  - B) trade names
  - C) common names
  - D) certified names
- 17) Which of the following (there may be more than one) are required by the TFPIA to be present on labels?
- \*A) percent fiber content by generic name in order of predominance
  - \*B) manufacturer's name or registration number
  - C) care procedures for the item
  - D) trade name of the fiber
  - \*E) country where the item was manufactured if it was imported
- 18) Is the following statement true or false? Generic names group together fibers that are similar in chemical composition.
- \*A) True
  - B) False
- 19) Is the following statement true or false? The TFPIA covers textiles used in wearing apparel, costumes, accessories, draperies, floor coverings, furnishings, bedding, and other textile goods of a type customarily used in a household regardless of place where used.
- \*A) True
  - B) False
- 20) Is the following statement true or false? The TFPIA requires labels to be permanently attached to the product.
- A) True
  - \*B) False
- 21) In which of the following instances would a fiber be labeled by generic name if it is present in an amount less than 5%?
- \*A) if it serves a clearly established and definite function
  - B) if it is included for appearance
  - C) if its name would make the product sell better.

22) Furniture, pillows, and mattresses contain labels which state "do not remove under penalty of law." Can the ultimate consumer legally remove this tag?

- A) No
- \*B) Yes

23) According to the TFPIA, the fiber content of linings, sewing thread, upholstery fabric, padding, filling, and interlinings:

- A) must appear on the garment label
- B) appears on the label only if the fiber content of the lining is different from the rest of the garment
- C) is labeled by trade name only
- \*D) does not need to be present on the label

Match the following terms with the correct definitions in the next three questions.

- A - inflammable
- B - nonflammable
- C - flame resistant

24) A The fabric, once ignited, will burn unassisted.

25) C The fabric will burn slowly if exposed to an open flame, but will self-extinguish if the source of the flame is removed.

26) B The fabric will not burn or contribute to combustion when exposed to a flame.

27) Is the following statement true or false? Upholstery stuffing does NOT need to be labeled unless it has been used previously.

- \*A) True
- B) False

28) In 1953, the Flammable Fabrics Act was passed. This Act was vague, so in 1967 it was amended. The amended Flammable Fabrics Act was designed to prohibit the marketing or sale of articles and fabrics that are so highly flammable as to be dangerous when worn or used. The Act also:

- A) requires the manufacturer's name to appear on all labels
- B) established deadlines after which all fabrics must be flameproof
- C) requires fire extinguishers to be readily available in institutional situations where textiles are heavily used
- \*D) authorized research on flammability, development of test methods and standards, training of personnel, and continued investigation of death, injury, and economic loss caused by accidental burning of textile products.

- 29) To provide protection from flammable fabrics, flammability standards have been set up for certain end use items. Which of the following end use items is NOT presently covered by the flammability standards.
- A) children's sleepwear sizes 0 - 14
  - B) carpets and rugs
  - C) mattresses
  - \*D) draperies and upholstery
- 30) Is the following statement true or false? Flame resistant finishes provide safety at no increase in cost to consumers.
- A) True
  - \*B) False
- 31) Is the following statement true or false? By law, flame resistant finishes on children's sleepwear must remain flame resistant through 50 launderings.
- \*A) True
  - B) False
- 32) The Secretary of Commerce was responsible for issuing and enforcing flammability regulations until 1973. At that time the \_\_\_\_\_ took over the responsibility and established flammability standards which certain textile items must meet before they can be sold.
- A) Federal Trade Commission
  - B) Agency for Consumer Advocacy
  - \*C) Consumer Product Safety Commission
  - D) Underwriters Laboratory (UL)
- 33) The Care Labeling Ruling is intended to aid consumers in making wise choices. Is the ruling:
- \*A) voluntary
  - B) mandatory
- 34) Is the following statement true or false? The purpose of the FTC is to promote fair competition in interstate trade by preventing price fixing agreements, unlawful price discrimination, and unfair advertising.
- \*A) True
  - B) False
- 35) Consumers as well as producers benefit from textile legislation because of which two reasons listed below?
- \*A) legislation requires accurate information on labels to help consumers choose textile products

(Continued on next page)

- \*B) legislation protects producers from unfair advertising and competition
  - C) legislation helps maintain price controls
  - D) government must pay subsidies to industry when costly legislation is enacted
- 36) Is Care Labeling:
- A) an Act of Congress
  - \*B) a ruling of the Federal Trade Commission
- 37) Is the following statement true or false? A Federal Trade Commission ruling is enforced as strictly as an Act of Congress.
- A) True
  - \*B) False
- 38) Must care labels be permanently attached to textile items?
- \*A) Yes
  - B) No
- 39) Which of the following would be exempt from the Care Labeling Ruling? (There may be more than one answer.)
- \*A) a designer scarf selling for \$25.00 which would be aesthetically impaired by a permanent label
  - \*B) completely washable cotton gloves selling for \$2.50
  - C) a belt selling for \$2.00 which would be damaged by laundering
  - \*D) infant cotton T-shirts selling for \$2.95
  - E) piece goods except remnants
- 40) Which two items below are not covered under the care labeling ruling:
- \*A) bedspreads
  - B) piece goods
  - \*C) suede coats
  - D) children's apparel
  - E) women's sports wear
- 41) Textile products may be labeled in several ways. Which of the following is the most acceptable way to convey care instructions?
- A) stamping information directly on the facing of an item
  - B) printed identification on a bolt, roll, spool, or wrapper
  - C) woven or printed identification on the selvage
  - D) printed label pasted or stuck with adhesive on the item

(Continued on next page)

41) Cont'd.

- \*E) woven or printed cloth labels machine stitched in a seam or on a facing
- F) hang tags

Consumers have a right to be informed about clothing and household fabrics they buy. The most popular way a manufacturer has of informing the consumer is through the use of labels. Match the terms below with the proper type of label described in the next four questions.

- A - brand
- B - certification
- C - informative
- D - union

- 42) A A distinctive mark, design, symbol, or word used to identify goods of a particular seller. Trade names fall into this category of labeling.
- 43) D A label that assures the consumer that the garment was manufactured under fair working conditions. Some unions in the clothing area are:  
 -Amalgamated Clothing Workers of America (ACWA)  
 -International Ladies Garment Workers Union (ILGWU)  
 -United Garment Workers of America (UGWA)
- 44) B A label indicating that the item has been laboratory tested and passed certain standards of performance or quality, or was manufactured according to recognized standards.
- 45) C A label that states fiber content, fabric structure, finishes, care, size, manufacturer's name, and manufacturer's address or registration number.
- 46) A RN followed by a number (for example - RN 6821-) found on a garment label indicates:
- A) the garment has been inspected
  - B) the garment has passed certain government quality standards
  - \*C) the manufacturer of the garment is registered with the Bureau of Consumer Protection of the FTC
  - D) a confidential code indicating wholesale price of the item

UNIT 2 - TEXTILE STANDARDS AND TEXTILE TESTING

- 1) Standards may be set up by individual retailers, manufacturers, government, and voluntary organizations.
  - \*A) True
  - B) False
  
- 2) Which of the following is most likely to be required to pass performance standards?
  - A) high fashion evening apparel
  - \*B) work clothes
  
- 3) The American National Standards Institute (ANSI) has developed voluntary standards of performance for textile products which are called:
  - A) American Society for Testing and Materials Standards
  - B) Wear-dated Standards
  - C) American Association of Textile Chemists and Colorists Standards
  - \*D) American National Standard Performance Requirements for Textile Fabrics
  
- 4) ANSI is:
  - A) a group organized by the American Home Economics Association to insure quality in textile items
  - B) an association of informed consumers which regulates quality of textile items
  - C) an agency of the federal government responsible for setting up textile performance standards
  - \*D) a non-profit federation of trade, technical, labor, and consumer organizations, companies, and government agencies which set up performance standards for many industries including textiles.
  
- 5) The ANSI performance standards for textile fabrics are minimum performance requirements.
  - \*A) True
  - B) False
  
- 6) Membership in the American National Standards Institute (ANSI) is:
  - \*A) voluntary
  - B) required of all major textile manufacturers
  - C) mandatory only if it is required by state law
  - D) required of all textile manufacturers and retailers



7) Standards that have been made mandatory by federal law are:

- A) performance standards for Air Force parachutes
- B) performance standards governing durability of military field uniforms
- C) performance standards for flammability of spacesuits
- \*D) performance standards for flammability of mattresses, carpets, rugs, and children's sleepwear

8) Many companies such as Celanese Fiber Company have established trademark licensing programs to assure consumer confidence in the fibers they market. Under these programs, the company authorizes the use of its fiber trademark to identify its fibers in fabrics of licensees who have complied with the terms of the license agreement.

- \*A) True
- B) False

9) Performance standards for textiles are also developed by the federal government.

- \*A) True
- B) False

10) Most trademark licensing programs are based on performance standards for apparel items which are more stringent than the American National Standards.

- \*A) True
- B) False

11) Test methods that have been developed by leading technical societies provide nationally recognized and reproducible methods that are widely used in textile research and testing. These test methods are the basis for establishing textile performance requirements. Which of the following organizations does NOT develop test method standards?

- A) Federal government and its agencies
- \*B) American National Standards Institute
- C) American Society for Testing and Materials
- D) American Association of Textile Chemists and Colorists

Match the organization with its correct definition:

- A - American Association of Textile Chemists and Colorists (AATCC)
- B - American Society for Testing and Materials (ASTM)

(Continued on next page)



(Con'td.)

- 12) B Society organized to promote knowledge of materials of engineering and standardization of specifications and methods of testing dealing with textiles and textile items. It develops primarily standard physical test methods for textiles and other materials.
- 13) A A national technical and scientific organization whose members are active in the textile wet processing industry. It develops many standard textile test methods, especially in the area of chemical testing, colorfastness tests, evaluation of physical and biological properties, and standard methods for identification and analysis.
- 14) The most important requirements of standard textile test methods is that they be simple, reliable, and reproducible in other laboratories.
- \*A) True  
B) False
- 15) Which of the following can NOT be determined by textile testing?
- A) approximate serviceability for an intended end use  
\*B) exact serviceability for an individual item and individual consumer
- 16) Product durability can often be estimated by laboratory tests.
- \*A) True  
B) False
- 17) Physical properties of textiles are affected by temperature and relative humidity. Therefore, physical tests are performed:
- \*A) in a conditioning room stabilized at  $70^{\circ} \text{F} \pm 2^{\circ} \text{F}$  and 65% relative humidity  $\pm 2\%$   
B) in a drying room kept at 1% relative humidity and at room temperature  
C) in a conditioning room maintained at 95% relative humidity  
D) in a normal laboratory environment
- 18) When cutting samples for textile testing from a piece of fabric, it is important to cut the sample from different sets of warp and filling yarns:
- A) because the bow may be skewed  
B) because it is the best way to conserve fabric  
C) because it is important that the design be identical on all samples  
\*D) to randomize the influence of flaws or irregularities in certain areas of the fabric or yarn

- 19) Transference of color from one fabric to another by rubbing is known as:
- \*A) crocking
  - B) fume fading
  - C) migration
  - D) none of the above
- 20) Colorfastness to laundering can be tested in a:
- A) Scott CRE
  - B) Crockmeter
  - C) Fade-ometer
  - \*D) Laundrometer
- 21) The determination of the amount of air flow through a fabric is a determination of its:
- A) water resistance
  - B) resiliency
  - \*C) air permeability
  - D) thickness
- \*\*22) A standard test to measure the strength of knits is performed by:
- \*A) determining the bursting strength in  $\text{lbs/m}^2$  with the ball burst attachment on the Scott CRE, or Model J
  - B) pulling fabric between two clamps on the Scott CRE, or Model J
  - C) creating a short cut in the fabric, then tearing it
  - D) measuring how many inches (or centimeters) the fabric will stretch before breaking
- 23) The ability of a fabric to endure a strong pulling force is called:
- A) tear strength
  - B) extensibility
  - \*C) breaking strength or tensile strength
  - D) elongation
- \*\* 24) Wear life of a fabric is partially related to tensile strength.
- \*A) True
  - B) False
- 25) If a fabric does not retain its shape under normal care and wearing conditions (e.g. laundering), it is said to lack the property of:
- \*A) dimensional stability
  - B) absorbency
  - C) colorfastness
  - D) abrasion resistance

- \*\*26) If a fabric has good resiliency, it will have poor recovery from wrinkles.
- A) True
  - \*B) False
- 27) Friction or abrasion can break fibers and cause strong fiber ends to ball up into fuzz and cling to the fabric surface. This is called:
- A) crocking
  - B) snagging
  - C) wearing
  - \*D) pilling
- 28) Would it be possible to press a neat, long-lasting crease in slacks made of fabric with high wrinkle recovery (without aid of industrial equipment)?
- A) Yes
  - \*B) No
- 29) In addition to pulling forces, a fabric is often subjected to rubbing, as when a shirt is worn under a jacket. A fabric which tolerates such wear is said to be:
- A) wrinkle resistant
  - \*B) abrasion resistant
  - C) colorfast
  - D) cohesive
- \*\*30) Which part of a man's shirt is most susceptible to edge abrasion?
- A) elbows
  - \*B) cuffs
  - C) collar
  - D) tail
- \*\*31) In order for a young boy's jeans to be serviceable, the fabric must be durable enough to withstand wear at the knees. For such use, a fabric must have high:
- A) resiliency
  - \*B) abrasion resistance
  - C) colorfastness to perspiration
  - D) durability to laundering
- 32) Which end use requires the highest dimensional stability?
- \*A) swim suit
  - B) neck tie
  - D) pillowcase

- 33) If you were testing fabric that is to be used as an upholstery fabric, which of the following properties would be of least importance?
- A) crocking
  - B) abrasion resistance
  - \*C) resiliency
  - D) tensile strength
- 34) Which two of the following would you consult to find performance standards for a specific end use:
- \*A) Celanese standards
  - \*B) American National Standards
  - C) AATCC standards
  - D) ASTM standards
- \*\*35) A standard test to measure the tensile strength of woven fabrics is performed by:
- A) creating a short cut in the fabric, then measuring the strength required to perpetuate the tear
  - B) rupturing the fabric with a small metal ball on an arm of the tensile tester
  - \*C) pulling the fabric between two clamps on the tensile tester
  - D) abrading the fabric with sandpaper
- 36) The consumer has an obligation to return unsatisfactory merchandise because all products that are not returned are assumed by the retailer and manufacturer to be satisfactory.
- \*A) True
  - B) False

### UNIT 3 - TEXTILE FINISHING

- 1) If a fabric has undergone any finishing processes, the finish is always visible.
  - A) True
  - \*B) False
  
- \*\*2) The term gray goods does not necessarily mean that the fabric is gray, but rather that:
  - A) no color has been applied to the fabric
  - \*B) no finish has been applied to the fabric
  - C) no end use has been designated for the fabric
  - D) no legislation has been complied with
  
- 3) A converter:
  - A) transports fabric to warehouses for future sale
  - B) changes fiber or yarn into fabric
  - \*C) obtains fabric from a mill and applies appropriate finishes
  - D) constructs finished items from finished fabric
  
- 4) Before choosing an appropriate finish for a fabric, the finisher must:
  - \*A) know the end use specified for the fabric
  - B) press the fabric
  - C) age the fabric
  - D) know the price of the fabric
  
- 5) A machine used frequently in fabric finishing to apply a finishing solution or dye to fabric is:
  - A) calender
  - B) vat
  - \*C) padding machine
  - D) oven
  
- 6) The whitening of textiles and removal of impurities in fabrics by use of chemicals, such as peroxide or chlorine compounds, is called:
  - A) fulling
  - B) delustering
  - \*C) bleaching
  - D) crabbing

- 7) A finishing process is applied to wool fabrics to set the material, enhance luster, and improve hand and which is achieved by passing steam through the fabric is called:
- A) degumming
  - B) crabbing
  - C) flocking
  - \*D) decatizing or decatizing
- 8) Tentering is the mechanical straightening and drying of fabrics.
- \*A) True
  - B) False
- 9) Beetling is sometimes used to give cotton fabric the appearance of linen.
- \*A) True
  - B) False
- 10) Singeing is a finishing process which:
- A) straightens fabric
  - \*B) removes protruding fibers from the surface of a fabric
  - C) chemically etches a design in the fabric
  - D) cleans impurities from silk
- \*\*11) A special benefit of singeing a fabric is to prevent the balling up of fiber ends called:
- \*A) pilling
  - B) napping
  - C) flocking
  - D) searing
- 12) Sizing would be an appropriate finish for:
- A) lingerie
  - B) polyester doubleknit fabric
  - C) bath towels
  - \*D) flimsy cotton fabric with no body
- 13) Silk is sometimes weighted to:
- A) decrease static
  - B) increase tensile strength
  - C) decrease thermal conductivity
  - \*D) increase body

14) Excessive weighting:

- \*A) decreases the durability of silk
- B) increases the durability of silk
- C) does not affect the durability of silk

15) A finishing process of pressing fabric between rollers with heat, pressure, tension, and sometimes chemicals to produce special surface effects is called:

- \*A) calendering
- B) decatizing
- C) searing
- D) carbonizing

16) An all-weather coat advertised as having the "wet" look, probably has had which of the following finishes applied?

- \*A) creasing
- B) scouring
- C) tentering
- D) singeing

17) Mercerization involves treatment of which of the following fibers with sodium hydroxide?

- A) nylon
- \*B) cotton
- C) wool
- D) polyester

18) Mercerization under tension results in:

- A) more yardage and greater dimensional stability
- B) smaller yarn, increased resistance to mildew, and increased water resistance
- \*C) stronger, more lustrous fabric with greater ability to accept dyes
- D) a soft, full, and thready finish

19) Slack mercerization contributes which of the following properties to cotton fabric?

- \*A) stretch
- B) abrasion resistance
- C) resiliency
- D) colorfastness

Match the following definitions with the correct finish:

- A - waterproof
- B - water resistant

(Continued on next page)

(Cont'd.)

- 20) A will not let water penetrate fabric.
- 21) B sheds water but will allow penetration of moisture.
- 22) Water repellent clothing is more comfortable than waterproofing clothing because:
- A) the fabric isn't as heavy
  - \*B) air is allowed to penetrate the fabric
  - C) no air can pass through the fabric
  - D) less moisture penetrates to the skin than in waterproof clothing
- \*\*23) Would an all weather coat be more functional with:
- A) a waterproof finish
  - \*B) a water resistant finish
- 24) Which finish increases fabric loft and thermal retention?
- A) embossing
  - \*B) napping
  - C) calendaring
  - D) moireing
- 25) A napped finish is produced by:
- A) weaving the fabric with fuzzy yarns
  - B) inserting short fibers perpendicular to the fabric surface during weaving
  - \*C) brushing the surface of the fabric with fine metal brushes to pull fiber ends to the surface of the fabric
  - D) adding acid to the fabric surface
- 26) Teasels have been used to produce which finish?
- \*A) napping or gigging
  - B) beetling
  - C) tentering
  - D) frosting
- 27) Durable press and permanent press are interchangeable terms?
- \*A) True
  - B) False
- 28) A fabric labeled permanent press should require little or no ironing.



- 29) In which method of producing permanent press fabrics is the garment constructed before being cured?
- A) pre-cured
  - \*B) post-cured
- 30) Which of the following is NOT a drawback associated with permanent press items?
- A) difficult to alter because creases are permanent
  - B) crocking occurs in areas of wear
  - \*C) increased shrinkage potential
  - D) decreased strength of fabric
  - E) makes soil release more difficult
- \*\*31) Soil release finishes are often used in conjunction with permanent press finishes to overcome the difficulty of removing soil from permanent press fabrics.
- \*A) True
  - B) False
- 32) Fulling is used on many wool fabrics to:
- A) slightly felt the wool fibers
  - B) make the weave tight and firm
  - C) decrease relaxation shrinkage
  - \*D) all of the above
- 33) Shrinkage is a major problem with textile fabrics; however, all shrinkage takes place in the first laundering or drycleaning.
- A) True
  - \*B) False
- 34) Residual shrinkage is the amount of shrinkage left in a fabric after any type of shrinkage control treatment.
- \*A) True
  - B) False
- 35) To prevent shrinkage in fabrics made of manmade fibers, the fabrics are:
- \*A) heatset
  - B) laundered and dried before selling
  - C) sanforized
  - D) tentered

- 36) During the weaving process, warp yarns are held under considerable tension. In subsequent launderings, these yarns relax and \_\_\_\_\_ shrinkage occurs.
- A) progressive
  - \*B) relaxation
  - C) residual
  - D) felting
- \*\*37) You would expect a garment that has been Sanforized to:
- A) shed wrinkles easily
  - \*B) shrink less than 1% when laundered
  - C) be extremely durable
  - D) be flame retardant
- 38) An antiseptic or bacteriostat finish would be serviceable in:
- A) delaying bacterial growth
  - B) lessening perspiration odors
  - C) inhibiting mildew growth
  - \*D) all of the above
- 39) Which of the following would not need an antiseptic or bacteriostat finish?
- A) suitcase lining
  - B) shoe lining
  - C) diapers
  - \*D) jeans
- \*\*40) Which of the following is most likely to require an anti-static finish?
- \*A) hydrophobic fibers
  - B) hydrophilic fibers
- 41) Consumers can purchase wool fabric with a mothproof finish which means that mothballs are not necessary when storing the fabric.
- \*A) True
  - B) False
- 42) Flame retardancy in textiles may be natural to the fiber, in which case the fiber is called inherently flame retardant. Flame retardancy may also be the result of a special finish applied to the fabric. Which of these is the most permanently flame resistant?
- \*A) inherent in the fiber
  - B) applied finish

- 43) Which of the following cleaning agents is the most effective for maintenance of flame retardant finishes:
- A) soap
  - B) non-phosphate detergent
  - \*C) phosphate detergent
  - D) bleach
- 44) Cotton is dangerously flammable if not treated to be flame retardant.
- \*A) True
  - B) False

UNIT 4 - APPLIED DESIGN

- 1) Applied design refers to that which is:
  - A) incorporated in the assembling of the fabric
  - \*B) added to the fabric surface
  - C) union dyed
  - D) all of the above
  
- \*\*2) Which of the following fabric finishes are used solely for design effect?
  - A) schreinerling and flocking
  - \*B) moire and embossing
  - C) parchmentizing and mercerization
  - D) fulling and beetling
  
- 3) A crinkled or puckered surface created by printing caustic soda on a cotton fabric in designated areas is created by which of the following:
  - \*A) plisse
  - B) cire
  - C) moire
  - D) embossed
  
- 4) A burned-out or etched design is created by burning away fibers with a fine gas flame.
  - A) True
  - \*B) False
  
- 5) A design finish which creates raised 3-dimensional design on a fabric is:
  - \*A) embossing
  - B) etching
  - C) parchmentizing
  - D) block printing
  
- 6) An imitation suede can be produced by which of the following finishes?
  - A) moire
  - B) cire
  - C) schreinerling
  - \*D) flocking

- 7) A flocked finish involves:
- A) brushing the fabric to roughen the surface
  - \*B) attaching very short fibers to the fabric surface by use of an adhesive
  - C) adding tiny bundles of fibers to the yarn to create a design and texture in the finished fabric
  - D) sprinkling a glitter like substance over the fabric
- 8) Two methods of applying a flocked finish to a fabric are:
- A) resin and chemical
  - \*B) mechanical and electrostatic
  - C) residual and compressive
  - D) Sanforized and Regmel
- 9) Dyeing fabric in a dye bath is referred to as:
- A) stock dyeing
  - B) fiber dyeing
  - C) solution dyeing
  - \*D) piece dyeing
- 10) Stock dyeing refers to:
- \*A) dyeing fibers before they are made into yarn or fabric
  - B) dyeing the yarns before construction of fabric
  - C) dyeing the manmade fiber solution before it is formed into fibers
  - D) dyeing the fabric
- 11) Adding color to a man-made fiber solution before filaments are formed is called:
- A) vat dyeing
  - B) piece dyeing
  - \*C) solution dyeing
  - D) union dyeing
- 12) If an all white fabric woven from different fiber types is dyed in just one dye bath to produce a multi-colored design, what method of dyeing was used?
- A) union dyeing
  - B) tie-dyeing
  - \*C) cross dyeing
  - D) fiber dyeing
- 13) Union dyeing produces a single color on fabrics which are:
- A) made of just one fiber type

(Continued on next page)

13) (Cont'd.)

- \*B) made of two or more different fiber types
- C) basted together for ease of dyeing
- D) already pre-dyed a light color

14) Resist printing involves protecting selected areas of the fabric from dye penetration. The only resist printing process used widely in industry is:

- A) roller printing
- \*B) rotary screen printing
- C) photographic printing
- D) discharge printing

15) Two methods of resist dyeing are:

- \*A) batik and tie-dyeing
- B) union and cross dyeing
- C) solution and stock dyeing
- D) piece and yarn dyeing

16) A method of dyeing that involves the use of melted wax as a resist substance is called batik.

17) In tie-dyeing, the areas that have been tied are the ones that end up the color of the dye bath.

- A) True
- \*B) False

18) Discharge prints are usually characterized by:

- \*A) light designs on dark backgrounds
- B) large colorful designs
- C) 3-dimensional scenic designs
- D) small dark designs on white or light background

19) Block printing is used widely in industry today to print textiles.

- A) True
- \*B) False

20) In warp printing, a design is printed:

- \*A) on just the lengthwise yarns before the fabric is woven
- B) parallel to the selvage
- C) purposely off grain
- D) on everything but the warp yarns

- 21) A large number of printed fabrics are produced by a process called roller printing. If a roller printed fabric had four different colors in its design, how many rollers were necessary to produce the design?
- \*A) 4
  - B) 3
  - C) 5
  - D) 8
- 22) The depressed or etched out areas on the rollers used in roller printing are the areas responsible for transference of color onto the fabric.
- \*A) True
  - B) False
- 23) A problem with roller printing is the possibility that the design:
- A) will be outdated quickly
  - B) will not show up very well
  - C) must be made from dark colors
  - \*D) will be printed off-grain
- 24) The printing method in which a thick ink is forced through a mesh is:
- A) duplex printing
  - B) discharge printing
  - C) roller printing
  - \*D) screen printing
- 25) A new printing method which can print complex designs from pre-printed paper is:
- A) duplex printing
  - B) screen printing
  - \*C) heat transfer printing
  - D) roller printing
- 26) The dye in heat transfer printing is transferred by:
- A) evaporation
  - B) migration
  - \*C) sublimation (passes from solid to a gas without ever being a liquid)
  - D) dispersion

27) One environmental problem with heat transfer printing is:

- \*A) disposal of paper
- B) gases are hazardous to plant workers
- C) disposal of waste water
- D) extensive air pollution

Use the following terms to answer the following questions.

- A - roller printing
- B - rotary screen printing

- 28) B Which of these printing methods would be the most economical choice for a short fabric run?
- 29) B Which of these printing methods would be the best choice for printing knits?
- 30) A Which of these printing methods produces the most exact and detailed design?
- 31) B Which of these printing methods is capable of producing the largest designs?



UNIT 5 - WEAVES

- 1) Design imparted during weaving is called:
  - A) applied design
  - \*B) structural design
  - C) conventional design
  - D) innovative design
  
- 2) The part of the loom responsible for raising and lowering groups of warp yarns to form the shed is a:
  - \*A) harness
  - B) warp beam
  - C) reed
  - D) shuttle
  
- 3) The function of the heddles of a loom is:
  - \*A) to separate and hold individual warp yarns
  - B) to carry filling yarns through the shed
  - C) to hold the finished fabric
  - D) to produce the selvage
  
- 4) Which of the following is used to carry filling yarns back and forth through the shed?
  - A) heddle
  - B) pick
  - C) harness
  - \*D) shuttle
  
- 5) Which part of a loom packs the filling yarns against each other as the fabric is being woven?
  - A) heddle
  - B) harness
  - \*C) reed
  - D) cloth beam
  
- \*\*6) The more complex a weave structure is, the more \_\_\_\_\_ are required on the loom.
  - A) reeds
  - \*B) harnesses
  - C) picks
  - D) ends

- 7) The lengthwise yarns in a fabric are called the:
- \*A) warp yarns
  - B) filling yarns
  - C) picks
  - D) weft
- 8) The crosswise yarns in a fabric are called the:
- A) warp yarns
  - B) ends
  - \*C) filling yarns
  - D) skew
- 9) Is the following statement true or false? The term "end" in weaving refers to the filling yarns.
- A) True
  - \*B) False
- 10) Lengthwise grain in a fabric refers to:
- A) the smoothness or roughness of the fabric
  - B) a slanting line across the warp and filling of the goods
  - \*C) the direction of the warp yarns in a woven fabric
  - D) the direction of the design or pile on a woven fabric
- 11) When a yarn travels over two or more other yarns before interlacing in any type of weave, this portion of the yarn is called:
- A) a reed
  - \*B) a float
  - C) a selvage
  - D) a rib
- 12) The tightly woven narrow band on the lengthwise fabric edges is the:
- A) bow
  - B) warp
  - \*C) selvage
  - D) end
- 13) Is the following statement true or false? Warp yarns are usually weaker than filling yarns because of the stress they bear during weaving.
- A) True
  - \*B) False

14) Plain weaves are:

- A) the simplest weaves
- B) reversible unless printed or napped
- C) the weave with the greatest number of interlacings per inch of fabric
- \*D) all of the above

15) Does a basket weave always have a balanced thread count?

- A) Yes
- \*B) No

\*\*16) Parallel diagonal ridges characterize which weave?

- A) basket
- B) rib
- \*C) twill
- D) satin

17) A balanced twill could have a ratio of:

- A)  $\frac{2}{1}$
- \*B)  $\frac{2}{2}$
- C)  $\frac{2}{4}$
- D)  $\frac{4}{2}$

18) Which set of yarns are usually the floats in sateen?

- \*A) filling
- B) warp

19) Is the following statement true or false? The degree of luster on the wrong side of a satin weave would be the same as the degree of luster on the face side.

- A) True
- \*B) False

20) Dobby weaves are characterized by:

- A) large floral designs
- B) dense but short pile
- C) tapestry-like scenes
- \*D) small, geometric designs

- 21) The most complex woven designs are produced on a:
- A) dobby loom
  - B) four harness loom
  - \*C) Jacquard loom
  - D) inkle loom
- 22) The Jacquard loom can produce more complex patterns because:
- A) it is a wider and faster loom
  - B) it has more harnesses
  - C) it is the only computerized loom in use in the United States
  - \*D) each warp yarn is controlled individually
- 23) Is the following statement true or false? Leno structures achieve good lengthwise durability despite low yarn count?
- \*A) True
  - B) False
- 24) Quality in pile construction is dependent upon:
- A) dense pile
  - B) high thread count of base fabric
  - C) being woven by the double cloth method
  - \*D) both A and B
- 25) Is the following statement true or false? The pile yarn in both velvet and velveteen runs in the warp direction.
- A) True
  - \*B) False
- 26) Is the following statement true or false: Loop pile fabric is frequently made by the:
- A) double cloth method
  - \*B) slack tension method
  - C) overwire method
  - D) all of the above
- 27) W or V interlacing occurs in a:
- A) filling pile
  - \*B) double cloth pile
  - C) wire-cut pile
  - D) tufted pile

- 28) Thread count is:
- A) the number of twists per inch in a yarn
  - B) the number of fibers in a yarn
  - \*C) the number of yarns per inch or centimeter of fabric
  - D) the number of yarns in three square inches of fabric
- 29) Which of the following properties would you expect from a fabric with balanced thread count?
- A) better wrinkle recovery
  - B) colorfastness to crocking
  - \*C) greater strength
  - D) greater absorbency
- 30) Which factors would produce the highest absorbency in a pile weave?
- A) low thread count and uncut loops
  - \*B) high thread count and uncut loops
  - C) low thread count and cut loops
  - D) high thread count and cut loops
- 31) Is the following statement true or false? Resiliency decreases with an increase in thread count.
- A) True
  - \*B) False
- 32) Which would you expect to be the most abrasion resistant?
- \*A) plain weave
  - B) satin weave
  - C) basket weave
  - D) Jacquard weave
- 33) Garment linings are often made of satin weave fabric because of its:
- A) warmth
  - B) low cost
  - \*C) smooth surface
  - D) extreme durability
- 34) If the same yarn is used to produce a plain weave and a twill weave, which could have the highest thread count?
- A) plain weave
  - \*B) twill weave

35) All other things being equal, would you expect a satin weave fabric to be more or less durable than a twill weave fabric?

- A) more durable
- \*B) less durable

UNIT 6 - DETERGENCY

- 1) Is the following statement true or false? Water hardness has no effect on the cleaning ability of soap.
  - A) True
  - \*B) False
  
- 2) the biggest disadvantage of soap is:
  - A) its natural ingredients are becoming scarce
  - \*B) it combines with hardness minerals and forms lime soap (scum)
  - C) its contribution to pollution
  - D) its reputation for causing skin irritations
  
- 3) Detergents are improvements over soaps because they:
  - A) do not contribute to pollution
  - B) are able to remove tough stains with ease
  - C) do not require the use of bleach or pre-soaks
  - \*D) tie up hardness in water and prevent redeposition of soil
  
- 4) What is the basic "working" ingredient in detergents?
  - A) the builder
  - \*B) the surfactant
  - C) the fluorescent brightener
  - D) the anti-redeposition agent
  
- 5) Is the following statement true or false? Surfactants increase the wetting ability of water.
  - \*A) True
  - B) False
  
- 6) The surfactant molecule is made up of which parts?
  - A) soluble and insoluble ends
  - B) a metallic and a salt end
  - \*C) a hydrophilic head and a hydrophobic tail
  - D) all of the above
  
- 7) Ingredients which absorb invisible ultraviolet rays and reflect them as visible blue light which will give the illusion of whiteness to the fabric are:
  - A) chlorine bleaches
  - B) enzyme detergents
  - \*C) fluorescent brighteners
  - D) oxygen bleaches

- 8) Is the following statement true or false? Suds are necessary for complete cleaning.
- A) True
  - \*B) False
- 9) Is the following statement true or false? Drycleaning may be used on any fabric.
- A) True
  - \*B) False
- 10) Enzyme laundry products:
- A) perform best in very hot water
  - B) often harm color in fabrics
  - \*C) are most effective on food derived stains
  - D) are used as a substitute for a detergent
- 11) The function of builders is:
- A) to keep hardness minerals in suspension
  - B) reduce germ levels
  - C) provide alkalinity for efficient cleaning
  - D) emulsify oily, greasy dirt by breaking and freeing it from the soiled surface
  - \*E) all of the above
- 12) A basic function of detergents is:
- \*A) keep soil suspended in wash water
  - B) cause redeposition
  - C) add a perfume smell to clothing
  - D) reduce stains
- 13) Cleanliness of fabrics depends on:
- A) water level
  - B) water temperature
  - C) detergent type and amount
  - D) agitation
  - \*E) all of the above
- 14) Phosphates are:
- \*A) the most successful detergent builders used so far
  - B) the sole determinants in eutrophication of lakes
  - C) harmful to flame retardant finishes
  - D) all of the above



APPENDIX C  
Programming Examples

```
QU1:TCOUNT←0
SKIP 2
' 1) DESIGN IMPARTED DURING WEAVING IS CALLED:'
''
'   A) APPLIED DESIGN'
'   B) STRUCTURAL DESIGN'
'   C) CONVENTIONAL DESIGN'
'   D) INNOVATIVE DESIGN'
''
READ
MATCH 'B'
SCORE
YES 'RIGHT'
→QU2 IF TRUE
MATCH 'A'
OR 'C'
OR 'D'
NO 'PLEASE ENTER A, B, C, OR D'
→LASTREAD IF FALSE
COUNT
→QU1A IF FALSE
YES 'NO, WHY DON'T YOU TRY AGAIN?'
YES ''
→LASTREAD
QU1A:'NO, THE CORRECT ANSWER IS B, STRUCTURAL DESIGN IS'
IMPARTED DURING CONSTRUCTION OF A FABRIC.'
```

## TRUE/FALSE

QU9:TCOUNT←0

SKIP 2

' 9) IS THE FOLLOWING STATEMENT TRUE OR FALSE?'  
' THE TERM 'END' IN WEAVING REFERS TO THE FILLING'  
' YARNS.'

''

' A) TRUE'

' B) FALSE'

''

READ

MATCH 'B'

SCORE

YES 'YES'

→QU10 IF TRUE

MATCH 'A'

NO 'PLEASE ENTER A, OR B'

→LASTREAD IF FALSE

YES 'NO, THE ANSWER IS B. THE TERM 'END' IS USED TO'

YES 'REFER TO THE WARP YARNS.'

SCOREF

## FILL IN THE BLANK

QU24:TCOUNT←0

SKIP 2

'24) A FABRIC LABELED PERMANENT PRESS SHOULD REQUIRE'  
' LITTLE OR NO \_\_\_\_\_. (TYPE IN THE CORRECT ANSWER).'

''

READ

DEBLANK

MATCH 'IRONING'

OR 'PRESSING'

SCORETF

YES 'YOU'RE RIGHT!'

NO 'NO, THE CORRECT ANSWER IS IRONING OR PRESSING. IF'

NO 'YOU HAVE ACCIDENTLY MISPELLED THE WORD, MAKE A NOTE'

NO 'TO YOUR LAB INSTRUCTOR AT THE BOTTOM OF YOUR PRINTOUT.'

**APPENDIX D****Instructions for Computer Use**

REVISED STEPS FOR THE COMPUTER TERMINALS

- 1) PICK UP THE PHONE RECEIVER AND PRESS THE TALK/CLEAR BUTTON
- 2) DIAL THE PHONE NUMBER 9-537-4141
- 3) WAIT FOR THE TONE, THEN PRESS THE DATA BUTTON, AND HANG UP.
- 4) TURN THE TERMINAL ON
- 5) HIT THE RETURN KEY TO GET THE COMPUTER'S ATTENTION

IT WILL RESPOND WITH: VM/370 ONLINE

- 6) YOU THEN TYPE IN:

LOGON CMS APLBALL

- 7) IT WILL ASK YOU FOR THE ACCOUNT NUMBER AND TYPE A MASK FOR YOU
- 8) IT WILL ASK YOU FOR YOUR SOCIAL SECURITY NUMBER, AND TYPE A MASK. TYPE YOUR SSN WITHOUT SPACES. IF IT SAYS YOUR SSN IS INVALID, SEE ONE OF THE INSTRUCTORS LISTED BESIDE YOUR TERMINAL.
- 9) AFTER SEVERAL LONG PAUSES AND A FEW LINES OF TYPING, IT WILL TYPE AN R; AT THIS POINT, YOU MUST TYPE IN THE UNIT OF YOUR CHOICE AS FOLLOWS:

PRACTICE UNIT1  
 PRACTICE UNIT2  
 PRACTICE UNIT3  
 PRACTICE UNIT4  
 PRACTICE UNIT5  
 OR  
 PRACTICE UNIT6

- 10) IF YOU MUST LEAVE BEFORE COMPLETING A UNIT, WAIT FOR THE SYMBOL  TO APPEAR AND THEN TYPE: SIGN OFF
- 11) ALWAYS WAIT FOR THE TERMINAL TO TYPE THE ACCOUNT INFORMATION. THE LAST LINE IT TYPES LOOKS SOMETHING LIKE THIS:

LOGOFF AT 12:38:53 CST WEDNESDAY 01/26/77

- 12) WHEN YOU ARE FINISHED, TURN OFF THE TERMINAL, PICK UP THE RECEIVER, AND PRESS THE TALK/CLEAR BUTTON AND HANG UP!

-THE UNITS TAKE ABOUT 30 MINUTES TO COMPLETE-

**APPENDIX E****Student Version of Computer Quiz**

\*LOGON CMS APLBALL

ENTER ACCOUNT NUMBER

\*#####

ENTER SS NUMBER

\*#####

LOGON AT 20:02:02 CST MONDAY 03/07/77

CMS V3 PLC 8 - 12/26/76 16:42

Y-02/01/77 14:11 \* WATFIV 1.5 NOW INSTALLED; WORKSPACE IS  
REDUCED BY 28K.

FORMATTING DISK 'A'

R;

\* PRACTICE UNIT6

V S A P L

CLEAR WS

SAVED 19:0 :42 02/21/77

WSSIZE IS 83036

UNIT 6 - DETERGENCY

PLEASE TYPE IN YOUR NAME

□

\*KATHY

THIS IS THE LAST TIME YOU'RE GOING TO BE HERE KATHY. I'LL BE SAD  
TO SEE YOU GO! YOU SHOULD BE ABLE TO TAKE THIS UNIT IN 15 MINUTES.  
IT ONLY CONTAINS 14 QUESTIONS. GOOD LUCK!!

1) IS THE FOLLOWING STATEMENT TRUE OR FALSE? WATER HARDNESS  
HAS NO EFFECT ON THE CLEANING ABILITY OF SOAP

- A) TRUE
- B) FALSE

□

\* A

NO. THE ANSWER IS B. WATER HARDNESS INTERFERES WITH THE CLEANING  
ABILITY OF SOAP.

2) THE BIGGEST DISADVANTAGE OF SOAP IS:

- A) ITS NATURAL INGREDIENTS ARE BECOMING SCARCE.
- B) IT COMBINES WITH HARDNESS MINERALS AND FORMS LIME SOAP (SCUM).
- C) ITS CONTRIBUTION TO POLLUTION.
- D) ITS REPUTATION FOR CAUSING SKIN IRRITATIONS.



\* B  
RIGHT

3) DETERGENTS ARE IMPROVEMENTS OVER SOAPS BECAUSE THEY:

- A) DO NOT CONTRIBUTE TO POLLUTION.
- B) ARE ABLE TO REMOVE TOUGH STAINS WITH EASE
- C) DO NOT REQUIRE THE USE OF BLEACH OR PRE-SOAKS.
- D) TIE UP HARDNESS IN WATER AND PREVENT REDEPOSITION OF SOIL.

\* D  
AFFIRMATIVE

4) WHAT IS THE BASIC 'WORKING' INGREDIENT IN DETERGENTS?

- A) THE BUILDER
- B) THE SURFACTANT
- C) THE FLUORESCENT BRIGHTENER
- D) THE ANTI-REDEPOSITION AGENT

\* A  
NO. TRY AGAIN

\* B  
CORRECT

5) IS THE FOLLOWING STATEMENT TRUE OR FALSE? SURFACTANTS INCREASE THE WETTING ABILITY OF WATER.

- A) TRUE
- B) FALSE

\* A  
YEP!

6) THE SURFACTANT MOLECULE IS MADE UP OF WHICH PARTS?

- A) SOLUBLE AND INSOLUBLE ENDS
- B) A METALLIC AND A SALT END
- C) A HYDROPHILIC HEAD AND A HYDROPHOBIC TAIL
- D) ALL OF THE ABOVE

\* C  
CERTAINLY!

7) INGREDIENTS WHICH ABSORB INVISIBLE ULTRAVIOLET RAYS AND REFLECT THEM AS VISIBLE BLUE LIGHT WHICH WILL GIVE THE ILLUSION OF WHITENESS TO THE FABRIC ARE:

- A) CHLORINE BLEACHES
- B) ENZYME DETERGENTS
- C) FLUORESCENT BRIGHTENERS
- D) OXYGEN BLEACHES

\* A  
NO, TRY AGAIN

\* D  
NO, THE CORRECT ANSWER IS C, FLUORESCENT BRIGHTENERS.

8) IS THE FOLLOWING STATEMENT TRUE OR FALSE? SUDS ARE NECESSARY FOR COMPLETE CLEANING.

- A) TRUE
- B) FALSE

\* B  
POSITIVELY!

9) IS THE FOLLOWING STATEMENT TRUE OR FALSE? DRYCLEANING MAY BE USED ON ANY FABRIC.

- A) TRUE
- B) FALSE

\* B  
SURE!

10) ENZYME LAUNDRY PRODUCTS:

- A) PERFORM BEST IN VERY HOT WATER.
- B) OFTEN HARM COLOR IN FABRICS.
- C) ARE MOST EFFECTIVE ON FOOD DERIVED STAINS.
- D) ARE USED AS A SUBSTITUTE FOR A DETERGENT.

\* A  
NO, GO AHEAD AND TRY AGAIN

\* C  
TRUE

11) THE FUNCTION OF BUILDERS IS:

- A) TO KEEP HARDNESS MINERALS IN SUSPENSION
- B) REDUCE GERM LEVELS
- C) PROVIDE ALKALINITY FOR EFFICIENT CLEANING
- D) EMULSIFY OILY, GREASY DIRT BY BREAKING AND FREEING IT FROM THE SOILED SURFACE.
- E) ALL OF THE ABOVE

\*E

YOU'RE RIGHT

12) A BASIC FUNCTION OF DETERGENTS IS:

- A) KEEP SOIL SUSPENDED IN WASH WATER
- B) CAUSE REDEPOSITION
- C) ADD A PERFUME SMELL TO CLOTHING
- D) REDUCE STAINS

\*A

RIGHT AGAIN!

13) CLEANLINESS OF FABRICS DEPENDS ON:

- A) WATER LEVEL
- B) WATER TEMPERATURE
- C) DETERGENT TYPE AND AMOUNT
- D) AGITATION
- E) ALL OF THE ABOVE

\*E

YEA!

14) PHOSPHATES ARE:

- A) THE MOST SUCCESSFUL DETERGENT BUILDERS USED SO FAR.
- B) THE SOLE DETERMINANTS IN EUTROPHICATION OF LAKES.
- C) HARMFUL TO FLAME RETARDANT FINISHES
- D) ALL OF THE ABOVE

\*C

NO, GO AHEAD AND TRY AGAIN

\*B

NO, THE RIGHT ANSWER IS A. PHOSPHATES ARE THE MOST SUCCESSFUL BUILDERS USED TO DATE. HOORAY!! YOU'RE FINISHED WITH THE COMPUTER. THANK YOU VERY MUCH FOR YOUR PARTICIPATION IN THIS STUDY.

KATHY, YOU GOT 11 RIGHT OUT OF 14 ASKED.

PLEASE WAIT A MINUTE OR SO, UNTIL YOU SEE AN ACCOUNT  
BALANCE TYPE OUT BEFORE YOU TURN OFF THE TERMINAL  
AND LEAVE. THANK YOU.

CONNECT= 00:11:00 TOTCPU= 000:10.83  
CONNECT COST .44 CPU COST 1.76 I/O COST .08  
TOTAL COST 2.28 ACCOUNT BALANCE 198.81  
LOGOFF AT 20:13:04 CST MONDAY 03/07/77

**APPENDIX F**

**Student Attitude Questionnaire**

STUDENT ATTITUDE

QUESTIONNAIRE

1. Which method did you use for completing the weekly lab questions?

Computer Terminal

Weekly Handouts

2. Who is your lecture instructor?

Cabradilla

Munson

Ordoñez

3. Circle your degree of preference for answering the questions by the method you used (either computer or handouts):

(1) extremely disliked the method

(2) disliked the method

(3) no feeling one way or the other

(4) liked the method

(5) liked the method very much

4. Please include any additional comments you have concerning the method of answering the weekly questions you used.

THE EFFECTIVENESS OF COMPUTER ASSISTED  
INSTRUCTION (CAI) IN BASIC TEXTILES CLASSES

by

KATHLEEN A. LARSON

B.S., Kansas State University, 1975

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AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Clothing, Textiles, and Interior Design

KANSAS STATE UNIVERSITY  
Manhattan, Kansas

1977

A six-week study measuring the effectiveness of computer assisted instruction (CAI) in Basic Textiles classes at Kansas State University was implemented spring semester, 1977, by the Department of Clothing, Textiles, and Interior Design.

The participants in the study were the students enrolled in the four sections of Basic Textiles at Kansas State University spring semester, 1977. One instructor taught two of these sections and two other instructors each taught one of the remaining two sections. The students were given a written explanation of the study, and asked to sign a consent statement if they were willing to participate in the study. The consenting students in each of the four sections of Basic Textiles were divided into a control group and an experimental group by pairing students with grade point averages as nearly equal as possible to insure that students of approximately the same achievement levels were compared.

Practice questions covering the topics of six consecutive textile laboratories were developed by the researcher. The control group was issued the questions in printed form to be answered on the student's own time each week. The experimental group utilized the computer to answer the questions. Both groups received ten points for completing the units regardless of their actual score.

The practice questions for the CAI group were programmed into the computer by the researcher in an English based course



author language in APL called CAL/APL (computer assisted learning/ a programming language). The input - output devices used by the students were IBM 2741 communications terminals. These are interactive hardcopy typewriter terminals connected to the central computer by dialed telephone lines.

During the course, each instructor independently prepared two tests covering the material in the six units of questions. An analysis of variance was used to compare the test scores of the control group with the test scores of the experimental group within each section. Data from eighty students (forty control and forty experimental) were available upon completion of the study.

At a 0.05 level of significance, there was no significant difference between competencies, as measured by test scores, of students in the control group and students in the experimental group. The participating students were asked to complete an attitude questionnaire in which they rated the method they used to answer the practice questions on a scale from one to five. The rate of return of questionnaires was one hundred percent. Student attitudes regarding both CAI and the traditional method of completing the practice questions were very positive. Only nine students out of eighty rated the method they used lower than "liked the method." Of these nine, four were in the experimental group and five were in the control group. It can be concluded that both CAI and the traditional instructional approach appear to be effective methods with high acceptance among students.