FAA ACADEMY EDUCATION SPECIALISTS' PERCEPTIONS CONCERNING COMPUTER-BASED INSTRUCTION IN TECHNICAL TRAINING

By

THELMA LEE STACY

Bachelor of Arts

Oklahoma Science and Arts University

Chickasha, Oklahoma

1956

Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment of
the requirements for
the degree of
MASTER OF SCIENCE
December, 1984

FAA ACADEMY EDUCATION SPECIALISTS' PERCEPTIONS CONCERNING COMPUTER-BASED INSTRUCTION IN TECHNICAL TRAINING

Thesis Approved:

Wayne B. James
Thesis Adviser

Larry G. Dooley

John L. Beard

Norman N. Durham
Dean of Graduate College

ACKNOWLEDGEMENTS

My work for the past six years has been on the Computer-Based Instruction (CBI) Project for the Federal Aviation Administration (FAA). The FAA has spent a large sum of money to implement the CBI technology for delivery of technical training in the FAA. The project was approved as a means of improving the efficiency and effectiveness of the training while at the same time reducing the training costs. Although many of the education specialists have been involved with the development of the CBI courseware, there had been no effort to determine their perception of CBI methodology compared to the traditional training method that they were accustomed to using.

This study was made to find out how the education specialists' perceived the CBI methodology after these few years of limited use. It was also made to determine if they perceived that there was a requirement for special training to develop CBI courseware.

Several people have been very important to me in the completion of this study. The most helpful has been my husband, Don, who provided unselfish support and assistance. He provided the technial assistance for the

word processing system that I used and also performed the printing task. Dr. Waynne James, provided the help and advice necessary for me to complete this thesis. The other members of my committee, Dr. John Baird and Dr. Jerry Davis also receive a big "Thank You".

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION

Computers are becoming so common today that they are being used to perform all kinds of tasks and functions. The easy availability of the small microcomputers, and the ever-increasing capabilities, make the use of computers for teaching/training a logical and reasonable methodology. The use of computers to teach all levels of learning and all kinds of training is growing and expanding daily (Heines, Levine, and Robinson, 1983).

According to Heines, Levine, and Robinson (1983), the world changes so rapidly due to technological improvements that industry is faced with providing training for its personnel at an ever-increasing rate. The working adult is constantly being trained to perform a different job due to changing job functions. Industry training budgets have ballooned at a high rate in the last decade. This rise has forced an investigation into more efficient and economical training methods. Several studies have indicated that students learn as well or better in other learning environments than the basic lecture methods requiring the lock-step mode. Adults also like to control their learning

and the rate and way they proceed through training which are facilitated using the computer. Individualized training is not easily accomplished with traditional training methods.

A major reason, computer based training is being pursued by several educational institutions and businesses, is due to its capability to train large numbers of students in diverse locations at one time (Kearsley, Hunter, and Siedel, 1983). Computer-based instruction (CBI) also supports individualized training, and the learning time required to accomplish the objectives is usually reduced by as much as 25 - 50 percent (Tatsuoka and Misselt, 1978).

The CBI methodology is a new training technology that is unfamiliar to many educators (Lidtke, 1981). However, educators usually make the decisions on when, how much, and in what training computers are used. Their acceptance and support are important to the success of the CBI training technology (Heines, Levine, and Robinson, 1983).

Problem

The Federal Aviation Administration (FAA) has as not investigated the education specialists' perception concerning the use of CBI methodology for delivery of technical training. The education specialists who perform course design and development tasks in the FAA Academy are important to the efficient and effective utilization of the

CBI system. Without the education specialists' support and commitment, the total benefits available from the use of CBI will not be realized.

Purpose

The purpose of this study was to determine how the education specialists in the FAA Academy perceived CBI in technical training. The study will attempt to answer the following questions:

1. Do the education specialists perceive that CBI is an appropriate methodology for delivery and course management of technical training?

2. Do the education specialists perceive that acquisition of knowledge and self-motivation are improved through CBI delivery of technical training?

3. Do the education specialists perceive that instructional aids used with CBI methodology enhance technical training?

4. Do the education specialists perceive that development of CBI courseware requires special training and skills?

Scope and Limitations

The scope and limitations of this study are as follows:

1. All surveying was conducted in the Oklahoma City, Oklahoma area during September, 1984.

2. The questionnaire was mailed to the education specialists who were employed in the FAA Academy.

3. The education specialists perform all the training tasks including course planning, development, and in some cases, teaching in the classroom.

Assumptions

For purposes of this study, the researcher accepted the following assumptions:

1. All education specialists surveyed were qualified to identify the need for CBI in technical training.

2. All responses on the questionnaire were honest expressions of the education specialists' perceptions concerning CBI in technical training.

Definition of Terms

The following definitions are furnished to provide a clear meaning of terms used in this study.

Adult learner - An individual who assumes responsibility for his/her own learning.

Computer-assisted instruction (CAI) - Any instruction which uses a computer to teach an objective or portion of an objective in the course.

Computer-based instruction (CBI) - Any training/teaching which uses a computer to present or administer any portion of the courseware.

Computer-managed instruction (CMI) - The computer is used to manage/direct the student through the training, performing the administrative tasks of administering tests and keeping student records.

Courseware - Educational or training material developed specifically to be used for computer delivery.

Education Specialist - A person who performs educational tasks associated with teaching and the design and development of training in the FAA.

Federal Aviation Administration (FAA) - An agency within the Department of Transportation whose primary function is the safe and efficient operation of the United States airspace system.

Individualized training - Permits a student to proceed through the training at his/her own rate by selecting materials best suited to his/her learning style.

Technical Training - Training of technical subjects and equipments, such as radar principles and navigational equipment which uses radar.

Traditional Methods - Training/teaching which is conducted using the lock-step classroom delivery method.

Organization of Study

Chapter I introduced the study, contained a statement of the problem, and stated the purpose of the study. It also set forth the scope and limitations, assumptions, and provided definitions of the terms used in the study. Chapter II provides an overview of materials researched to establish the background information and supportive data for the study that was conducted. This includes; (1) the evolution of CBI, and (2) the educators'/teachers' perception of CBI. Chapter III explains how the study was conducted, describes the data-gathering instrument and how the data-gathering instrument was used. The study results are described in Chapter IV in both narrative and tabular format. Chapter V contains a summary of the study, conclusions drawn from the study, and the recommendations.

CHAPTER II

REVIEW OF LITERATURE

The review of literature related to this study was divided into the following two areas: (1) Evolution of Computer-Based Instruction and (2) Educators' perception of Computer-Based Instruction.

Evolution of Computer-Based Instruction

> During the Industrial Revolution, the engine was the tool which permitted people to handle large amounts of matter with ease and speed. In the current Information Revolution, another machine, the computer, is doing for the human mind what the engine did for the human muscle (Barger, 1983, p. 108).

The computer has introduced a new revolutionary age by permitting people to handle large amounts of information easily and quickly (Barger, 1983). Barger (1983) quotes Columbia University Professor White, "I think that the computer is as much a revolution as the printing press, and I think that the learning and teaching will never be the same" (p. 108).

The use of computers in industry and government is widespread today. Even small businesses use computers to perform the routine office tasks. The use of computers in

the educational setting has been much slower. However, educators are becoming more acceptable to the use of computers in the educational programs. According to Johnson (1977), the use of computers today is revolutionizing the educational processes and dramatically changing the learning environment. The computers influence on education has yet to be fully realized (Barger, 1983).

Since 1960, much effort has been expended on the development of CBI. Programing Logic for Automatic Teaching Operation (PLATO), the International Business Machines (IBM) 1500 system, and the Time-shared Interactive Computer-Controlled Information Television (TICCIT) systems are three major systems developed specifically for CBI during the sixties. These three systems used computers with local or remote time-sharing terminals for student learning stations. They provided opportunities for large numbers of individuals to gain practical experience with CBI, often in operational settings. Even though many other systems have been developed since these (including microcomputer systems) few have incorporated any features or ideas significantly different from these three major systems (Kearsley, Hunter, and Siedel, 1983).

The PLATO system developed at the University of Illinois was introduced in 1961. In 1965, the first college course, Library Science, was delivered by the PLATO system.

Now the PLATO system is used at all levels of education from elementary school to graduate school and for training both in private industry and the government. The National Science Foundation (NSF) primarily provided the funding necessary for the development of CBI (Johnson, 1977).

The high costs of computers in the 1960s greatly limited extensive use of CBI (Byrd, 1983). In the late 1960's and early 1970's some computer companies such as IBM and RCA began using the computer to train its employees. According to Heines, Levine, and Robinson, (1983) the Digital Equipment Corporation (DEC) turned to computer training for both its customers and employees as the costs of central training in the lecture mode became prohibitive. DEC has used the computer to increase training productivity, reduce costs, and increase effectiveness. The changes in the economy changes educational needs. The fast technological changes create an increased need for extensive training and frequent retraining. Today, industry is paying for current technical knowledge (Heines, Levine, and Robinson, 1983).

> New technology means not only new machines, systems and procedures, but also changes in skill training, working conditions, and academic and professional requirements for employment (Miller, 1983, p. 123).

Economic growth requires skilled personnel. The rapid technological development has placed a difficult task on

education institutions to provide appropriate education for new careers. Many corporations are developing their own in-house training systems to satisfy the new skills, which necessitate a higher level of proficiency required by the rapid technology changes (Miller, 1983).

In the late 1970's microcomputers were introduced. This technological achievement effected a significant decrease in the cost of computers resulting in schools and institutions now being able to afford computers for educational purposes. This cost reduction revitalized the efforts in CBI development. The NSF has estimated that by 1985 there will be one million computers in use in schools across the United States (Gleason,1981).

Educators' Perception of CBI

According to Kearsley, Hunter, and Seidel (1983), change in any area is difficult to achieve, but educational change is most difficult because of the established nature of the institutions and the roles involved. Based on the success of many CBI projects, it should be considered a major educational innovation, but many limiting factors still exist. Two of these factors are: (1) teachers are prepared to teach in a group environment rather than to provide individual training on content delivered by a computer, and (2) they have not been trained in the thinking

or problem-solving skills required to use computers for teaching (Kearsley, Hunter, and Seidel, 1983). "Major advances in CBI will not be made until a majority of teachers understand and are supportive of important changes which are needed in their role" (Lewis, 1983, p. 81). Lewis further states that the computer technology cannot be expected to solve many of the organizational and practical problems which accompany the desired changes. The problems of using computers in education are problems of education, not of computers. The problem of acceptability is a difficult task based on the "not invented here" or "not invented yet" syndrome held by many teachers and educators (Lewis, 1983). This attitude may result from exposure to poor materials or materials that are inappropriate and/or too inflexible for adaptation to their teaching needs (Lewis, 1983).

According to Lidtke (1981), many teachers are resistant to CBI due to: (1) the lack of training in the use of the equipment; (2) the lack of suitable hardware, software, and courseware; (3) the need to change their teaching style in order to use the technology; and, (4) the time required and difficulty of preparing training to use these technologies. Educator acceptance occurs when: (1) concrete evidence supports the effectiveness of the technology with students; (2) adequate training to

effectively and efficiently use the technology has been received; (3) there is adequate hardware, software, and courseware; and, (4) the technology fits the teaching style of the teacher.

Lidtke (1981), states that the major factor most teachers require before changing to a new technology is proof of its effectiveness in the learning environment. Nearly all technology requires time and effort from the teacher before it can be used in the classroom. Therefore, they must be convinced of its value before they will be motivated to expend their time and effort using the technology (Lidtke, 1981).

According to Stevens (1980), educators have emphasized the need for expanding educational processes to include instruction in computer usage. Not only are teachers interested in the student's computer literacy, but they are also interested in using computers as instructional tools to assist in the teaching/learning process. The educator's expertise and attitude toward computers will determine the success or failure and the speed at which changes in teaching will occur. Stevens further states that teachers must have positive attitudes toward computers and believe they are a viable instructional tool before computers can be used productively in education. Some teachers appear to be reluctant to use computers in education based on a fear of

losing classroom authority or a lack of computer expertise (Stevens, 1980).

According to Stevens (1980), educators lack computer expertise to use computers in teaching, therefore it becomes most important to develop computer-oriented education programs to prepare knowledgeable teachers at all levels of education. These teachers will then be able to direct the use of computers, and to design, modify and evaluate quality courseware. "Enthusiastic and knowledgeable teachers are the key to the successful use of computers in education" (Stevens, 1980, p. 231).

> Major technological change, affecting an increasing proportion of the population, is taking place within a single generation. Now for the first time, the situation has to be faced in which change has to be accepted within the working life of individual people. Adaptation to change can no longer take place from generation to generation but must be accommodated within a lifetime. There is every indication that the rate of technological development will continue to rise and hence the pressures on human beings to accept change in an 'unnaturally' short time will grow. Amongst those in society who are closest to change are teachers (Lewis, 1983, p. 87).

Summary

In summary, one of the primary reasons that educators list as the basis for their reluctance to use CBI is the lack of training to use the technology efficiently and effectively. To over-come this major problem, teacher

training needs to include computer-oriented educational programs. Teachers need to have access to computer hardware, software, and quality courseware. They need to learn how to evaluate courseware for adaptation to their teaching needs to overcome the "not invented here" syndrome.

Gleason (1981), states that despite the educator's resistance to change, the availability of less expensive and more powerful computers will result in a technological educational revolution within the near future.

CHAPTER III

METHODOLOGY

The purpose of this study was to investigate the FAA Academy education specialists' perceptions concerning CBI in technical training. This chapter specifies the methodology used. It includes a description of the population surveyed, development of the data-gathering instrument, collection of the data, and the analysis of the data.

Population Surveyed

The population surveyed by this study was the education specialists employed in the Federal Aviation Administration (FAA) Academy. These educators are responsible for the design and development of technical training courses for the FAA. Both CBI and traditional methods of training are used for course delivery. The training courses taught range from theory courses in basic fundamentals to highly complex technical courses. Many of the courses teach the operation and maintenance of the most advanced technological equipments available (Buck, 1979). Computers, microcomputers, and microprocessors concepts and uses are included in many of the courses.

Development of the Questionnaire

The questionnaire was designed by the researcher based on information and ideas obtained from the literature search and from personal experience. This instrument was used to document the education specialists' perceptions concerning CBI in technical training.

The questionnaire was divided into seven areas concerning the CBI methodology. The areas were: (1) CBI methodology, (2) acquisition of knowledge through CBI, (3) course management by CBI, (4) instructional aids used with CBI, (5) self-motivation through CBI, (6) CBI training requires, and (7) use of CBI in technical training. The questionnaire was field-tested by several of the education specialists who worked as a panel of experts. The suggested improvements, which were primarily for clarity, were incorporated into the questionnaire before it was distributed. (See Appendix A for a copy of the final questionnaire.)

A brief transmittal letter was prepared which accompanied the questionnaire (see Appendix B). It requested the education specialists assistance by completing the questionnaire and returning it in the enclosed stamped envelope by September 15, 1984.

Six questions requesting personal characteristics from

the respondents were also included with the questionnaire. The questions asked for sex, age range, years of experience as an education specialist, years of experience as a FAA Academy education specialist, the highest degree obtained, and whether the respondent used a home (personal) or main-frame computer.

Collection of the Data

The questionnaires were mailed to the 26 FAA Academy education specialists on August 30, 1984. A stamped return envelope was enclosed for ease of returning the questionnaire after completion by the education specialist. The transmittal letter requested that the questionnaire be completed and returned in the enclosed stamped envelope by September 15, 1984.

Analysis of the Data

The questionnaires were reviewed and the various responses tabulated. The responses were then summarized in narrative and tabular format to report the survey population's perception of the need for CBI in technical training. The respondent's personal characteristics were also summarized in narrative and tabular format.

CHAPTER IV

PRESENTATION AND DISCUSSION OF FINDINGS

Introduction

The findings of this study are presented in this chapter. These findings are organized as follows: (1) Respondents, (2) CBI Methodology, (3) Acquisition of Knowledge Through CBI, (4) Course Management by CBI, (5) Instructional Aids Used with CBI, (6) Self-Motivation Through CBI, (7) CBI Training Requirements, and (8) Use of CBI in Technical Training.

Respondents

FAA Academy education specialists responding to the questionnaire were persons of varying ages and experiences. Their ages ranged from between 30 to 40 to over 60 years. Their experience as educatiom specialists varied from five years or less to over 25 years. Their experience in the FAA Academy ranged from five years or less to 15 to 20 years. Seven of the respondents use either a home (personal) or main-frame computer. There were 21 responses (81%) out of the 26 questionnaires distributed, with six being from females and 15 being from males. The respondents' personal characteristics are reported in Table I.

TABLE I

EDUCATION SPECIALISTS' RESPONSES TO PERSONAL CHARACTERISTICS

PERSONAL CHARACTERISTICS	RESPONSES MALE N	MALE %	FEMALE N	FEMALE %
Sex	15	71	6	29
Age				
30 to 40 years	2	10	3	14
40 to 50 years	5	24	2	10
50 to 60 years	5	24	1	5
over 60 years	3	14	0	0*
Education specialist experience				
less than 5 years	1	5	2	10
5 to 10 years	5	24	2	10
10 to 15 years	3	14	2	10
15 to 20 years	2	10	0	0
20 to 25 years	1	5	0	0
25 or more	3	14	0	0*
FAA Academy education specialist experience				
less than 5 years	3	14	2	10
5 to 10 years	5	24	2	10
10 to 25 years	6	29	2	10
15 to 20 years	1	5	0	0*
Higheat degree attained				
Bachelor	4	19	3	14
Masters	10	48	2	10
Doctorate	1	5	1	5*
Use a home or main-frame computer				
Yes	3	14	4	19
No	12	57	2	10

N=21

* - May not equal 100 percent due to rounding.

CBI Methodology

The first section of the questionnaire covered the CBI methodology as a training delivery method. The results from this section are presented in Table II. The first statement in this section was, "CBI methodology trains as efficiently as traditional method". Nine, or 43 percent, of the respondents agreed, with 12, or 57 percent, disagreeing on the efficiency of CBI methodology.

The second statement was, "CBI methodology trains as effectively as traditional method". Eight, or 38 percent, of the respondents agreed with effectiveness, 12, or 57 percent, disagreed, while two, or five percent, indicated no opinion. The third statement was, "CBI methodology increases training productivity". Table II shows 11, or 52 percent of the respondents agreeing on productivity increase with five each disagreeing or having no opinion which represented 24 percent each. The fourth statement was, "CBI methodology is suitable for fundamental courses". The respondents' responses indicated 18, or 86 percent agreeing, two disagreeing, and one with no opinion on suitability for fundamental courses. The fifth statement in the first section was, "CBI methodology is suitable for complex technical courses." This question had eight, or 38 percent, of the respondents agreeing, 10, or 48 percent, disagreeing, and three, or 14 percent, with no opinion. Three of the

TABLE II

EDUCATION SPECIALISTS' RESPONSES TO COMPUTER-BASED INSTRUCTION METHODOLOGY

CBI METHODOLOGY STATEMENTS	RESPONSES					
	Agree		Disagree		No Opinion	
	N	%	N	%	N	%
Trains as efficiently as traditional method.	9	43	12	57	0	0
Trains as effectively as traditional method.	8	38	12	57	1	5
Increases training productivity.	11	52	5	24	5	24
Is suitable for fundamental courses.	18	86	2	10	1	5*
Is suitable for complex technical courses.	8	38	10	48	3	14

N=21

* - May not equal 100 percent due to rounding.

five statements in this first section had a larger percentage disagreeing than agreeing. However, a large percentage agreed with CBI suitability for fundamental courses as presented in Table II.

Acquisition of Knowledge Through CBI

The second section of the questionnaire covered the acquisition of knowledge through CBI. The findings are reported in Table III. The first statement was, "acquisition of knowledge through CBI ensures that students master the course objectives." Eight of the respondents agreed, nine disagreed, and four had no opinion concerning this area of CBI. The second statememt was, "acquisition of knowledge through CBI enables the student to learn at his/her own rate." All 21, or 100 percent, of the respondents agreed with this CBI capability. The third statement was, "acquisition of knowledge through CBI places more emphasis on completing a module than acquiring a skill or knowledge." Seven, or 33 percent, of the respondents felt that it did, while eight, or 38 percent, disagreed and six, or 29 percent, had no opinion. The fourth item in the second section was, "acquisition of knowledge through CBI supports equipment simulations that can replace laboratory training." This capability can reduce or eliminate the requirement for buying extra equipment for use in laboratory training which can result in significant savings. There

TABLE III

EDUCATION SPECIALISTS' RESPONSES TO ACQUISITION OF KNOWLEDGE THROUGH CBI

ACQUISITION OF KNOWLEDGE THROUGH CBI STATEMENTS	RESPONSES					
	Agree		Disagree		No Opinion	
	N	%	N	%	N	%
Ensures that students master the course objectives.	8	38	9	43	4	19
Enables the student to learn at his/her own rate.	21	100	0	0	0	0
Places more emphasis on completing a module than acquiring a skill or knowledge.	7	33	8	38	6	29
Supports equipment simulations which can be used to replace laboratory training.	11	52	8	38	2	10

N=21

were eleven, or 52 percent, of the respondents who agreed, eight disagreed, and two with no opinion on this statement as reported in Table III.

Course Management by CBI

The third section of the questionnaire concerned the course managemnt functions performed by CBI as presented in Table IV. The first statement was, "course management by CBI takes care of student recordkeeping efficiently." Eighteen, or 86 percent, of the respondents agreed, two disagreed, and one had no opinion. The second statement was, "course management by CBI informs the student when a unit is successfully completed." One hundred percent of the respondents agreed that this function was handled by CBI training. The third statement in section three was, "course management by CBI provides the student with a detailed description of training objectives." The responses resulted in 15, or 71 percent, agreeing, three, or 14 percent, disagreeing, and three having no opinion. The fourth statement was, "course management by CBI administers and scores tests more efficiently." Fourteen respondents agreed, five disagreed, and two had no opinion on this area of CBI. The third section of the questionnaire had a majority of the respondents agreeing on all four of the statements as reported in Table IV.

TABLE IV

EDUCATION SPECIALISTS' RESPONSES TO COURSE MANAGEMENT BY CBI

COURSE MANAGEMENT BY CBI STATEMENTS	RESPONSES Agree N	Agree %	Disagree N	Disagree %	No Opinion N	No Opinion %
Takes care of student record-keeping efficiently.	18	86	2	9	1	5
Informs a student when a unit is successfully completed.	21	100	0	0	0	0
Provides the student with a detailed description of training objectives.	15	71	3	14	3	14*
Administers and scores tests more efficiently.	14	67	5	24	2	10*

N-21

* - May not equal 100 percent due to rounding.

Instructional Aids Used with CBI

The data collected on the fourth section of the questionnaire are reported in Table V. This section dealt with instructional aids used with CBI being an asset to the delivery method. The first statement was, "instructional aids used with CBI frees the instructor to perform individual assistance when needed by the students." Eighteen, or 86 percent, of the respondents agreed with three, or 14 percent, having no opinion on this capability. The second statement was, "instructional aids used with CBI make the subject materials more clear." CBI supports multi-media learning materials permitting the same material to be presented by more than one medium. Eight persons agreed, nine disagreed and four had no opinion on this item. The third statement in section four was, "instructional aids used with CBI provides immediate confirmation to the student." Seventeen of the respondents agreed, two disagreed, and seven had no opinion on this area of CBI. The fourth statement was, "instructional aids used with CBI meets the individual needs of the students." Eight of the educators agreed, six disagreed and seven had no opinion on this question. Statements one, three, and four had a larger percentage agreeing, while statement two had a larger percentage disagreeing as presented in Table V.

TABLE V

EDUCATION SPECIALISTS' RESPONSES TO INSTRUCTIONAL AIDS USED WITH CBI

INSTRUCTIONAL AIDS USED WITH CBI STATEMENTS	RESPONSES					
	Agree		Disagree		No Opinion	
	N	%	N	%	N	%
Frees the instructor to perform individual assistance when needed by students.	18	86	0	0	3	14
Makes the subject materials more clear.	8	38	9	43	4	19
Provides immediate confirmation to the student.	17	81	2	10	2	10*
Meets the individual needs of the student.	8	38	6	29	7	33

N-21

* - May not equal 100 percent due to rounding.

Self-Motivation Through CBI

The fifth section of the questionnaire covered the area of self-motivation that occurs with CBI. This information is reported in Table VI. The student is given specific study assignments and then tested to ensure mastery of all unmastered objectives in CBI. The first statement was, "self-motivation through CBI puts the student in charge of his/her training more than traditional training." The responses resulted in 14, or 67 percent, agreeing while only four disagreed and three had no opinion. The second statement was, "self-motivation through CBI removes pressure on the student to compete with other students." With CBI delivery of training, students do not necessarily know the other students taking the course or how they are doing in the course. There were 16 respondents agreeing, three disagreeing and two having no opinion on this statement. The third statement in section five was, "self-motivation through CBI demands more student effort than traditional training." CBI requires each student to respond to every question in the course as compared to classroom delivery where only one student often answers a given question. The respondents' responses indicated that nine agreed, nine disagreed and three had no opinion on this point. The fourth statement was, "self-motivation through CBI helps

TABLE VI

EDUCATION SPECIALISTS' RESPONSES TO SELF-MOTIVATION THROUGH CBI

SELF-MOTIVATION THROUGH CBI STATEMENTS	RESPONSES Agree N	%	Disagree N	%	No Opinion N	%
Puts the student in charge of his/her training more than traditional training.	14	67	4	19	3	14
Removes pressures on the student to compete with other students.	16	76	3	14	2	10
Demands more student effort than traditional training.	9	43	9	43	3	14
Helps to make the training more enjoyable.	4	19	12	57	5	24

N=21

to make the training more enjoyable." The respondents disagreed on this statement with 12, or 57 percent, disagreeing compared to four agreeing and five having no opinion as presented in Table VI.

CBI Training Requires

The sixth section of the questionnaire concerned the education specialist's perception of what was required for an educator to develop CBI training. These results are presented in Table VII. Statement one was, "CBI training requires special training to develop quality courseware." All 21 respondents, or 100 percent, agreed with this requirement. Statement two was, "CBI training requires a knowledge of computers." Fourteen of the respondents agreed, five disagreed and two had no opinion on this item. Statement three was, "CBI training requires an ability to program a computer." Eleven of the respondents agreed, but seven disagreed and three had no opinion on this area. The fourth statement was, "CBI training requires more time to design and develop courseware." All respondents agreed on this point. The last statement in this section was, "CBI training requires less time for revision and update of CBI courseware." A majority of the respondents agreed on this statement with 13 agreeing, six disagreeing and two having no opinion.

TABLE VII

EDUCATION SPECIALISTS' RESPONSES TO CBI TRAINING REQUIRES

CBI TRAINING REQUIRES STATEMENTS	RESPONSES Agree N	Agree %	Disagree N	Disagree %	No Opinion N	No Opinion %
Special training to develop quality CBI courseware.	21	100	0	0	0	0
A knowledge of computers.	14	67	5	24	2	10*
An ability to program the computer.	11	52	7	33	3	14*
More time to design and develop courseware.	21	100	0	0	0	0
Less time for revision and update of courseware.	13	62	6	29	2	10*

N=21

* - May not equal 100 percent due to rounding.

Use of CBI in Technical Training

The last section of the questionnaire dealt with the education specialist's perception concerning CBI in technical training as reported in Table VIII. The first item was, "use of CBI in training makes good business sense." Fourteen respondents believed that it did with only three each disagreeing or having no opinion. Statement two was, "use of CBI in technical training permits long term savings not possible in traditional training." The respondents were divided on this point. Eight of them agreed, seven disagreed, and six had no opinion. The third and last statement was, "use of CBI in technical training supports both centralized or decentralized training." The respondents agreed on this area by 18 to one with two having no opinion as presented in Table VIII.

In conclusion, the questionnaire contained 29 statements. Twenty-one of the statements received a majority of responses indicating agreement. There were seven statements which had a majority of the responses disagreeing. Table VI had one item with an equal number of agree and disagree responses. The "no opinion" responses represented less than 20 percent on 24 of the statements. Table V, statement four, had a 33 percent "no opinion" response which was the largest of the five remaining "no opinion" responses to the 29 statements.

TABLE VIII

EDUCATION SPECIALISTS' RESPONSES TO USE OF CBI IN TECHNICAL TRAINING

USE OF CBI IN TECHNICAL TRAINING STATEMENTS	RESPONSES					
	Agree		Disagree		No Opinion	
	N	%	N	%	N	%
Makes good business sense.	14	67	3	14	4	19
Permits long term savings not possible in traditional training.	8	38	7	33	6	29
Supports centralized or decentralized training.	18	86	1	5	2	10*

N=21

* - May not be equal to 100 percent due to rounding.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

This is the concluding chapter of the study to determine the FAA Academy education specialists' perceptions concerning CBI in technical training. The chapter contains a summary of the research, conclusions, and recommendations for further study and research into the use of CBI for delivery of technical training.

Summary

This research was conducted because the FAA Academy had not perviously investigated the education specialists' perception of the use of CBI in the delivery of technical training. The FAA management made the decision to use CBI as one method for delivery of technical training. This research was designed to provide answers to the following questions:

1. Do the education specialists perceive that CBI is an appropriate methodology for delivery and course management of technical training?

2. Do the education specialists perceive that

acquisition of knowledge and self-motivation are improved through CBI methodology?

3. Do the education specialists perceive that instructional aids used with CBI methodology enhance technical training?

4. Do the education specialists perceive that development of CBI courseware requires special training and skills?

A review of literature relating to the evolution of CBI and the educators'/teachers' perceptions of CBI was made by the researcher. The review focused on the evolution of computer-based instruction and the educators' resistance to make any changes from the traditional training method. A questionnaire was developed by the researcher and was field-tested by several associates. It was then distributed to the FAA Academy education specialists. The questionnaire was designed to document the education specialists' perceptions concerning CBI delivery of technical training. The education specialists' responses to the questionnaire were tabulated and summarized in narrative form.

Overall, a majority of the responses to the questionnaire agreed that CBI was an appropriate delivery method for technical training. The two sections on CBI methodology and instructional aids used with CBI had the narrowest margins betwen agree and disagree responses. However, both of these

sections would result in a change to the respondents' role when compared to the traditional role they are used to performing. The remaining five sections had general agreement as compared to disagreement. Even though there were "no opinion" responses to most all the questions the numbers were relatively small and were considered insignificant to the overall results of the responses to the questionnaire.

Conclusions

Based on the FAA Academy education specialists' perceptions, the following conclusions concerning the use of CBI methodology for delivery of technical training can be made:

1. The education specialists were confident of the course management functions performed by CBI.

2. They all agreed that special training was required to develop CBI courseware and that more time was required for the design and development of the courseware.

3. They liked the self-motivation CBI provided to the students and the immediate confirmation of responses.

4. They generally agreed that CBI makes good business sense and that it supports both centralized or decentralized training.

5. They were not sure that CBI training was as

efficient or as effective as the traditional method.

6. Finally, they were unsure that CBI methodology was suitable for delivery of complex technical courses, even though a majority agreed that it was suitable for fundamental courses.

Recommendations

For Practice

Based on the outcome of the findings the folloing is recommended:

1. The FAA Academy provide special training in CBI courseware development for the education specialists prior to an assignment involving CBI courseware development.

2. That training in computer use and an introduction to programing be provided to the education specialists prior to being assigned CBI courseware development tasks.

For Further Research

Based on the findings from this study it is recommended that additional research be conducted in the following areas:

1. Does CBI train as efficiently as the traditional method?

2. Does CBI train as effectively as the traditional method?

3. Is CBI suitable for delivery of complex technical courses?

4. Does CBI ensure that students master the course objectives?

5. Does CBI make the subject materials more clear?

6. Does CBI help to make the training more enjoyable?

BIBLIOGRAPHY

Barger, Robert N. "Computer Literacy: Toward a Clearer Definition." T.H.E. Journal, Vol. 11, No. 2 (October, 1983), pp. 108-112.

Buck, John C. "CBI Feasibility Study for the FAA." (Unpub. 1979).

Burke, Robert L. Computer-Assisted Instruction Sourcebook. New York: Prentice-Hall, 1982.

Byrd, Bonnie K. "Adult Learners' Perceptions Of The Effectiveness Of Computer-Based Instruction Related To Systems Approach Design Elements." (Unpub. M.S. thesis, Oklahoma State University, 1983.)

Federico, Pat A. "Changes in the Cognitive Components of Achievement as Students Proceed Through Computer Managed Instruction." Journal of Computer-Based Instruction, Vol.9, No.4 (Spring, 1983), pp. 156-168.

Gleason, Gerald T. "Microcomputers in Education: The State of the Art." Education Technology, Vol. 21, No. 3 (March, 1981), pp. 7-18.

Hansen, Arthur G. "The Industrial-Educational Partnership: The Promise and the Problems." T.H.E. Journal, Vol. 11, No. 2 (October, 1983), pp. 113-116.

Heines, Jesse H., R. Levine, and J. Robinson. "Tomorrow's Classroom - The Changing Focus in Computer Education." T.H.E. Journal, Vol. 10, No. 5 (March, 1983), pp. 100-108.

Johnson, Carlos E. "The Effects of Computer Assisted Instruction on the Academic Achievement of Students in Accounting I Classes." (Unpub. Ed.D. thesis, Oklahoma State University, 1977.)

Kearsley, G., B. Hunter, and R.J. Seidel. "Two Decades of Computer-Based Instruction Projects: What Have We Learned?" T.H.E. Journal, Vol. 10, No. 3 (January, 1983), pp. 90-94.

Kearsley, G., B. Hunter, and R.J. Seidel. "Two Decades of Computer-Based Instruction Projects: What Have We Learned?" T.H.E. Journal, Vol. 10, No. 4 (February, 1983), pp. 89-96.

Lewis, R. "Teachers, Pupils and Microcomputers." T.H.E. Journal, Vol. 10, No. 4 (February, 1983), pp. 81-87.

Lidtke, Doris K. "Securing Teacher Acceptance of Technology." National Conference on Technology and Education, Washington, D.C. (January, 1981), pp. 3-17.

Margolin, Joseph B. and Marion R. Misch. Computers in the Classroom. New York: Spartan Books, 1970.

Miller, Harry G. "Perspectives on Emerging Technical Careers and Higher Education." T.H.E. Journal, Vol. 11, No. 2 (October, 1983), pp. 123-127.

Robinson, Carol A. Computer Managed Instruction in Navy Technical Training: An Attitudinal Survey. Final Report. San Diego: Navy Personnel Research and Training Center, June, 1980 - March, 1981.

Steinberg, Esther R. Teaching Computers to Teach. London: Lawrence Erlbaum Associates, 1984.

Stevens, Dorothy J. "How Educators Perceive Computers in the Classroom." AEDS Journal, (Spring, 1980), pp. 221-232.

Strippoli, William P. "Postsecondary Education and the Computer." Business Education World, Vol. 60, No. 3 (January - February, 1980), pp. 28.

Tatsuoka, Kikumi K., L. Misselt. Attitude and Performance of Military Students and Instructor Attitude in Computer Based Technical Training. MTC Report, No. 23, Urbana-Champaign: Computer-Based Education Research Laboratory, University of Illinois, 1978.

White, Mary A. The Future of Electronic Learning, London: Lawrence Erlbaum Associates, 1983.

APPENDICES

APPENDIX A

COMPUTER-BASED INSTRUCTION

DIRECTIONS: Please respond to the following questions concerning the use of computer-based instruction (CBI) in technical training. Check the one response which best represents your perceptions in the provided parentheses.

	Agree	Disagree	No Opinion
I. CBI METHODOLOGY...			
1. Trains as efficiently as traditional method.	( )	( )	( )
2. Trains as effectively as traditional method.	( )	( )	( )
3. Increases training productivity.	( )	( )	( )
4. Is suitable for fundamental courses.	( )	( )	( )
5. Is suitable for complex technical courses.	( )	( )	( )

	Agree	Disagree	No Opinion
II. ACQUISITION OF KNOWLEDGE THROUGH CBI...			
1. Ensures that students master the course objectives.	( )	( )	( )
2. Enables the student to learn at his/her own rate.	( )	( )	( )
3. Places more emphasis on completing a module than acquiring a skill or knowledge.	( )	( )	( )
4. Supports equipment simulations which can be used to replace laboratory training.	( )	( )	( )
III. COURSE MANAGEMENT BY CBI...			
1. Takes care of student recordkeeping efficiently.	( )	( )	( )
2. Informs the student when a unit is successfully completed.	( )	( )	( )
3. Provides the student with a detailed description of training objectives.	( )	( )	( )
4. Administers and scores tests more efficiently.	( )	( )	( )

	Agree	Disagree	No Opinion
IV. INSTRUCTIONAL AIDS USED WITH CBI...			
1. Frees the instructor to perform individual assistance when needed by students.	( )	( )	( )
2. Makes the subject materials more clear.	( )	( )	( )
3. Provides immediate confirmation to the student.	( )	( )	( )
4. Meets the individual needs of the student.	( )	( )	( )
V. SELF-MOTIVATION THROUGH CBI...			
1. Puts the student in charge of his/her training more than traditional training.	( )	( )	( )
2. Removes pressures on the student to compete with other students.	( )	( )	( )
3. Demands more student effort than traditional training.	( )	( )	( )
4. Helps to make the training more enjoyable.	( )	( )	( )

	Agree	Disagree	No Opinion
VI. CBI TRAINING REQUIRES...			
1. Special training to develop quality CBI courseware.	( )	( )	( )
2. A knowledge of computers.	( )	( )	( )
3. An ability to program the computer.	( )	( )	( )
4. More time to design and develop.	( )	( )	( )
5. Less time for revision and update of courseware.	( )	( )	( )
VII. USE OF CBI IN TECHNICAL TRAINING...			
1. Makes good business sense.	( )	( )	( )
2. Permits long term savings not possible in traditional training.	( )	( )	( )
3. Supports centralized or decentralized training.	( )	( )	( )

Please provide the following information:

1. Your sex. Male ( ) Female ( )

2. Your age.
   - 20 to 30 years ( )
   - 30 to 40 years ( )
   - 40 to 50 years ( )
   - 50 to 60 years ( )
   - over 60 years ( )

3. Education specialist experience.
   - less than 5 years ( )
   - 5 to 10 years ( )
   - 10 to 15 years ( )
   - 15 to 20 years ( )
   - 20 to 25 years ( )
   - 25 or more years ( )

4. FAA Academy experience as an education specialist.
   - less than 5 years ( )
   - 5 to 10 years ( )
   - 10 to 15 years ( )
   - 15 to 20 years ( )
   - 20 to 25 years ( )
   - 25 or more years ( )

5. Highest degree obtained.
   - Bachelor ( )
   - Masters ( )
   - Doctors ( )

6. Do you use a home (personal) or main-frame computer? Yes ( ) No ( )

Thank you for your time in completing this questionnaire. Please return it to me in the enclosed stamped envelope by September 15, 1984.

APPENDIX B

Fellow employee;

I would appreciate your assistance in completing the attached questionnaire. This questionnaire is required for completion of my thesis in Human Resources Development. I have enclosed a stamped envelope for your convenience in returning the questionnaire to me. Please return it by Spetember 15, 1984, so that I can meet the deadlime for completion of my thesis by October 15, 1984.

Thank you,

Thelma Stacy

VITA

Thelma Lee Stacy

Candidate for the Degree of

Master of Science

Thesis: FAA ACADEMY EDUCATIONAL SPECIALISTS PERCEPTION CONCERNING COMPUTER-BASED INSTRUCTION IN TECHNICAL TRAINING

Major Field: OCCUPATIONAL AND ADULT EDUCATION

Biographical:

Personal Data: Born in Washita, Oklahoma, December 31, 1932, the daughter of Mr. and Mrs. John C. Boydstun.

Education: Graduated from Anadarko High School, Anadarko, Oklahoma, in May, 1950; received a Bachelor of Arts degree in Mathematics from Oklahoma College for Women (now Oklahoma University of Arts and Science) in 1956; completed requirements for the Master of Science degree in Occupational and Adult Education with an emphasis in Human Resources Development at Oklahoma State University in December, 1984.

Professional Experience: Engineering Assistant, Southwestern Bell Telephone Company, 1956-59; Computer Programer/ Analyst, and Education Specialist, U.S. Government, 1962-Present.