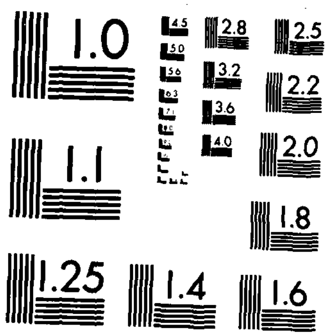
AD-A154 792   COMPUTER BASED INSTRUCTION IN THE US ARMY'S ENTRY LEVEL ENLISTED TRAINING(U) ARMY MILITARY PERSONNEL CENTER ALEXANDRIA VA J A ELDREDGE 13 MAR 85   1/2

UNCLASSIFIED   F/G 5/9   NL



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

(2)

AD-A154 792

COMPUTER BASED INSTRUCTION IN THE U.S. ARMY'S ENTRY LEVEL ENLISTED TRAINING

Captain James A. Eldredge
HQDA, MILPERCEN (DAPC-OPA-E)
200 Stovall Street
Alexandria, VA 22332

Final report 13 March 1985

A thesis submitted to the University of Utah, Salt Lake City, Utah in partial fulfillment of the requirements for the degree of Master of Science.

Unclassified
SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

(2)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. A154792	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) COMPUTER BASED INSTRUCTION IN THE U.S. ARMY'S ENTRY LEVEL ENLISTED TRAINING		5. TYPE OF REPORT & PERIOD COVERED FINAL REPORT, 13 March 1985
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Captain James A. Eldredge		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Student, HQDA, MILPERCEN(DAPC-OPA-E), 200 Stovall Street, Alexandria, Virginia 22332.		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS HQDA, MILPERCEN, ATTN: DAPC-OPA-E, 200 Stovall Street, Alexandria, Virginia 22332		12. REPORT DATE 13 March 1985
		13. NUMBER OF PAGES 137
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Masters degree thesis for the department of communication, University of Utah

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Computer based instruction, Army training, videodisc, simulators, training devices, embedded training.

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This study profiles the present use and perceptions of computer based instruction (CBI) by the U.S. Army's enlisted trainers. Attention is given to the methods of employment, software productio current hardware, the training time devoted to CBI, and the perception of the value of CBI. A 33-item questionaire was mailed to the 28 proponents of Army enlisted training. Data reported were derived from the 22 responses received.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

Unclassified
SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

85 5 30 099

Currently, 55% of the respondents employ CBI in their training, with half of those also using videodisc enhancement. However, within three years 91.7% of the Army's training institutions will utilize CBI. Minicomputers and microcomputers presently constitute the bulk of the Army's computer hardware, but simulators are growing rapidly in popularity. This influx in utilization is attributed to their ability to drastically reduce training costs.

Another innovation is that of embedded training. Outfitting computerized weapons and support devices with embedded training programs increases the availability of instructional systems, without increasing inventory. Collectively, simulators and embedded training devices are most effectively employed in combat arms and combat service support training. The complexities of simulators and embedded devices do demand greater expertise to program, which is one reason why civilians presently produce 33% of the Army's software.

The Army is rapidly entering the computer age in its armaments, support systems, and training aids. Trainers are turning increasingly to computers as a means of coping with growing training requirements brought on by this sophistication. Although CBI has the potential of meeting a variety of educational needs, its continued employment will require a well-managed and carefully controlled approach if it is to serve the Army, and indirectly the citizenry, in a responsible manner.

COMPUTER BASED INSTRUCTION IN THE U.S. ARMY'S ENTRY LEVEL ENLISTED TRAINING

by

James A. Eldredge

A thesis submitted to the faculty of
The University of Utah
in partial fulfillment of the requirements for the degree of

Master of Science

Department of Communication

University of Utah

~~June~~ 1985
13 MARCH

ABSTRACT

Just as the ever-growing body of knowledge challenges civilian educators, so also does the increasing sophistication of warfare perplex military trainers. Educators from both settings have turned to computer support as a partial answer to the dilemma.

This study profiles the present utilization and perceptions of computer based instruction (CBI) in the U.S. Army's enlisted training institutions. Specific attention is given to the methods of employment, software production, current hardware, the training time devoted to CBI, and the perception of the value of CBI. A 33-item questionnaire was mailed to the 28 proponents of Army enlisted training. Data reported were derived from the 22 responses received.

Currently, 55% of the respondents employ CBI in their training, with half of those also using videodisc enhancement. However, within three years 91.7% of the Army's training institutions will utilize CBI. Minicomputers and microcomputers presently constitute the bulk of the Army's computer hardware, but simulators are growing rapidly in popularity. This influx in utilization is attributed to their ability to drastically reduce training costs.

Another innovation is that of embedded training. Outfitting computerized weapons and support devices with embedded training programs increases the availability of instructional systems, without increasing inventory. Collectively, simulators and embedded training devices are most effectively employed in combat arms and combat support training. The complexities of simulators and embedded devices do demand greater expertise to program, which is one reason why civilians presently produce 33% of the Army's educational software. Additional keywords: Training devices

The Army is rapidly entering the computer age in its armaments, support systems, and training aids. Trainers are turning increasingly to computers as a means of coping with growing training requirements brought on by this sophistication. Although CBI has the potential of meeting a variety of educational needs, its continued employment will require a well-managed and carefully controlled approach if it is to serve the Army, and indirectly the citizenry, in a responsible manner.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

(Appendix A) was five pages in length and contained 33 questions. A glossary of commonly used terms was attached to each questionnaire in an attempt to insure uniform definitions.

The questionnaire was divided into four sections. The first section defined the kind and scope of training offered by the responding agency. The second section was concerned with the hardware, software and method of CBI employment. The third section used a Likert scale to gauge value perceptions of CBI. The fourth section was a single open-ended question designed to encourage candid assessment of CBI. The flow of questions led the respondent from simple descriptions to perceptions and value assessments.

Population

The questionnaire was sent to the proponents for all Army schools which provide entry level military occupational speciality (MOS) training. There were 381 specialities listed in AR 611-210 (1984). However, only 340 specialities were open to entry level soldiers. For purposes of control and administration the Army classified all specialities according to 32 career management fields (CMF). For example, all infantry training came under the direction of CMF 11, located at Fort Benning, Georgia. All military intelligence specialities were directed by CMF 96, located at Fort questionnaire format was different than the present effort, there were some methodological insights gleaned from the study.

In 1982 the Department of the Army responded to the uncontrolled introduction of CBI into the Army's training programs by requiring TRADOC to set up a program management office (PMO) to control the purchase of training bound-computer hardware. In response to this directive, TRADOC conducted a needs ascertainment survey. The report generated from that survey was published in April 1983 and contained some quantitative data concerning the numbers of computers in the training inventory (Miller, et al., 1983). The report concluded that there was a need to standardize computer hardware and supported the establishment of the PMO. The population surveyed consisted of high ranking officers in the TRADOC command. Although the two studies just cited relate to the current effort, and help form a methodological base, neither study investigated the current day to day employment of computers in entry level training.

Methods and Procedures

Instrument

A mail questionnaire was employed to collect the data reported in this study. The survey instrument

Software Development

Army trainers found the process of converting civilian courseware to Army use to be a cumbersome process. Project IMPACT was a study of the feasibility of creating Army unique computer training support. The study determined that the Army had the resources and expertise to author and produce its own software and that it was cost effective to do so (Seidle, 1971).

Instructor Attitude

A student survey contained in Longo's doctoral dissertation (1976) cites poor instructor attitude as one of the critical problems in implementing CBI (p.93). Some important questions are suggested by this study. What is the attitude of Army trainers to this training aid? Is there a need for increased awareness of the potential uses and the potential problems of CBI?

Related Studies

In 1974 TRADOC commissioned a survey of computer applications throughout the Army's schools. The activities then incorporating computer support employed centralized main frame computers of limited capacity, by today's standards. Consequently, plans for future CBI use were not well formed. Recorded respondent comments indicate that CBI was then in its infancy and little understood (Rich & Van Pelt, 1974). Even though the battlefield reports for both actual and training scenarios (Brown, 1984. p.55). The Artillery branch is using their TACFIRE computer in this dual role of mission and training support. No conclusive research has been conducted using embedded training devices.

Main frame networks. Both the TICCIT and the PLATO systems have been tested in the Army, with PLATO receiving the most attention. Stimutis (1979) found PLATO to be comparable to traditional instruction in preparing students for their GED examination, while saving instruction time. Respondents of this survey claim that PLATO's language was too complex for their use. An appropriation of over 14 million dollars has been approved for a PLATO network based at Fort Leavenworth, Kansas (Denlinger, 1984).

Instructional games and demonstration. Only one other related study resulted from a thorough search through Dissertation Abstracts International and Masters Abstracts. White's doctoral dissertation (1983) tested the use of instructional games to teach military history to college students. White found games to be effective tools for teaching military history. Both instructional games and demonstration appear to be ancillary uses for computers in education and have not been subjected to rigorous investigation.

considered as a supplement for high cost training. Two simulators are being tested. One simulates the combat engineer vehicle (CEV), a tank-like vehicle used to blow holes in concrete (Brown, 1984, p.55). The other simulator being tested duplicates the inside of the new M1 tank. The conduct of fire trainer (COFT) was designed to present a wide variety of environmental conditions to train both drivers and gunners (Longhorn, 1984, p.15). Initial responses from both trainers and trainees are favorable.

Tutorial. The Army tested the use of computers to teach new material at its Signal School. Longo and Guinti (1971) followed the progress of these tests and presented their findings at the 1972 annual convention of the Association for the Development of Instructional Systems. Longo and Guinti found that computers used in the tutorial mode reduced training time by 35% and reduced the student attrition rate by 21%. They also concluded that, "...CAI is as effective as conventional instruction in teaching basic electronics" (p.5).

Embedded training. Embedded training appears to constitute a new field of research. Existing, computerized material can be programmed to accommodate training in addition to performing its normal function. Microfix is one such system being tested. It is a map storage intelligent videodisc capable of generating praised the computers' ability to produce personnel reports with background information, class rosters with essential personal data, and graduation rosters with class standings and printed diplomas. The computer also managed the progress of the 28,000 nonresident trainees.

Drill and practice. Drill and practice is reinforcement of previously presented material. Again, the Infantry School was the test site. Course material ranged from parts supply to mortar fire direction. Some skills involved in these areas included spatial ability, arithmetic reasoning, analyzing and categorizing problems, and converting metric measurements. Consistently, trainees performed task-relevant procedures more often when using CBI to supplement classroom instruction, compared with non-CBI practice, i.e., looking up parts or procedures in the technical manual increased from an average of 7 times in the conventional environment, to 15 times in the CBI mode (Freeman, p. S9).

Simulation. Simulation has a long history in Army training. Whether it is recreating a personnel management office to instruct clerks, or simulating the battlefield to train infantry soldiers, trainers take great pains to make the training environment as close to reality as possible. With the exception of aviation, computerized simulation is only recently being the Army's research is offered as an overview to the present study. A more detailed discussion is presented in Chapter Three.

Methods of Employment

Course administration. In 1980 the US Army Research Center for Behaviorial and Social Studies published a report concerning project AIMS (automated instructional management system). AIMS was a response to the 1975 TRADOC directive to implement self-paced training (Berkowitz & O'Neal, 1980, p.1). The cumbersome manual process of managing self-paced courses distracts from the instructor's major duties. TRADOC turned to computer managed instruction for help. The Navy's versatile training system (VTS) held the greatest promise and was modified for use in AIMS testing. The tests showed conclusively that computers could handle the complexities of self-paced course work, and could track student progress, give and/or correct and record tests, while reducing the nonteaching workload for instructors. Even for large student populations, self-paced course work is feasible. The Infantry School at Fort Benning, Georgia also tested computer managed courses. However, in 1969 the computer at Fort Benning was not sophisticated enough to handle scheduling of classrooms and ranges for an annual student load of 74,000 (Freeman, 1969, p. S12). Still, the Infantry School

5. To what extent do combat arms, combat support and combat service support schools differ in their utilization of computers in their training programs?

6. To what extent are microcomputers, minicomputers, main frame networks and videodisc enhanced systems utilized in MOS training?

7. To what extent are computers integrated into the training schedules?

8. To what extent are Army trainers instructed in the capabilities and imitations of CBI?

9. To what extent do Army trainers perceive computers as adaptable to their school's course offerings?

10. In what configuration, drill and practice, tutorial, demonstration, simulation, instructional games or course management, do Army trainers perceive computer support as most applicable?

Survey of Previous Army CBI Research

There is an ever-growing plethora of research concerning the pedagogical employment of computer technology. The bulk of this research deals with primary, secondary and higher education in the civilian sector. However, the military is also amassing data on the use of computers in the classroom. The Army's experiments and projects approach CBI on several levels relevant to the present study. The following survey of information concerning current uses and problems encountered in the field.

Knowing the current level of utilization and how instructors perceive the value of CBI would assist in this central decision. If present computer support is underutilized it would indicate a need to either familiarize instructors with the equipment or reevlauate the current trend and reduce computer purchases. In any event, an ascertainment of the current use of computers within Army training units appears warranted.

Statement of the Problem

The purpose of this study was to document the present utilization of computers to assist Army trainers with initial enlisted military occupational speciality (MOS) training. The specific questions derived from this problem statement were as follows:

1. To what extent is CBI used for drill and practice, tutorial, demonstration, simulation, instructional games or course management?

2. To what extent are computers employed in the individual mode; in the group mode?

3. To what extent do MOS producing schools offer individual self-paced course work?

4. To what extent do local trainers develop their own software for training?

In 1982 TRADOC responded to this lack of homogeneity by commissioning a study to determine the need for establishing a program management office (PMO) for computer based instruction (Miller, Hess, & DePrima, 1983). Included in this ascertainment report were several advantages for CBI. First, CBI can reduce training costs by decreasing training time and travel expenses, while increasing levels of learner proficiency. Second, training packages are easily produced, standardized and updated with central control. Third, well-produced training packages can reach a greater number of units, thus servicing the National Guard and the U.S. Army Reserve, as well as the regular Army recruits. And finally, both hardware and software are readily expandable for modernization (p.1-3).

Justification

Although there are advantages for CBI, not everyone shared the enthusiasm expressed in the 1983 report. Many Army trainers were apprehensive about accepting a new and unfamiliar device into their already burgeoning training aid inventories. The newly established PMO has been wrestling with this problem, but there is no documentation regarding levels of utilization by training facilities. Hence, the major question of how extensively CBI ought to be integrated into training is, as yet, unanswered. There is a critical need for more devices; and provide these products for training in institutions and in units" (TRADOC Reg. 10-41, 1983, para. 1-5). One device which may hold considerable promise in meeting the ever-increasing training challenge is the computer, a technology employed in Army training for nearly 20 years.

In 1965 the Secretary of Defense invited the service secretaries to search for innovative approaches to training (Longo, 1976). This emphasis on innovation led to some 38 studies from 1968 to 1979 which documented some of the applications of computer based instruction (CBI). The most clearly identified advantage of CBI was a 30% savings in time (p.16). In 1975 TRADOC set the stage for CBI by directing that self-paced training be implemented throughout its schools (Berkowitz, O'Neal, & Wagner, 1980, p.1).

Despite these positive thrusts, the incorporation of computers into the training environment has been slow. The real driving forces have been local needs and a handful of visionary trainers. Consequently, there is considerable diversity in hardware, software, and approaches to system mananagement. Even within commands there has been little effort to standardize or to develop cost-saving networks. For computer technology to truly take a meaningful place in Army training, standardization of hardware and software is essential.

materials, there is an unprecedented incorporation of sophisticated systems, designed to enhance battlefield survivability. The United States military depends on an ever-improving technology to compensate for a smaller armed force than its potential adversary. But this rapid advance in technology is not made without some troublesome problems: "This decade will see the greatest influx of new equipment ever, but our enlisted people can not satisfactorily operate or maintain much of the equipment we have now" (Bunderson, Olson, & Baillio, 1981, p.1).

Bunderson and his colleagues were not passing judgment on the quality of today's soldier. Rather, they were challenging commanders to provide the kind of meaningful training needed to prepare soldiers to effectively employ and maintain the new technologies of war.

Keeping pace with the rapid changes taking place are major challenges for military trainers. The Training and Doctrine Command (TRADOC) is responsible for developing tactics to effectively employ new material on the battlefield, and for coordinating appropriate training to support the new weapons and tactics. One of TRADOC's primary training functions is to "... develop training support materials, literature, simulators, and

CHAPTER 1

INTRODUCTION TO THE STUDY

> An overriding consideration throughout military training is the need to keep maximum numbers of personnel operational at any one time. (Miles, 1977, p.244)

Background

War, or the imminent threat of war, brings into clear focus the importance of effective and efficient training. This was evident during the initial preparation for World War II. In early 1941 the Division of Visual Aids for War Training was established within the Office of Education (Hitchens, 1979, p.7).

The legacy of that division is an incredible array of films, slides, videotapes, overhead transparencies, mock-ups, and scale downs, which are common in military training. The use of training aids to maintain interest and enhance learning within the military is now a well accepted practice. New technologies have radically altered the conduct of war, and consequently, they have also changed military training methodology.

Today, rapid change serves as a critical part of balancing the might of the major powers. The microchip has already had a profound impact on battlefield technology and tactics. In weapons and support

ACKNOWLEDGMENTS

My deep appreciation goes to Dr. Tiemens and Dr. Larson for their confidence, support, and help. Dr. Avery performed service above and beyond the call of duty (he would call it yeoman service). Without his careful guidance, patience, and insight, this thesis would still be a jumble of papers strewn around our basement. He has the rare ability to cut to the heart of a problem, then tactfully offer insights which lead to the solution. It has been a rare privilege to study under the tutelage of these intellectual giants.

Four miniature people deserve accolades. Wendy, Fred, Steven and David did not always understand why their dad was not speaking, and spent too much of their time staring at blank pages. But, they gave me the gift of silence when silence was the best possible gift. I'll try to make it up to them.

Finally and foremost, there is Nancy, whose faith and encouragement never failed. She shared the toil, now she can share the joy.

Huachuca, Arizona. Hence the 32 management fields located within the continental United States constitute the population for this study.

Five sources were consulted to identify the survey population: AR 601-210 (1982), AR 351-1 (1984), Rich & Van Pelt's survey (1974), Weiskoff's article (1984), and a telephone conversation with TRADOC headquarters. All of the installations identified in these sources were selected for study.

Data Collection

Thirty-eight questionnaires were mailed out on October 24, 1984, with a response deadline of November 8, 1984 (Appendix B includes the cover letter for the first mailout). On October 31st a reminder (also in Appendix B) was mailed. By the November 8 deadline, twelve responses had been returned. Letterman Army Medical Center, in San Francisco, returned the questionnaire uncompleted, with a comment that the inquiry was not applicable to their installation. Eventually, 10 of the original 38 addressees were determined to fall outside the parameters of this investigation and were eliminated from the potential response pool. These 10 installations either no longer conducted enlisted training or represented a level of command outside the parameters of this study.

A second questionnaire was sent on November 8, 1984, with a response deadline of November 22, 1984. On the 9th and 10th of November, nonrespondents were contacted by telephone and encouraged to expedite return of the questionnaire. Six more responses were received by the second deadline. Further telephone encouragement resulted in five additional responses, for a total of 22 out of 28, a response rate of 79%. An address list of the survey population is contained in Appendix C.

Data Presentation

All responses from the questionaires were coded for use by the Statistical Package for the Social Sciences (SPSS) (see Appendix D for the SPSS data list). A frequency count summarized the data by question. Two sets of cross tabulations were generated; one used branch affiliation as the independent variable, the second set used current CBI use or nonuse as the independent variable. The data are explained and presented in tabular form.

Organization of Chapters

Chapter 1 serves as an introduction to the study. Chapter 2 acquaints the reader with the pertinent Army organizational structure, TRADOC's role and function, and the officer and the enlisted institutional career training ladders. Chapter 3 explores both civilian and military experiments dealing with the use of computers in education, training and instruction. Chapter 4 includes the findings of the mail survey. Chapter 5 contains a summary, conclusion, and recommendations for TRADOC, the PMO, and some suggestions for additional research.

Limitations of the Study

This descriptive study deals with and is narrowly focused within a unique organization. The data will be of value to several Army agencies, e.g., the program management office for computer based instruction and the Army's communication technology office. The findings do not have clear generalizable application in any other setting. However, it is probable that other agencies, researchers, and civilian educators will be interested in many of the findings. Conclusions concerning the need for instructor familiarization with CBI, cost advantages, hardware charateristics, software development, and trainer perceptions on the value of CBI, all add to the growing body of CBI research.

As with any mail survey, some uncertainty regarding the respondent's definition of terms and question intent is possible. It is hoped that by careful question structure and the inclusion of a glossary, this problem will have minimal impact of the study results.

CHAPTER 2

U.S. ARMY TRAINING ENVIRONMENT

> Every up-to-date dictionary should say that "peace" and "war" mean the same thing....it may even reasonably be said that the intensely sharp competitive preparation for war by the nations is the real war, permanent, unceasing; and that the battles are only a sort of public verification of the mastery gained during the "peace" interval. (James, in Montross, 1960, p.754)

Introduction

What does the Army do in peacetime? "Maintain the peace" is the pat answer, but that description lacks substance. The key activities of a peacetime Army are training and maintaining. Maintaining refers to keeping unit equipment in combat ready repair. Preparing people to function in time of war is the training mission. There are two mutually-dependent categories of training: unit and individual. Unit training is the on-going, day to day function of building team cohesiveness and responsiveness. Individual proficiencies are part of unit training. However, as with a football team, a collection of exceptional players does not insure a winning season. Teamwork is essential for victory. For combat arms soldiers, training as units in simulated battlefield conditions is the major training activity. Support specialities, such as personnel administration or vehicle repair, perform their assigned mission in their unit each day. Additionally, individuals are trained periodically in common soldier skills as part of their unit training.

Soldiers must acquire baseline competencies in institutional individual training. This skill acquisition and enhancement continues throughout a soldier's career. This chapter is devoted to an explanation of the institutionalized individual training environment in the Army. A brief discussion of the organizational structure of the Army will provide the framework for understanding the role and function of the US Army Training and Doctrine Command (TRADOC). Within TRADOC there are two individual career school systems; one for officers and one for enlisted soldiers. Both of these career training ladders are addressed. This background information is provided to help the reader understand the environmental constraints and parameters of this study.

U.S. Army Organization

Command Structure

Since its birth in 1775, the U.S. Army has been under civilian control. One of the few clearly defined roles of the President of the United States is that of Commander-in-Chief of the Armed Forces (Constitution, Art. 2). The President appoints a civilian Secretary of Defense. The Office of the Secretary of Defense was first established in 1947 with the appointment of James V. Forrestal and is organized with a staff of deputies, assistant secretaries, under secretaries, advisors and directors (Defense, 1982, p.5).

The Joint Chiefs of Staff comprise the first military echelon. Their chairman is answerable directly to the Secretary of Defense. A General Officer is appointed from each service as the Chief of Staff for that service. One additional officer is picked as the Chairman of the Joint Chiefs of Staff. The concept of the Joint Chiefs of Staff was implemented in 1949 with the appointment of General Omar Bradley.

Directly under the Joint Chiefs of Staff are six unified commands and three specified commands. Unified commands are composed of forces from two or more services and are usually organized on a geographical basis (i.e., U.S. European Command, Pacific Command). Specified commands are organized on a functional basis and are normally made up of forces from a single service (i.e., Aerospace Defense Command). These nine special case commands bypass the various service secretaries and report directly to the Joint Chiefs of Staff (Defense, p.11-12).

The Department of the Army is comprised of a civilian Secretary of the Army, who reports to the Secretary of Defense; and the Army Chief of Staff, who sits on the Joint Chiefs of Staff and reports both to the Chairman and to the Secretary of the Army.

Fifteen major commands make up the Department of the Army. Three of these 15 commands are preeminent. Forces Command (FORSCOM) is comprised of all the active combat ready units stationed in the continental United States. U.S. Army Europe (USAEUR) is made up of all the Army units stationed in Europe. U.S. Army Training and Doctrine Command (TRADOC) controls all institutional training conducted throughout the Army, and sets the standards for unit training. Indicative of the importance of these three commands is the fact that they are each led by a four star General.[1]

Horizontal Staffs

At each level of command there is a horizontal structure of staff support. The military staff is a cohesive unit with the specific duty of helping a commander accomplish the mission. Specifically staffs are:

1. To respond immediately to the needs of the commander and subordinate units.

2. To keep the commander informed of the situation.

3. To reduce the time needed to control, integrate and coordinate operations.

4. To reduce chances of error.

5. To relieve the commander of supervisory details in routine matters (FM 101-5, para.11).

Although the commander is free to determine staff organization and structure, there is a preferred arrangement. Three groups are common in a large staff. The coordinating staff officers are the principal staff assistants, each being concerned with a broad field of interest. In combat units these coordinating staff officers are designated as: G1, personnel; G2, intelligence; G3, operations; G4, logistics; G5, civil-military operations. The special staff advises the commander on professional, technical and functional matters. Usually, the special staff is composed of officers who have other duties, i.e., the medical facility commander.

Finally, the commander will have a personal staff, usually the Inspector General and the Judge Advocate (lawyer). The personal staff members have direct access to the commander. Other staff members report to and through a Chief of Staff. A common staff structure is outlined in Figure 1.

At the level of Chief of Staff of the Army, several staff offices are involved with plans and procurement of computerized training devices. One of the duties of the Deputy Chief of Staff for Operations and Plans (DCSOPS) is to develop individual and unit training policy. There are additional, specific tasks given DCSOPS which also relate to training material acquisition. For example, he or she establishes "priorities for material research, development, acquisition and affordability determinations" and "oversees audio-visual activities of the Army" (AR 10-5, 1980, para.2).

The Deputy Chief of Staff for Logistics (DCSLOG) is responsible for material acquisition, transportation and allocation. Of specific interest is the mandate concerning standardization. Although this directive deals basically with intra-Army

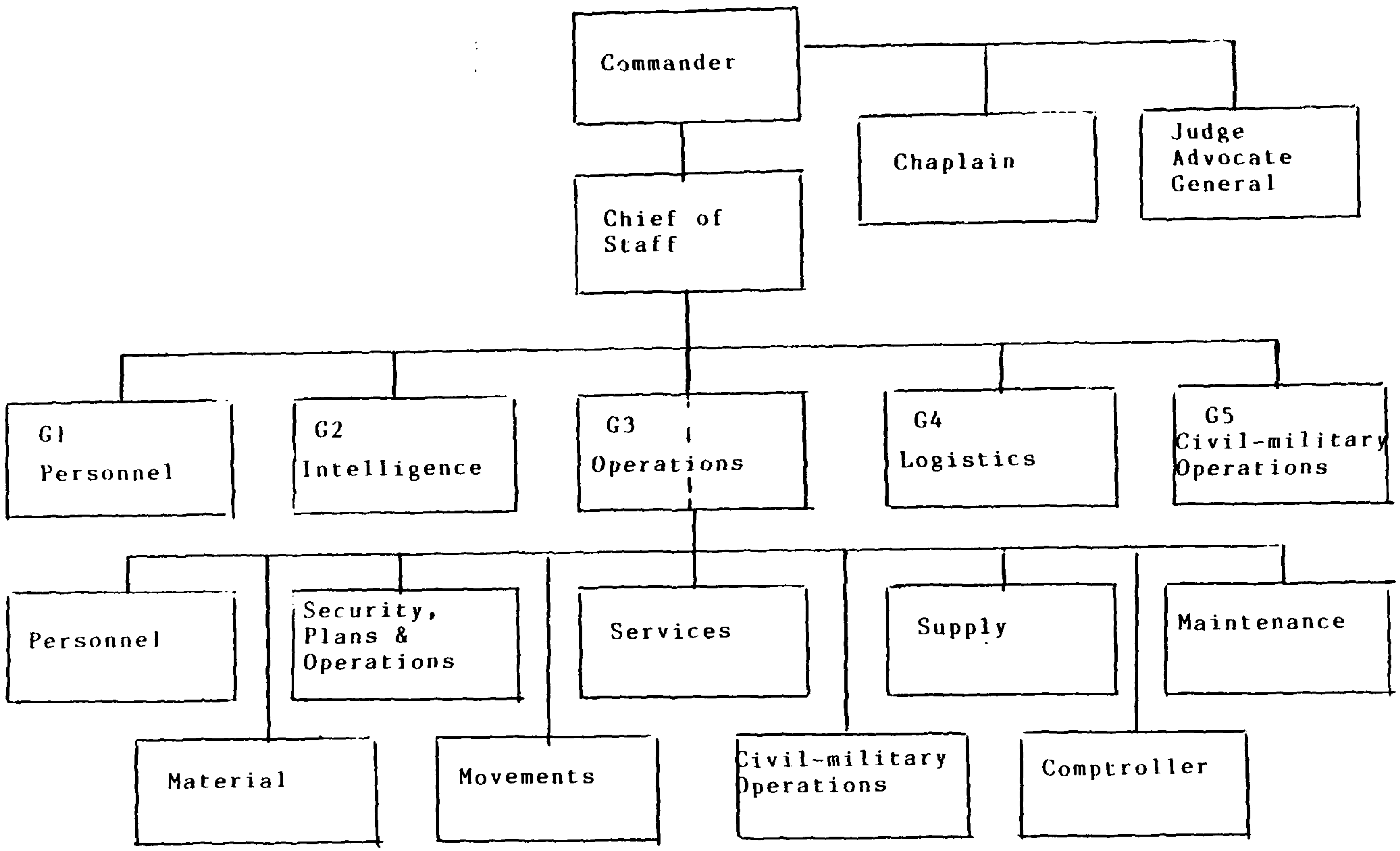


Figure 1. Typical Army division and corps staff structure.

is a prerequisite to achievement of that broader goal.

The Deputy Chief of Staff for Research, Development and Acquisition (DCSRDA) is a key staff agency in development and procurement of computer based instruction devices. This staff office has the major responsibility to form policies to govern material purchases. DCSRDA conducts research on everything from tanks to tin cans, as an on-going effort to improve the Army's supplies. Congress has established a special set of appropriations to fund this research and development activity.

Requests for these and all other funds are compiled by the Comptroller of the Army. In turn, the budget is prepared and presented to the Office of Management and Budget (OMB). After a budget has been approved, the Comptroller allocates those finances to the various commands.

There is one additional staff office which has an interest in the area of CBI--the Assistant Chief of Staff for Automation and Communications (ACSAC). Since CBI is clearly an automation development, and is often dependent on communication resources, this office has a definite interest in the employment of CBI. ACSAC is the principal proponent for research and development of automation/communication systems.

The U.S. Army Training and Doctrine Command (TRADOC)

Structure

TRADOC is subdivided into three major functional areas: combat developments, training, and support operations and mobilization planning. Training is further separated into the three categories of training development, training support, and training.

Subordinate to TRADOC are three integrating centers. The three broad operational functions over which these integrating centers preside are combined arms, logistics and administration. Each center's responsibility is to integrate combat and training developments into their respective associated service schools. They are also tasked to develop Army doctrine within their assigned area of expertise.

In addition to doctrinal development and dissemination, the integrating center commander is expected to "develop concepts, coordinate, and recommend training device programs for their functional areas"(TRADOC Reg. 10-41, 1981, para.2).

Each integrating center has several associated schools assigned to it. The general concept developments are designed and disseminated by the integrating centers. However, branch specific and common tasks are developed by the service schools who report directly to Headquarters, TRADOC. Each school and installation has a command headquarters and either a Director of Plans and Training or a Training Proponent Office which acts as a conduit through which communication flows. It is this local training office which served as the subject for this study. As should be apparent from the previous discussion, it is this office which is directly involved with the utilization of CBI, while maintaining a position of access to future planning information.

Functions

Figure 2 is a line diagram of TRADOC's organization. As can be seen, the three major functions are combat development (which includes doctrinal development and material support), training, and mobilization planning.

The Department of the Army broadly defines TRADOC'S training mission in terms of the Army's total preparation for armed combat. (AR 10-41, 1982, para.4). TRADOC outlines its own objectives in more specific terms:

> 1. Develop and manage a training system by which the total Army trains and motivates soldiers and units to fight cohesively and as corporate entities employing strategy and tactics, material systems, and organizations derived from the underlying operational concepts. 2. Direct the Army's training development process; develop criteria, methods, techniques, and standards for

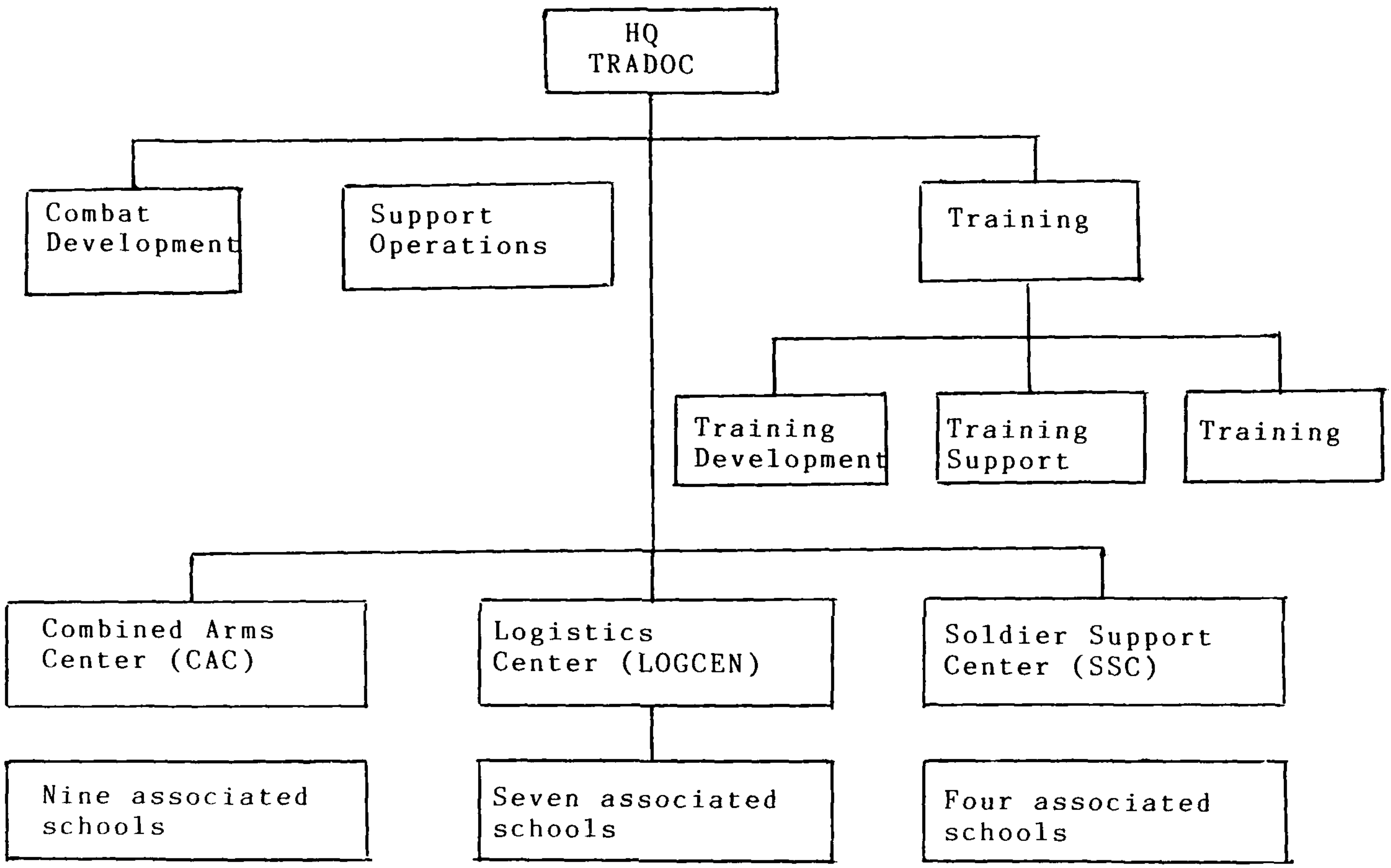


Figure 2. Functional organization of TRADOC

Experimental Findings

The Effect of CBI on Test Scores

Several studies report increased learning from CBI. A wide variety of student grade levels and course subject matter have been tested with fairly uniform results. In 1981, Poore, Qualls, and Brown studied the effectiveness of teaching mathematic skills using the PLATO interactive computer system. The authors found that mathematics scores improved significantly, from a mean grade level of 5.87 to that of 8.0. On the college level, Biology students using CBI improved their scores 15% to 27% over those of the control group (Bunderson, Olsen, & Baillio, 1981).

Technical skill courses readily adapt to CBI, especially those with well defined objectives. First aid is one of this genre. In a 1977 study, Markle notes a dramatic difference in test scores. The CBI students scored consistently higher than the control group. The lowest score in the experimental condition was 44 points above the best score in the control group.

A more recent experiment was conducted using two groups of students from the HAWK anti-aircraft missile repair course. The students were subjected to two experimental conditions. Treatment one received CBI only, while treatment two's CBI was enhanced with videodisc simulation. Students is both groups achieved a essential to Skinner's behavior modification theory. Skinner argued that the advantages of machine instruction were those of a private tutor, with constant interchange, sustained activity, presentation of small increments of material, and constant reinforcement. Even at this early stage Skinner realized that well-programmed material was essential to success.

Despite Skinner's claims for the tutorial benefits of technology, George Comstock, consultant for the Carnegie Commission, reported that the most common area of instructional use was that of data processing and computer science. Only 10% of the surveyed institutions reported tutorial use (1972, p. 23). The reasons cited in the report for the low incidence of tutorial use were: an unaware faculty and a lack of efficient software. These two concerns still plague technological innovation today.

The discussion in this chapter is based on findings from both civilian and military studies, and provides the ideological framework for the present work. The experiments and findings are presented as they relate to pertinent subject areas. Topics include: The effect of CBI on test scores, learning time, drop-out rates, training costs, and student/teacher attitudes of CBI. The importance of well-designed software, and some areas of caution are also considered.

CHAPTER 3

BACKGROUND STUDIES OF COMPUTERS IN EDUCATION

> It is time for we educators, trainers and managers to extract to the fullest the promise offered by the technology to provide training that is motivating and cost effective. (Kimberlin, 1983, p.2)

Introduction

Incorporation of technology into educational curricula is a common practice. Transparencies, motion pictures, overhead projectors, radio, and television are familiar tools found in today's classrooms. As early as 1926, S. L. Pressey conceptualized mechanized teaching. Pressey (1926) claimed that "... education is at present the most inefficiently carried on of any large scale undertaking in this country" (p. 373). His answer to inefficiency was a teaching and testing machine. However, Pressey's crude mechanical devices were limited. In the test mode there was no immediate feedback, but it did score the test. In the teaching mode the question could only be advanced by a correct response.

Pressey's idea did not noticeably change the academic community. Citing the same inefficiency, Skinner (1958) introduced his own teaching machine. Pressey's invention lacked the immediate feedback

Notes

1. References consulted for the discussion on command and staff organization are listed in brief form here and are fully referenced in the bibliography: AR 10-5. (1980). _Organization and function, Department of the Army_. AR 10-41. (1982). _Organization and function, U.S. Army Training and Doctrine Command_. AR 10-10. (1970). _Organization and functions, class I installation organization_. TRADOC Reg. 10-41. (1981). _U.S. Army Training and Doctrine Command_. FM 101-5. (1979). _The Army staff_.

2. The basic regulation outlining Army training is AR 351-1. (1984). _Individual military education and training_.

local level. Although this policy encourages local initiative, it severely inhibits system standardization of computer hardware and software.

Military trainers have a distinct advantage over their civilian counterparts in being able to justify large expenditures for computer support. The sheer volume of trainees and the apparent cost savings from reduced training time, coupled with an increased life for expensive equipment, provide sufficient inducement to purchase devices which can save time and training dollars. This study was designed to record, describe and analyze the extent to which commanders have incorporated CBI into their enlisted training institutions, and report their perceptions of its value.

operations in accordance with assigned missions.

In order to meet this overall training mission, some specific objectives are given to Army trainers. They are told to conserve training resources through increased use of training devices and simulation, and they are directed to improve training efficiency and effectiveness by more intelligent training management and execution.

To facilitate management of training, a functional division of labor has been established. The U.S. Army Training and Doctrine Command (TRADOC) has the overall responsibility for doctrine development and training management. Three integrating centers are the functional proponents for combined arms, logistics and administration. Service schools within those functional areas are assigned to help develop, test and implement doctrine and training programs. The service schools are the proponents for their areas of expertise for both officer and enlisted training and education.

Given this highly structured control system it would seem logical that standardization of computer hardware would have been an early consideration. However, this has not been the case. Considerable latitude is given to the service schools to develop systems for improving training efficiency at the colleges. The distinction is often blurred, as course material can be very similar in some cases. Officers do acquire some routine skills and enlisted soldiers do learn concepts.

For purposes of this study, the enlisted advanced individual training was chosen as the focus. This is the school system which is clearly definable, and contains the full variety of service school proponents. In addition, instructional units contain the kind of skill level material which is easily adaptable to computer courseware. That is, the overall objective of a training course or a block of instruction is defined and broken into manageable tasks. For each task a set of conditions is developed within which the task should be performed. Once that performance standard is met, within specified conditions, the task is said to be learned. This highly structured step-by-step approach lends itself well to computer assisted programs.

Summary

Unit and individual training is a major function of the peacetime Army, and indeed an Army at war. The Army is organized with this training mission in mind. Stated succinctly, the purpose of training is: to attain and maintain the state of operational readiness required to conduct combat or other periodically to go over course material.

Although skill level five is the apex, one more promotion preparation school is offered. Sergeants Major are the senior enlisted soldiers and function as part of the command headquarters in battalion and higher commands, or as the senior enlisted expert in support organizations. The Sergeants Major Academy prepares selected E8s for these duties. The school is located at Fort Bliss, Texas and the training course is 22 weeks. There is also a nonresident course which takes 2 years of self study.

In addition to these career ladder courses there are numerous additional skill courses offered to both officer and enlisted personnel to supplement basic branch skills, such as, airborne, ranger, special forces.

The Nature of Training

Not only is the career progression school system different for officers and enlisted soldiers, but the training within those courses is fundamentally dissimilar. Officers are expected to formulate plans and orders, enlisted soldiers are expected to implement the plans and carry out the orders. Enlisted training is highly task oriented, consistent with its name, skill level training. Officers are concerned with concepts in their schools and needs support soldiers either go to the primary leadership course (PLC) or the primary technical course (PTC). The first two mentioned courses are offered at NCO academies in the U.S. and overseas. PTC is conducted at the service schools or through correspondence. The course length varies but is normally 4 weeks.

Skill level three is taught at the basic noncommissioned officer course or a basic technical course. Both courses prepare E5 soldiers for advancement to E6 (Staff Sergeant). Course length is about 4 weeks but can be extended by local commanders to facilitate more detailed instruction.

The advanced noncommissioned officer course is a preparatory school for advancement to E7 (Sergeant First Class). Course presentation takes 10 weeks and is only offered at service schools in the U.S.

There are two echelons of senior level courses. One is designed to teach the skills needed at the rank of E8, and is split for those going on as Master Sergeants and those who will be assigned as First Sergeants. The First Sergeant course concerns company level unit administration. The Master Sergeant course deals with battalion level staff work. Both of these senior level courses are offered by correspondence. However, most posts gather the potential E8s together field intensive instruction.

Each speciality has a proponent service school. For example, a saxophone player is a different speciality than a drummer, but both are under one proponent, the school of music. The present study focuses on the proponent school.

Skill level one is attained by completion of advanced individual training (AIT). After level one the soldier comes under the noncommissioned officer education system (NCOES). NCOES philosophy provides for ongoing training within the units and periodic institutional training which provides, "...coordinated, job-related training for noncommissioned officers and specialists throughout their career" (AR 351-1, 1984, para.5). Prerequisite to rank advancement a soldier has to attain the next higher skill level. This is accomplished on the job and through institutional training.

Skill level one is good for promotion through E4 (the fourth enlisted rank--corporal). At that time the primary noncommissioned officer course (PNCOC) is offered. This training develops skill level two proficiency, preparatory to promotion to E5 (Sergeant). There are three different school options, one for the combat arms (PNCOC/CA), and two for the support troops. Depending on their career track schooling. This year-long course is offered to select senior Lieutenant Colonels and Colonels. This is also the group from which future Generals will be chosen. Again, there are other, comparable level schools which can satisfy this educational requirement. But, they too are highly selective. A progressive sequence in course development is apparent in both the officer and enlisted career courses.

Enlisted career courses. Enlisted schooling works on a skill level system. Advancement through the ranks depends on time in service, job performance, yearly skill test results and skill level schooling. All enlisted soldiers pass through basic training. Basic training fills the role of climatizing civilians into the more disciplined style of Army life, providing basic soldier skills common to all soldiers, and physically developing recruits for the demands of many Army assignments. Upon graduation from basic training, enlisted soldiers go directly to their assigned advanced individual training (AIT) where they will qualify in one of the military occupational specialities (MOS).

There are a few single station training units which combine basic training and AIT. This arrangement saves time and travel expense, but is limited to only a few branch schools with the facilities to carry out battalion and brigade level. CAS3 is mandatory for all senior Captains and involves a year of home study and one month of resident instruction. Unlike the officer basic and advanced courses, which are branch sponsored, CAS3 and all higher level schools come under the direction of the Department of the Army.

The U.S. Army Command and General Staff College (C&GSC) is a generic course, open to officers on a selective basis, from all branches of the Army. Officers are screened for attendance after selection to the rank of Major, and are eligible until their 15th year of commissioned service. About 40% are chosen to attend the 9 month resident course at Fort Leavenworth, Kansas. Officers not selected for C&GSC can enroll in a 3-year correspondence course. The course is designed to prepare officers for battalion command and division and corps staff work. Completion of C&GSC is clearly an advantage for promotion to Lieutenant Colonel, and is absolutely essential for some additional advancements or assignments.

Other options for fulfilling this level of schooling include attendance at sister service sponsored schools, joint service colleges or foreign nation sponsored schools. Civilian school is not considered in the same genre.

The War college is the final career level of Army

States Military Academy at West Point, New York, and several other institutions, provide a 4 year academic curriculum which is supplemented with basic officer education and skill modules. The Reserve Officer Training Corps (ROTC) provides the bulk of new officers each year. ROTC is a course supplement offered on many university campuses which provides 4 years of basic officer education and training. The third source of precommissioning schooling is offered to qualified soldiers within the Army. The Branch Immaterial Officer Candidate Course is at Fort Benning, a Georgia based school which provides 14 months of intense schooling in basic officer skills.

Once commissioned, an officer attends 1 of 16 branch specific schools to prepare for the first duty assignment. Officer Basic courses are normally 3 months of concentrated study.

Following that first assignment, officers return to their branch school for the Advanced Course which is designed to prepare them for company command, or comparable level assignments for support officers.The Advanced Course extends over 6 months, with classes meeting 8 hours per day.

Recently,the Army opened a new career ladder course. Command and Staff Service School (CAS3) provides background for doing staff work at the

> individual and collective training in institutions and in units. 3. Develop training support material, literature, simulators, and devices; and provide these products for training in institutions and in units (TRADOC Reg. 10-41, para.1).

It is obvious that TRADOC's influence is pervasive. Unit training is the direct responsibility of the unit commander, as is the day to day advancement of individual soldier skills. However, throughout one's career, periodic breaks in unit assignments provide each soldier with concentrated, institutionalized, individual training. Promotion progression depends on attendance at a core group of schools.[2]

Career Courses

There are two career tracks; one is for officers and the second is designed for enlisted members. Branch schools direct the initial level of course offerings for both systems. For example, the Air Defense Artillery branch provides the basic courses for both officers and enlisted soldiers assigned to its branch. Still, the course work and career pattern is different for officer and enlisted career courses.

Officer career courses. For officers, initial training begins before actual entry into the military, with precommissioning training. The United

100% solution rate on the final trouble-shooting test. In contrast, the control group had a 25% solution rate. Given the possibility of designing computer courseware around the final test, a 100% solution rate is somewhat suspect.

A more definitive study was reported by Ragosta (1982). This was a complex 4 year experiment on the effect of computer assisted instruction in elementary schools in California. Three courses were monitored: mathematics, reading, and language arts. Using a control group design, the findings revealed that 1 year mathematics students cored 36% better, 2 year students 56% better, and 3 year students performed 72% better. Reading scores improved 42% and language arts scores improved 70% over the respective control groups.

An extensive literature search uncovered only one experiment which found no significant difference between conventional instruction and CBI (Simutis, 1979). The experimental evidence supports CBI as an effective tool in improving student test performance.

The Effect of CBI on Learning Time

Schramm (1977) presents the results of nine studies which examined the effect of CBI on learning time. Course topics included mathematics, college physics, maternity nursing, computer programming, German, special education, airline ticket agents, and statistics. Time savings ranged from 10% to an astounding 90%. In all cases the experimental groups performed as well or better than the control groups (pp.47-48).

Several of the studies cited in support of improved learner performance also reported reduced time required to achieve those higher scores. Along with improved test scores, Bunderson, et al., (1981) also credit CBI with a 32% reduction in study time. Schramm, citing Markle, noted a 25% decrease in time to complete the first aid course (p.32).

Sax (1983) used a 5 day AT&T dataphone course as a test bed. An average of 2 days was saved through self-paced computer instruction, with scores being comparable to normally taught students. The course took self-paced people from 14.48 hours to 22.75 hours to complete. The variance in completion times suggests that the system can accommodate learners who require various instructional periods. This reduction of time for coursework completion seems to favor highly structured training. Performance oriented coursework fits this description well. It has minimum acceptable standards, which all students are required to achieve at their own pace. This allows the faster students to move on to other objectives when they are ready. Army training is performance oriented.

The Effect of CBI on Drop-out Rates

Suppes and Morningstar (1977) conducted research on computer instruction in a Russian language course. They found that 78% of the CBI students completed the year long course, compared to a 32% completion rate for the control group (p.31). A similar report was generated by the U.S. Army Signal School. While testing the value of the tutorial mode at the Signal School, Longo and Guinti (1972) found CBI reduced course time by 35%, reduced test failures, and showed a 21% increase in course completion.

The Effect of CBI on Training Costs

Training soldiers is an expensive undertaking. Ammunition costs range from 24 cents per M16 rifle round to $50,000.00 per Stinger surface-to-air missile (Kolcum, 1981). Armor rounds range from $230.00 for each 105-mm shell, to $630.00 for each 120-mm shell. Gunnery practice quickly becomes cost prohibitive at those prices. Yet, battlefield survivability depends on effective, well-trained crews. Simulation may be part of the solution to spiralling training costs and increasing training requirements. Currently the Army is testing three simulation devices designed to train tank crews. The videodisc gunnery simulator substitutes stationary target practice, which saves ammunition and engine hour expenses. The unit conduct-of-fire trainer (UCOFT) trains crews to fire during movement and saves mileage costs, figured at $121.00 per mile. And the platoon combat mission trainer simulates battlefield environments for the crew. Using these training aids a tank battalion could avoid $2.4 million per year, which amortizes the simulators in 9 months. Reduced training time and lower drop-out rates also favorably influence training costs.

Student/Teacher Attitudes Toward CBI

It may be the novelty or the unintimidating interaction of CBI which produces a favorable student reaction to this medium of instruction. In a previously cited study, Poore, et al. (1981) not only report student enthusiasm for CBI, but also an overall improvement in the student's attitude toward school. Trainees working with the unit conduct-of-fire trainer were excited about being able to fire 44 years worth of gunnery practice in 3 weeks (Mena, 1984). Feedback may be mechanical and not as valuable as attention from a teacher, but the sheer volume of interaction appears to be appealing to students. A teacher gives feedback to bright students on the average of five times per class period, and only two or three times per week to the other students. Computers give feedback anywhere from 40 to 600 times in a 40 minute session (Hall, 1971, p.628). Students' favorable reaction to CBI classes is at its peak during their initial exposure to this medium. Although that enthusiasm does wane, it remains significantly higher than conventional instruction.

Educators have mixed reactions to the introduction of CBI into their curricula. Teachers are concerned about the organizational changes likely to accompany incorporation of computers. There is some fear of job security and some fear of being able to cope with new technology (Sandeen, 1983/84).

The Importance of Well-Designed Software

Skinner was the first to recognize that the success of mechanized teaching aids depends on careful programming. Ragosta (1982) also concluded that quality software was the essential element for successful CBI. Putting standard dialog in trivial ways will not improve the learning environment. With CBI, educators are forced to focus on clearly defining course objectives. Commercial software now available to educators, must also undergo careful evaluation. Instructors should avoid the temptation to purchase software and then mold their course material around it. The value of much of the educational software on the market is suspect. The director of the educational information exchange estimates that only one product in four meets even minimum instructional standards. And the director of software evaluation for the New York City public schools is even less optimistic in assessing software. Of the 10,000 programs on the market, the director identifies only 200 as useful for education (Nobel, 1984, p.24). The criticality of choosing or producing quality programs cannot be overstated. The burden of selection and development of quality software rests with the teacher. Rather than relieving educators from the responsibility of originating rigorous course objectives, CBI demands greater care and thought in subject design.

Some Words of Caution

A lack of quality programs is not the only limitation affecting CBI. Educators would do well to remember that CBI is but another teaching aid, not a substitute for quality instruction. Computers add nothing to the substance of education, they only introduce new techniques of presentation. Although the interactive ability of computers has been touted as an advantage, it lacks the human quality of a sensitive, caring teacher.

Standardization of hardware offers the advantages of bulk buying, ease of trainer familiarization and proliferation of quality software. But, in an era of rapid change, standardization limits upgrading. Even buying a single product line does not ensure full system homogeneity; different years and models are not always compatible.

Finally, computers were not initially designed with education in mind. They are limited in the data input and output formats they can handle. These formats or means of data presentation are not always convenient to the educational process. Custom peripherals, designed for a specific purpose, can be expensive and are often unreliable. Videodisc enhancement is one such device. A large storage capacity of rich visuals and audio make this an attractive addition to the training inventory. However, there are problems with the videodisc system. Presently the audio capability is lost with fixed frame use. Rudimentary fixed frame audio has been accomplished, but the present approach rapidly uses up storage space. Other drawbacks to videodiscs include a high first copy production cost and limited production facilities. Army trainers are concerned that, once mastered the videodisc cannot be modified to accommodate changing Army doctrine.

The basis for much of the dissent over CBI occurs because of an underlying assumption that technology can solve or overcome current pedagogical problems. "The error lies in thinking that new tools are the solution.... In our minds, at least, technology is always on the verge of liberating us from personal discipline and responsibility. Only it never does and never will" (Naisbitt, 1982, p.52-53).

Summary

Some notable tendencies surface from an overview of these experiments. CBI appears to save students about 30% in course time, when they are in a self-paced configuration. Short term learning is improved, and fewer students drop out of the courses. Both slow and fast learners can benefit from CBI. Students favor computer assisted courses. Financial savings are possible in every CBI mode, but it appears that simulation offers the greatest economic advantage. CBI can be effective in course administration, demonstration, simulation, instructional games, drill and practice, and tutoring. But there is a caveat, although CBI has the potential of meeting a large variety of educational needs, it cannot be approached in a haphazard way. CBI needs to be closely planned, managed, and controlled if it is to responsibly serve the academic community.

CHAPTER 4

SURVEY FINDINGS

> We believe technology should be the servant and not the master of instruction. It should not be adopted merely because it exists or because of institutional fears that it will be left behind the parade of progress without it.
> (Carnegie Commission report, 1972, p. 11)

Introduction

The data received from the mail survey are presented in this chapter. Each of the four major sections of the questionnaire are treated under a separate heading. These headings are: administrative profile of survey participants, current CBI utilization, Army trainer perceptions of the value of CBI, and respondent comments.

Initially, the survey covered the period from October 24, 1984 to November 22, 1984. However, the time was extended to achieve a larger sample. A total of 22 useable surveys were received from a population of 28, for a response rate of 78.6%. Four of the 6 nonrespondents refused to participate unless they were directed to do so by TRADOC headquarters. The School of Music received a verbal extension of their deadline, but still failed to respond until after the data were processed. This questionnaire was not included in the tabulations. The Information Systems Command could not be reached by telephone, nor did it respond in any manner to the three mailed inquiries. It may have undergone a recent reorganization.

Data derived from the survey instruments were analyzed with the assistance of the Statistical Package for the Social Sciences (SPSS). A general frequency count provided a summary of the 33 variables. Cross tabulations were produced, comparing combat arms (CA), combat support (CS), and combat service support (CSS) responses. Other cross tabulations compared the perceptions reported by current CBI users and nonusers. Frequency distributions and cross tabulations constitute the primary data presented in this chapter.

Summary of Results

Administrative Profile of Survey Participants

As expressed in Table 1, all of the possible combat arms proponents responded to the survey. Five of the possible nine combat support training facilities replied for a return rate of 55.5%. And 11 of the 13 combat support installations are represented, for a return rate of 84.6%. The overall survey response rate was 78.6%. For reader clarity in defining the three categories: front line fighting soldiers are considered

Table 1

Distribution of respondents by branch affiliation

Branch	Total mailout	Responses received	Return rate	% of total
Combat arms	6	6	100%	27.3%
Combat support	9	5	55.5%	22.7%
Combat service support	13	11	84.6%	50.0%
Total	28	22	78.6%	100%

combat arms, (i.e., Air Defense Artillery); battlefield support is provided by combat support, (i.e., Military Intelligence); administrative service is the role of combat service support, (i.e., Finance). Four of the 6 nonrespondents were combat support and 2 are combat service support facilities.

In light of the directive from TRADOC to establish self-paced courses in its schools, the finding that only 1 respondent reported all courses as self-paced was unexpected. Two other directors indicated that along with their normal course structure, "some" courses were self-paced. In summary, 85% of the survey sample did not offer any self-paced coursework, with another 10% presenting "some" self-pacing (see Table 2).

Future plans for employment of CBI are depicted in Table 3. No proponent was considering a decrease in the use of computers. One respondent from combat arms and one from combat support reported that they did not plan to either increase or decrease CBI in the next 3 years. Ninty-one percent of the survey respondents contemplated some increase of CBI within the next 3 years.

As revealed in Table 4, 12 (54.5%) of the 22 respondents employed CBI in their training. And 10 (45.5%) training institutions did not use CBI to

Table 2

Level of utilization of self-paced courses by branch affiliation

Branch	All self-paced	%	Partial self paced	%	No self-paced	%
Combat arms	1	5.0%	0	0.0%	4	20%
Combat support	0	0.0%	1	5.0%	3	15%
Combat service support	0	0.0%	1	5.0%	10	50%
Totals	[illegible]	5.0%	2	10%	17	85%

N=20

Table 3

Plans for CBI employment in the next 3 years

CBI will undergo a:	Frequency	Response %
Dramatic increase	13	59%
Slight increase	7	32%
No increase or decrease	2	9%
Slight decrease	0	0%
Dramatic decrease	0	0%
Total	22	100%

N=22

The weekly availability of computers on a nonscheduled basis was fairly consistent with the scheduled hours, with a mean availability of 8 hours. The nonscheduled hours are broken down in Table 12, and reveal that half (50%) of the CBI users did not offer any off-duty student access to their computers. Three (25%) respondents reported 10 or fewer hours of nonscheduled CBI time offered for trainee use. Students could practice during off-duty time between 11 and 20 hours at 2 (16.7%) installations. And 1 (8.3%) school offered students 40 hours of nonscheduled access to their computers per week.

The data in Tables 11 and 12 suggest that computers are being carefully integrated into the training environment as both administrative tools and as instructional aids. The large range of times which computers were available to trainees seems to indicate again the effect of local needs and attitudes.

These attitudes depend, in part, on how familiar instructors are with the capabilities and limitations of computers as training aids. Table 13 is a depiction of where this familiarization takes place. Apparently, none of the Army's trainers were formally acquainted with CBI prior to arriving at their assigned posts. Eleven (91.7%) of the installations conducted their own CBI familiarization, while 1 (8.3%) school provided no

Table 11

Number of hours that CBI was included on weekly training schedules

Scheduled hours	Frequency	%
None	4	33.3%
1 - 10	4	33.3%
11 - 20	3	25.0%
21 - 30	1	8.3%
Totals	12	99.9%

Table 10

Distribution of videodisc users by service unit

Branch	Yes	%	No	%
Combat arms	3	25.0%	1	8.3%
Combat support	2	16.7%	0	0.0%
Combat service support	1	8.3%	5	41.7%
Totals	6	50%	6	50%

N=12

Table 9

Current employment of videodisc enhancement

Use videodisc	Frequency	%
Yes	6	50%
No	6	50%
Total	12	100%

Table 9). From respondent comments it is apparent that videodisc enhancement was a major part of future plans. This suggests that the prevailing trend away from centralized systems will continue. A cross tabulation (Table 10) of videodisc users by branch, revealed that combat arms and combat support were heavily involved in this medium, with only 1 of their schools not employing videodisc hardware. Coupled with its reliance on sophisticated weaponry, the addition of the more complex videodisc systems explains, in part, the combat arms' reliance on civilian contractors for software development. Combat service support reflected the opposite philosophy regarding videodiscs; only 1 of its 6 proponents employed this technology.

As expressed in Table 11, CBI was included on weekly training schedules an average of 9 hours. Four (33.3%) facilities which used CBI did not schedule any training time on computers. Another 4 proponents (33.3%) officially programmed their students for 10 or fewer hours of CBI per week. This low incidence of scheduled time is consistent with the 51% administrative use of computer hardware reported in Table 5. Of those who extensively offer CBI, 3 (25%) had a weekly average of 11 to 20 hours. And 1 (8.3%) installation reported scheduling 26 hours of CBI per week.

Table 8

Distribution of existing computer hardware systems

System	Frequency	%
Microcomputers	2	16.7%
Minicomputers	3	25.0%
Centralized networks	1	8.3%
Major Simulators	1	8.3%
Other	2	16.7%
Combination of systems	3	25.0%
Totals	12	100%

22%, and the remaining 17% fell under the "other" category. If the distinction is limited to a division of Army and civilian designed software, civilians accounted for one-third of the Army's computer courseware.

The various levels of hardware currently in the Army's training inventory are depicted in Table 8. The spread of computer hardware was fairly even, with minicomputers cited as slight favorites, being employed by 3 (25%) of the 12 installations. Microcomputers were the sole CBI support used by 2 (16.7%) of the respondents. Only 1 installation (8.3%) depended entirely on a centralized system, and 1 (8.3%) other school employed only major simulators. The 2 (16.7%) "other" responses reported using embedded training devices. Three (25%) schools employed more than one level of computers to support their training. All types of hardware were represented in the multiple use installations, except centralized networks. The low incidence of centralized networks is noteworthy in the face of the planned expansion of the PLATO system. These findings also support the dependence on local initiative and the resultant lack of standardization.

Microcomputers and minicomputers provided the guiding intelligence for videodisc systems. Six (50%) of the installations utilized videodisc technology (see

Table 7

Percentage distribution of the sources of Army software

Branch	Civilian	Local	Other Army	Other
CA	64%	5%	0%	31%
CS	40%	40%	20%	0%
CSS	11%	40%	37	12%
Total percent of software	33%	29%	22%	17%

of current software was developed by civilian contractors, local instructors or other Army agencies. The reported percentages are delineated by branch affiliation in Table 7. The combat arms branch indicated that 64% of their courseware was produced by civilians and 31% was designed by "others," which included course administrators. Only 5% of the combat arms courseware was developed by local instructors. The combat support branch was more evenly split with both civilian contractors and local instructors each producing 40%. The remaining 20% of their software came from other Army agencies. Of the three branches, combat service support depended most heavily on other Army agencies (37%) and local instructors (40%) for their courseware, leaving only 11% for civilian contractors.

Even though the Army has the capability to produce much of its own software, the overall Army totals show that 33% of the software was provided by civilian contractors. Part of the reason for this reliance on civilians is that in many cases it costs less to contract the work out, particularly for the more sophisticated products. Hence the predominant dependence on civilian firms by the branch which relies most heavily on sophisticated technology, combat arms.

Local instructors were responsible for 29% of the courseware in Army schools. Other Army agencies produce

Table 6

Mean percentage of CBI use by group and individual mode

Method	Percent used
Group	38%
Individual	52%
No response	10%
Total	100%

administration was the favored mode for CBI, with a utilization factor of 51%. In contrast, scrolling text was used less than 1% of the time. Drill and practice is the most common instructional use (17%). Consistent with the Carnegie Commission report (1972, p.23), this investigation found that computers were used in the tutorial mode only 10% of the time. Demonstration accounts for 8% of CBI use, and in the enlisted training environment, instructional games were offered by computer only 1% of the time. An interesting division can be made between computer use in course administration (51%) and in course presentation (49%). Given that division, the findings were not as surprising as they initially appeared.

Instructors have the option of using the computers in either the individual mode or the group mode. Table 6 depicts the percentages of reported use. Respondents indicated that they used the group mode 38% of the time, as compared to 52% utilization of the individual mode (10% nonresponse). Considerable research has been done on the individual application of CBI, but very little has been written concerning the group mode. Given the dearth of substantive support for the group application it was unexpected to find such widespread acceptance of this mode of presentation.

Question 12 of the questionnaire asked what percent

Table 5

Mean percentage of computer use by method of employment

Mode	Percent
Administration	51%
Drill and practice	17%
Simulation	12%
Tutorial	10%
Demonstration	8%
Instructional games	1%
Scrolling text	1%
Total	100%

supplement their instruction. Coupled with the reported plans to increase CBI in the near future (see Table 3), these findings suggest that the Army was in the midst of a major upgrading of its training hardware. The 12 proponents who employed CBI provided the data which are presented in the following section.

Profile of Current Army CBI Utilization

The questions in section two of the questionnaire were designed to elicit comments from which a profile of current CBI use could be formulated. The number of individual computer stations available to students ranged from 4 to 155, with a mean of 33 (median= 22.5, mode=0). Student populations range from 35 to 9,840, with a mean of 3,216 (the median for the population was computer at 1173). The average student per terminal ratio is 97. The range runs from 4 stations for 3,000 students to 22 stations for 35 students. The great disparity in this ratio is not correlated to any independent variable tested.

The time CBI has been employed by the various installations ranges from 1 month to 15 years, with an average of just over 4 years (median= 3 years, mode= 4 years). Three respondents not employing CBI planned on implementation between December 1984 and March 1985.

Table 5 contains a summary of the reported percentages of CBI use. Clearly, course management and

Table 4

Distribution of respondents by utilization of CBI

Currently use	Frequency	%
Yes	12	54.5%
No	10	45.5%
Total	22	100%

Table 12

Weekly nonscheduled hours that computers are available to trainees

Hours available	Frequency	%
None	6	50.0%
1 - 10	3	25.0%
11 - 20	2	16.7%
21 - 30	0	
31 - 40	1	8.3%
Totals	12	100%

Table 13

Distribution of Army instructors' CBI orientation

Responses	Frequency	%
Local orientation	11	91.7%
No orientation	1	8.3%
Totals	12	100%

Note. Centralized Army instructor courses did not offer CBI familiarization.

familarizaion. It should be noted that this particular organization used CBI solely for course administration. In concert with the strong support for trainer familiarization expressed in Table 15, it appears the Army considered this an important ingredient in the successful employment of CBI. However, they still retained the concept of local control.

Table 14 is a breakdown by CBI users and nonusers of their respective perceptions of the need for trainer familiarization. Although both groups supported the need to orient trainers, users are less enthusiastic, recording a mean agreement of 4.0 on a 5.0 scale. This compares to the nonusers mean of 4.5. Apparently, people conversant with CBI were not as intimidated by this medium and were therefore not as concerned about prior exposure to computers.

Army Trainers' Perceptions of the Value of CBI

Table 15 is a composite of section three of the questionnaire (questions 18 through 25), which deals with respondent perceptions of CBI's value. A scale from "1," for strongly disagree , to "5," for strongly agree was used. Questions were structured as a mix of positive and negative statements. The first proposition was a negative statement, asserting that computer assisted instruction is not adaptable to the

Table 14

Distribution of responses to the question of the need for CBI familiarization

Group	Mean	1	2	3	4	5	Total
CBI users	4.0	0	1	1	6	4	12
CBI nonusers	4.5	0	0	1	0	9	10

Note. 1= strongly disagree, 5= strongly agree

N=22

Table 15

Numerical rating of respondents' perceptions of the value of CBI to Army training

Question	Mean
CAI is not adaptable to our particular training environment.	2.14
Computers are effective in course management and administration.	4.68
We need more computer training support to keep pace with advanced Army technology.	4.32
The expense of computers for training far outweighs their value.	1.82
Directors should have control over the development of the software used in their schools	4.24
Trainers need to be instructed in the use of CBI prior to commencement of their instructor duties.	4.41
The use of CBI detracts from our real training mission.	1.86
I have worked extensively with CBI.	2.73

Note. 1=strongly disagree, 5=strongly agree
N=22

respondent's training environment. The expectation of general disagreement to the statement was supported by a mean of 2.14. Ten respondents (45.5%) strongly disagreed, while 4 (18%) agreed with the statement. The highest mean agreement (4.68) was recorded in favor of using CBI in course administration. This finding is consistent with the high utilization rate (51%) and the reported effectiveness appraisal of 4.59 (see Table 17). With the reported future expansion of CBI (see Table 3), the expectation was that proponents would agree that there is a need for more computer training support. A 4.32 mean indicates a strong endorsement of this declaration. No respondents disagreed, and only 2 were uncertain about the need for increased computer support. Given this patronage it is not strange that respondents found CBI to be worth its cost. Only 1 school official agreed that the expense of CBI outweighed its value to training. Eighteen respondents (81.8%) disagreed that CBI was too expensive for what it did. Although the initial outlay of funds may strain training budgets, the payback is seen as worth the expense.

A mean of 4.24 denotes agreement with the proposition that course directors should have control over software development. A cross tabulation of users and nonusers showed that those familiar with CBI strongly support local control (see Table 16) with a mean agreement of 4.5. This staunch affirmation is compared to a moderate 3.9 mean agreement recorded by the present nonusers. Local control was a very real concern for trainers who are experienced with CBI. Not only did training institutions want control over software, they also wanted to train their own instructors in the appropriate use of CBI. A high mean agreement of 4.4 with the assertion that trainers do need to be instructed in the use of CBI, is consistent with the high incidence of trainer preparation reported in Table 13. Consonant with the positive reaction already expressed, it was expected that respondents would not agree that CBI distracts from their training mission. The recorded mean of 1.86 denotes a strong disagreement. Seventeen respondents (77.3%) either disagreed or strongly disagreed. Only 2 (9.1%) accept the proposition that CBI distracted from their training mission.

Question 25 is an expression of topic familiarity. No one admitted to extensive knowledge of CBI. The 2.7 mean reflects the difference between CBI users and nonusers. The 12 users acknowledged some familiarity, and the 10 nonusers admitted their lack of exposure to CBI. Overall, respondents were very supportive of CBI as a supplement to Army training.

Table 16

CBI users and nonusers responses to the question of local control of software development

Group	Mean	1	2	3	4	5	Total
CBI users	4.5	0	0	0	6	6	12
CBI nonusers	3.9	0	1	2	3	3	9

Note. 1= strongly disagree, 5= strongly agree

N=21.

Table 17 displays questions 26 through 32, which were opinions of various CBI applications. Again, a 1 to 5 scale is used, 1 being a judgment of very ineffective and 5 being a valuation of very effective. With the exception of scrolling text, or automatic page turning, all applications of CBI were appraised favorably. Scrolling text had a mean of 3.05. Administration or course management was judged as the most effective use of CBI, with a mean of 4.56. Unexpectedly, because of its low incidence of use (see Table 5) instructional gaming was rated as the second most effective employment of CBI with a mean of 4.0. Simulation, which appears to be on the verge of a big expansion, received a mean acceptance score of 3.96. Even though CBI was used for drill and practice more than for tutoring, the respondents assessed the tutorial mode as more effective, with a mean of 3.86 compared to a 3.77 mean for drill and practice. The mean effectiveness rating for demonstration was 3.82, which was also higher than drill and practice.

A cross tabulation comparing the assessment of CBI users and nonusers (see Table 18) concerning scrolling text, reveals that users judged this mode as ineffective with a mean of 2.3, while nonusers recorded a mean of 3.7 or a judgment of moderately effective. Apparently the appraised value of scrolling text reduces with

Table 17

Respondents' assessment of the effectiveness of the various methods of CBI application

Application	1	2	3	4	5	NR	Mean
Administration	0	0	2	5	15	0	4.59
Instructional games	0	1	4	10	6	1	4.00
Simulation	0	1	5	10	6	0	3.96
Tutorial	0	1	6	9	5	1	3.86
Demonstration	0	1	8	7	6	0	3.82
Drill and practice	1	1	7	6	7	0	3.77
Scrolling text	2	4	6	5	2	3	3.05

Note. 1= ineffective, 5= effective

N=22

Table 18

Comparison of the perception of CBI users and nonusers concerning the effectiveness of scrolling text

Group	Mean	1	2	3	4	5	Total
CBI users	2.3	2	3	3	1	0	9
CBI nonusers	3.7	0	1	3	4	2	10

Note. 1= very ineffective, 5= very effective

N=19

exposure to CBI. This finding supports the need to educate commanders and trainers in the effective use of CBI prior to implementing a system.

Since the ranking of the tutorial mode was unexpected, a cross tabulation is presented in Table 19, comparing user and nonuser responses. A marked difference in evaluation was manifest. Users judged tutorial employment at a mean of 3.5, and nonusers recorded a much more favorable mean of 4.2. The evaluation of the present CBI users was closer to the reported utilization trends.

Respondent Comments

Overall, survey comments were favorable toward CBI, citing such advantages as; self-pacing, immediate feedback, patience, course stantardization, built in administrative control, and time, money and personnel savings. Some of the disadvantages noted include some boredom, difficult language (PLATO), time needed to develop training packages, a confusing variety of hardware and software, and a lack of knowledgeable instructors and software developers. Several respondents voiced a common concern that CBI should not be used to replace instructors.

Summary

According to the results of this survey, Army

Table 19

Comparison of the perception of CBI users and nonusers concerning the value of the tutorial mode

Group	Mean	1	2	3	4	5	Total
CBI users	3.5	0	1	4	5	1	11
CBI nonusers	4.2	0	0	2	4	4	10

Note. 1= very ineffective, 5= very effective

N=21

trainers favored the employment of computer based instruction. Currently 55% of the survey respondents utilized some form of CBI, and one-half of the CBI users had some videodisk enhancement. All but two installations planned to increase CBI over the next three years. The preponderance (85%) of Army schools did not offer any self-paced coursework.

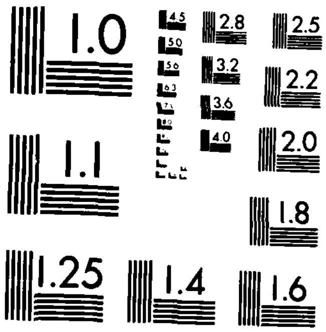
A mean profile of computer based instruction in Army entry level enlisted training presents a proponent serving 3,216 students. These trainees are scheduled for 8 hours each week of CBI on the 33 terminals available to them. In addition, students have access to those terminals for 9 hours each week of unscheduled time.

CBI has been employed for 4 years, chiefly in course administration. But drill and practice, tutorial, and simulation are also part of the package. One-third of the Army's software is developed by civilian contractors. Minicomputers are favored, with microcomputers coming in a close second. Embedded systems and simulators are gaining popularity. Trainers are oriented to the use of computers as training aids after their arrival at their assigned school. Survey respondents support CBI as a cost effective training supplement. In sum, there is a cautious optimism throughout Army training, depicting

AD-A154 792 COMPUTER BASED INSTRUCTION IN THE US ARMY'S ENTRY LEVEL ENLISTED TRAINING(U) ARMY MILITARY PERSONNEL CENTER ALEXANDRIA VA J A ELDREDGE 13 MAR 85 2/2

UNCLASSIFIED F/G 5/9 NL

END



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

an ever-increasing role for computer based instruction.

CHAPTER 5

SUMMARY, CONCLUSIONS, RECOMMENDATIONS

> In war there is nothing mysterious, for it is the most common-sense of all sciences....If it possess a mystery, then that mystery is unprogressiveness. (Montross, 1960, p. 765)

Summary

The military is in the midst of a major technological revolution. New weapons systems, and enhanced capabilities for old systems demand thoughtful reevaluation of existing strategies and tactics. The United States is not alone in weapons improvement. Advanced target detection, acquisition and engagement by technically refined adversarial weapons systems increases the difficulty of the equation for success in war.

There is a continuing challenge to develop more and better defensive and offensive hardware. But this new generation of battlefield technology creates an even greater need for more, and more effective training. One answer is to increase the number of institutional training hours. The drawback to this approach is a reduction of soldiers available to active combat units. This proposal is also expensive in terms of equipment wear, and ammunition expenditure.

A second alternative is to use existing training time more efficiently and make training more effective. Computer based instruction offers one possible method of improving training quality while reducing training time.

For over 20 years the Army has been testing the concept of computer enhanced training. Until 1984, local needs primarily guided the process. Through the newly formed project management office for computer based instruction (PMO), the Army is now taking a closer look at standardizing the hardware and software used throughout Army training. The decisions concerning how extensively, and in what configuration to use CBI, need to be made now.

However, Army planners lack a clear understanding of current CBI use. A description of present computer uses and trainer perceptions should help Army planners make sound policy decisions pertaining to the future employment of CBI.

Purpose of the Study

The purpose of this study was to determine both the present utilization and existing perceptions of computer based instruction in the U.S. Army's enlisted training institutions. Relative to utilization, specific consideration was given to the methods of CBI employment, the present level of self-paced coursework, who produces the Army's software, the level of computer hardware in the training inventory, and the number of training hours devoted to CBI. The perceptions of particular interest were those pertinent to the adaptability of CBI to various course offerings, and which methods of employment were seen as most valuable.

Methodology

A mail questionnaire was designed to capture the desired information. The instrument consisted of four sections (administrative data, current CBI employment, perceptions, and comments), with a total of 33 questions. All 28 proponents of Army schools offering enlisted military occupational speciality (MOS) training were included in the survey. The data derived from the 22 valid responses, were analyzed with the assistance of the Statistical Package for the Social Sciences (SPSS), from which a frequency count and cross tabulations were produced.

Findings

Twelve (55%) of the survey sample employed computers in some form of training support. Of the 6 nonrespondents, 2 did use CBI and 2 did not. The other 2 could not be reached. Just over 50% of the Army's trainers applied CBI to their MOS training. Administration and course management were by far the most popular methods of employment of CBI, with a reported usage rate of 51%. Drill and practice, and simulation constituted the bulk of student relevant training with usage rates of 17% and 12% respectively. Given the advantages of tutorial CBI employment, a 10% utilization rate seems modest. However, this finding relates directly to the low incidence of self-paced course design. Demonstration and instructional games made up the rest of CBI application. Although instructional gaming was only used 1% of the time, it was judged as second only to administration in effectiveness. A division between administrative and educational employment of CBI finds an even split of 51% and 49%, respectively.

Computers are employed in the individual mode 52% of the time, and in the group mode 38% of the time. The remaining 10% did not respond to this question. This finding was unexpected given the lack of research concerning the group mode. However, demonstration and simulation lend themselves well to the group setting.

The touted advantage of reduced training time associated with CBI depends, in part, on self-paced student progress. Considering this assertion and the directive from TRADOC to initiate self-paced coursework, the survey findings were unexpected. Only 1 respondent reported all self-paced courses. Two other proponents had a mix of conventional and self-paced courses. A full 85% of the respondents did not offer any self-paced studies.

Software development depends largely on system sophistication. Those installations with simulators, mainframe systems and minicomputers more frequently employed civilian contractors to develop their software. Civilian contractors originated 33% of the Army's software, while local instructors are credited with producing 29%. Other Army agencies account for 22% and the "other" category is credited with 17% of the Army's software. The combat arms and combat support branches depended heavily on civilians for their courseware, whereas the combat service support branch relied mostly on its instructors and other Army agencies for support.

Combat arms, combat support, and combat service support schools differed notably in CBI employment in three areas. Five out of the 6 combat arms and combat support schools used videodisc enhancement to support their coursework, while only one combat service support school had videodisc capability. Combat arms proponents favored individual instruction on computers, and combat service support trainers preferred the group mode. As has been mentioned, combat arms schools hired civilian contractors to program their courseware and combat service support schools used their own instructors. There is considerable consistency in these findings. Combat arms soldiers are trained on sophisticated battlefield armaments which lend themselves to simulators and embedded devices, both requiring greater expertise to program.

Twelve (55.5%) of the 22 proponents responding to the survey, employed CBI. Minicomputers and microcomputers accounted for 42% of the hardware. Major simulators and centralized systems only totalled 16.6%, and another 16.7% defined other systems, principally embedded devices. The final 25% combine several systems in their training. Fifty percent of the CBI users reported the addition of videodisc enhancement to their inventory. The low incidence of centralized systems is interesting, in light of the present PLATO expansion and the long term involvement the Army has had with major systems.

Computer based instruction was part of the official training schedule for an average of 8 hours per week. Four (33.3%) respondents indicated that they did not officially schedule any CBI. Weekly scheduled time ranged from zero to 26 hours. Nonscheduled availability of CBI ranged from zero (6 respondents) to 40 hours per week, with an average of 8 hours. Of those installations who employed CBI, 50% did not offer off-duty access to their computers. These findings indicate that CBI was employed a respectable 22.5% of the scheduled training time, given a 40 hour training week.

Of the 12 respondents who employed CBI, 11 conducted some CBI familiarization for their newly assigned instructors. All 11 provided the training after the instructor arrived on station. Nineteen of the 22 total respondents supported CBI familiarization for their instuctors, four were undecided and one opposed instructor training. Those involved in CBI were not as adamant about the need to acquaint instructors with CBI (mean agreement of 4.0 on a 5.0 scale), as were those who have not yet incorporated CBI (mean of 4.5). Since both groups did support the proposition, the difference in intensity may reflect reduced anxiety through familiarity with computers.

Ten of the respondents strongly agreed that CBI was adaptable to their training. Another three agreed with the proposition, for a total agreement of 59%. Four proponents were neutral and 3 disagreed that CBI was adaptable to their training (16.2%). However, 91.7% of the respondents were planning some increase in the use of CBI within the next 3 years. Apparently those who were neutral and some of those who did not agree that CBI was suited to their training, were still moving forward with plans to add CBI or expand their inventory.

Army trainers considered administration and course management as the most effective methods of CBI employment. The other uses were ranked as follows: instructional games, simulation, tutorial, demonstration, drill and practice, and scrolling text. With the exception of scrolling text, each method was rated above 3.75 on a 5.0 scale, with administration and course management scoring a 4.59 rating. These findings are interesting when compared to the reported methods of employment. As expected, administration was by far the most widely used method. It can be applied in virtually every school. The mode rated as second most effective, instructional games, was used only 1% of the time. The placement of simulation was consistent with its utilization. However, the tutorial mode was used only 10% of the time, which should have ranked it behind drill and practice, and demonstration. The judgment of scrolling text as marginally effective was compatible with its infrequent use.

Conclusions

From the findings summarized above, the following conclusions seem justified. The overall findings of this study support the proposition that the Army is on the verge of a major infusion of computer support into its training institutions. Army CBI is still driven by local initiative, resulting in a continued lack of standardization. System homogeneity must be a priority consideration as more training facilities enter the CBI family. Local control of software development and trainer preparation are crucial issues to training proponents. The challenge is to facilitate system standardization while retaining local initiative. Given the present TRADOC command structure, this dichotomy of control is possible. The PMO governs hardware acquisition, and school administrators provide the software relative to their area of expertise.

So little self-pacing occurs in Army schools, that many of the advantages of CBI are lost. If the forthcoming expenditures for hardware are to be justified, more self-pacing is needed.

The appropriate level of hardware is closely tied to course demands. The more sedentary training of combat service support schools benefits from drill and practice and tutorial instruction available from microcomputers, minicomputers and some centralized networks. The complex battlefield weapons and support systems associated with combat arms and combat support schools gain from simulation, videodisc, and embedded training.

It appears that the large centralized networks are falling into disfavor as microcomputers and minicomputers become more powerful. Each level of hardware has its own advantages and limitations.

Microcomputers are inexpensive, portable, available, and flexible. Local trainers have direct control over their use. Even though microcomputers are gaining in power, they still are not very sophisticated. Their authoring systems lack a powerful language. Their response time is considered slow. Maintenance and software development may be a problem. Still, their availability to units and even individual soldiers is attractive when considering correspondence coursework, review, and reinforcement.

Minicomputers offer departmental control, more powerful authoring and faster response times. Centralized administration is an attractive feature. There is a high start up cost, and experienced people are needed for maintenance and for software development. Minicomputers provide a good base for the more sophisticated videodisc systems.

Mainframe systems present some of the same advantages found in minicomputers with even greater power. They also provide direct access and administrative support to remote locations. The greatest weakness to mainframe systems is their high start up costs. They also require professional computer expertise.

Simulators favor expensive training like HAWK missile, aviation, and tanks. Their ability to duplicate the sights, sounds and mechanical responses of the real world give them considerable appeal and value for hands-on tasks. Their greatest advantage may be cost effectiveness. However, cost is closely tied to training efficiency. If soldiers can have additional hours of practical experience on equipment, even though it is simulated, their skills should improve. Also, some conditions can be created which are not available for training, i.e., low visibility training for tank drivers and gunners. In the field they cannot drive in that condition because of the inherent danger. But, a simulator can recreate these critical conditions. The major concern with simulation is the expense and the need for expert consultants. These expenses usually amortize quickly for high cost equipment and ammunition.

Videodisc enhancement has the added glitter of rich visuals and an audio track, while still allowing branching, self-pacing and course administration. Because it is realitively new, there still are some problems with the videodisc systems. In the fluid environment of Army training, a flexible medium is essential. Whereas conventional computers favor course change, videodiscs, once cut, can not be updated. Still frame audio is now in its infancy and is not yet adequate for current training needs. Authoring and mastering a videodisc is very expensive if the Army has to rely on civilian contracts. The Army has the studio facilities and the expertise to author videodisc software, but those resources are thinly spread throughout the nation. Although there are now problems with videodisc enhancement, expected future advances in this technology should make it a valuable training tool for the Army.

STRONGLY AGREE AGREE UNDECIDED DISAGREE STRONGLY DISAGREE

20. We need more computer training support to keep pace with advanced Army technology.

5 4 3 2 1

21. The expense of computers for training far outweighs their value.

5 4 3 2 1

22. Directors should have control over the development of the software (computer courseware) used in their schools.

5 4 3 2 1

23. Trainers need to be instructed in the use of CBI prior to commencement of their instructor duties.

5 4 3 2 1

24. The use of CBI detracts from our real training mission.

5 4 3 2 1

25. I have worked extensively with computer based instruction.

5 4 3 2 1

Please give your opinion of the relative effectiveness of CBI for each of the specific applications listed below. Use a scale from one (1) for very ineffective, to five (5) for very effective.

26. ______ Scrolling text of recorded pages.

27. ______ Drill and practice following instruction.

28. ______ Tutorial, doing the actual instruction.

29. ______ Demonstration of technique.

30. ______ Simulation of actual training.

31. ______ Instructional games.

32. ______ Administrative course management.

12. What percent of your current software (computer courseware) was developed by:

______ A. Civilian contractors
______ B. Local instructors
______ C. Another Army agency
______ D. Other (indicate)________________________

13. What level(s) of computer hardware is currently employed in your directorate?

______ A. Micro computers
______ B. Mini computers with terminals
______ C. Centralized instructional networks (PLATO)
______ D. Major simulation system
______ E. Other (indicate)________________________

14. Are you also using video disc enhancement?

______ YES
______ NO

15. What is the <u>average</u> number of hours per week that computer assisted instruction is officially included on your training schedules?____________________

16. What is the <u>average</u> number of hours per week that trainees have access to computers for non-scheduled, self-paced work?_______________________

17. Trainers are familiarized with the capabilities and limitations of computer based instruction:

_____ A. Before they arrive on station
_____ B. As part of their local trainer orientation
_____ C. Trainers do not receive formal familiarization with CBI.
_____ D. Other (indicate)______________________________

PERCEPTIONS

Indicate your level of agreement or disagreement with the following statements as they pertain to your school, by circling the appropriate number (from five (5) for strongly agree to one (1) for strongly disagree).

STRONGLY AGREE	AGREE	UNDECIDED	DISAGREE	STRONGLY DISAGREE

18. CAI is not adaptable to our particular training environment.

5	4	3	2	1

19. Computers are effective in course management and administration.

5	4	3	2	1

ARMY CBI SURVEY

1. How many different MOS producing courses does your school supervise? ____________.

2. Are these specialities (circle one) A. combat; B. combat support; C. combat service support?

3. Are your AIT courses set up for individual self-paced instruction? YES _____ NO ____.

4. Do your plans for the next three years include:
_____ A. A dramatic increase in CBI (includes CAI & CMI)
_____ B. A slight increase in CBI
_____ C. No increase or decrease in CBI
_____ D. A slight decrease in CBI
_____ E. A dramatic decrease in CBI

5. This directorate employs computers and/or video discs in course administration or instruction.
YES _____ if yes, proceed with the questionaire.
NO _____ if no, move to question 18.

6. How many individual computer stations are available for trainee use? ____________

7. What is your average student population? ________

8. How long have computers been used in support of your training __________

9. Please list the MOS producing courses which currently employ CBI: ____

____

METHOD OF EMPLOYMENT

10. Indicate the mode(s) in which computers are used in your schools. If computers are used in more than one mode indicate the percent each is used (ie., 40% simulation, 60% administration).
_____ A. Administration and course management
_____ B. Demonstration
_____ C. Drill and practice
_____ D. Simulation
_____ E. Instructional games
_____ F. Tutorial
_____ G. Scrolling text

11. What percent of CAI use is:
_____ A. Group mode (more than one trainee per station)
_____ B. Individual mode

APPENDIX A

SURVEY QUESTIONNAIRE AND CODE SHEETS

decisions on the purchase and employment of computer support should result from that premise.

the training arena, little is known about the real cost to develop courseware. The current suggested range is anywhere from $10 to $100 per frame. The difference, in terms of a complete disk is $540,000 to $5,400,000. And there is some uncertainty that the true cost is $10 per frame. Before the Army gets too heavily involved in this technology, actual authoring and mastering costs should be fully investigated.

5. Only one study touched on instructional games. There appears to be some promise with this method of CBI employment. However, before encouraging schools to adopt gaming programs, more definitive research needs to be conducted.

6. This study attempted to document for analytic purposes, the current status of CBI in the Army's enlisted training environment. A similar attempt should be made each 5 years to chart the progress and problems of CBI. Futher studies should include the whole scope of Army training.

Computer based instruction, in its several configurations, is very much a part of today's Army training. It will become an even more potent resource in the near future. The question of how much CBI to use is herein redefined as, what training objectives lend themselves to the capabilities of CBI. Circumspect consistently noted. Students express initial favor for CBI. But there is still much which is not adequately documented through careful research. Some suggestions future researchers might consider include:

1. Research needs to be conducted comparing computer instructed groups with normally instructed trainees. Little is known concerning the long term effects of CBI, videodisc, or simulation. The trainees' progress needs to be charted for at least 5 years. How do they compare on SQT scores? Is there a difference in skill retention, reenlistment rates, promotion rates?

2. If computers are to be used for refresher training, some research ought to be conducted to ascertain the value of such training. Is refresher training valuable to trainees initially taught by CBI? Is refresher training valuable to trainees not initially taught by CBI? Is that effectiveness enhanced by prior experience with CBI? Does refresher training take more or less time when administered by computer?

3. Survey respondents reported using CBI in a group mode 38% of the time. Yet, virtually no research has been done to validate the merits of group CBI. Both conventional and videodisc enhanced CBI ought to be subjected to rigorous examination in the group instruction setting.

4. Because videodisc is a relatively new addition to

minimum, portions of course work should be offered to motivated trainees through CBI tutoring, which will allow them to complete course requirements early.

7. Consideration should be given to the consolidation of the PMO and the ACTO. Both offices deal with computer hardware acquisition, standardization and proliferation in the training environment. As videodisc enhancement becomes more prevalent, the functions of these two offices will overlap to an even greater degree.

8. As computers become standard training aids in Army schools, microcomputers should begin to replace the Besler Cue-see devices at the unit level. These computers can be used for remedial training, subject review, and correspondence study. Software for unit training should be developed by the appropriate proponent for the particular subject matter.

9. In preparation for recommendation eight, officer and NCO courses need to have a block of instruction devoted to familiarization with this new training aid, so that when it appears at the unit it is appropriately utilized.

Recommendations for Future Research

Past research compared CBI with other methods of instruction and found some advantages and some disadvantages. Savings in time, money and instructors are well documented. Short term gains from CBI also are expertise to do much of its own software production, and even videodisc authoring. These resources need to be pooled and controlled by the PMO for Army wide use.

4. A more thorough trainer orientation needs to be conducted at each school. In addition, periodic symposiums should be held to acquaint trainers with their peers throughout TRADOC, and trade insights concerning CBI employment. Emphasis should be placed on the variety of uses and capabilities available to the trainer from computer enhancement. System familiarity should reduce the natural fear and reluctance associated with new and formidable appearing training aids. Trainers should also be familiar with the limitations of CBI.

5. Survey respondents familiar with CBI viewed scrolling text or automatic page turning as a waste of this resource. Nonusers considered scrolling text as advantageous. Considering the small population involved, the PMO could dispatch consultants to those installations planning to enter the field of CBI in the near future, to advise them of hardware and software considerations and optimal employment of CBI in their particular schools.

6. In training situations which are not team dependent, principally combat service support, consideration should again be given to self-paced course structure. The greatest advantages in time savings available through CBI occur in the self-paced mode. At a

Recommendation for Future CBI Uses

1. Consistent with the findings of the program management office feasability study, it is recommended that hardware standardization be a priority consideration. At a minimum each proponent should establish system homogeneity within its specialities. Without this consistency, software proliferation becomes unwieldy and courseware development is continually relegated to local schools and units. Not only is this an expensive process in terms of dollars, it is inefficient in terms of time and personnel. It is suggested that computer hardware be standardized on five levels: microcomputers, minicomputers, mainframe networks, simulators and videodisc enhancements.

2. Given the complexity of the new generation of battlefield and support implements, embedded training devices should be included in the initial design. The cost of adding training logic to sophisticated systems should be minimal, and would pay back in reduced outlay for other CBI devices, as well as enhance unit and institutional training.

3. Proponents and directors should have control over software development. Subject experts, who work at this level and lower, can be tapped to assist in the construction of quality courseware, which can be exported Army wide. The Army already has the facilities and the

Administrators also cite several benefits from computer support. High on the list of advantages is the ability of computer systems to change to meet alterations in methodology and doctrine which constantly outstrip field manual writers and publishers. Since student progress can easily be charted, monitored and predicted, both instructors and administrators are freed from some of their administrative burdens. Finally, a constant analysis of course weaknesses encourages constant course improvement.

However, CBI cannot and will not meet all training needs. Many student problems do not lend themselves to mechanical evaluation; an alert, sensitive instructor is irreplaceable. With the exception of some embedded devices, CBI has little to offer Tactical field training. There are other shortcomings expressed in the literature and on the survey. Rapid technical advances in computer hardware make system standardization difficult. The resulting variety of hardware and software further complicates course development and dissemination. Computers require a unique physical environment to perform properly; many Army posts lack adequate facilities to house computers. In addition to these constraints, survey respondents lament the shortage of instructors with sound CBI skills, and the dearth of competent software developers.

familiarity, and the motivational properties of gaming should provide a congenial learning atmosphere.

Various forms of computer support have been tested in an effort to reduce the increasing burden placed on training facilities. From these tests, civilian experiments and this investigation, several potential advantages emerge. One of the most consistent findings using computer assisted instruction, videodisc enhancement and simulators, was a reduction of training time required for students to attain a prescribed level of achievement; thirty percent was the figure most often quoted. The varied pace of individual instruction appears to aid both slow and fast learners. In a training situation dependent on large, expensive equipment, substantial monetary savings are possible particularly through simulation. The need for travel can also be reduced, with the attendant savings of time and money. For computers, course changes are much simpler to implement than they are with hard copy manuals.

Students benefit from the availability of computers, when they need additional practice. The material presented by computer is consistent from day to day and from station to station. Students also favor the features of patience and immediate feedback available from computers. More off-duty access to computers for drill and practice appears warranted.

benefit in some way from a careful application of CBI. The technology. with its promises and problems, does need a favorable training environment to be successful. Army enlisted, entry level training favors the kind of repetitive, skill mastery learning to which CBI is so well adapted. Much of the Army's classroom instruction could adopt computer augmentation. The carefully constructed lesson plans developed for each block of instruction, with clearly defined objectives, are easily applied to CBI. Still, there are apparent limits to this medium of presentation. No matter how advanced the CBI equipment and instruction, the training is still mechanical. CBI is not a total substitute for an instructor or actual hands-on training. Some courses require soldiers to train as a team; in the field environment, CBI has little value in these situations. But, with an understanding of the potential of CBI and some imagination much of the current courseware could be profitably augmented with CBI. Even those schools whose courses are not reasonably adaptable to CBI can benefit from course administration.

It appears that embedded systems and simulation devices will become standard fare in Army training. However, the potential of instructional gaming has not been fully exploited. Soldiers entering military service are probably acquainted with computer games. This

One of the unexpected findings of this survey is the expanding role of embedded training. Building training logic into sophisticated computerized hardware provides the advantages of many of the other systems coupled with real time on actual equipment. There is also the obvious advantage of reduced cost associated with utilizing existing equipment as the training base.

The average of 9 hours of scheduled CBI time appears to be approaching the optimal level. Too much reliance on a single training aid can be detrimental to the overall training process. On the other hand, computers seem to be underutilized as a nonscheduled course supplement, with only 50% of the schools offering any off-duty access. As long as the system is in place, additional availability can only increase its value to the educational process.

To fully exploit the capabilities of CBI, instructors need to know how to effectively employ them. Presently, trainer familiarization occurs at the local school. Given the diversity of hardware, software and methods of employment, this local training is appropriate. There is a need for trainers to understand the capabilities and limitations of CBI. Some cross-fertilization throughout TRADOC may help generate new approaches.

Although 45% of the survey respondents do not now employ CBI, and four proponents consider CBI inappropriate to their training, every school could

33. Please assess computer based instruction as it applies to your area of Army training. Address strengths and weaknesses, what it does well and what it does not do well. Please comment on any area not covered in the survey. Give your candid overall evaluation of CBI.

(use additional sheets, if needed)

If you want me to send you the results of this research please give me your name and address in the space below.

Either attach a current inventory of computer hardware used in training support or complete this inventory.

HARDWARE SYSTEMS MAKE & MODEL	QTY	INTERNAL MEMORY CAPACITY	EXTERNAL MEMORY CAPACITY	AUTHORING LANGUAGE	MONTH & YEAR ACQUIRED	O=OWNED S=SHARED L=LEASED	SYSTEM COST P=PURCHASE L=MONTHLY LEASE

GLOSSARY TO CLARIFY SURVEY TERMS

CAI Computer assisted instruction, the use of computers to instruct or assist instructors in the presentation of course material.

CBI Computer based instruction is a composite term which incorporates both CMI and CAI.

CMI Computer managed instruction, the use of computers to manage course administration, keep scores, generate and score tests (to include tests taken directly on the computer), and chart or control individual progress through a course.

Centralized instructional networks Large central processor with numerous terminals, often linked with telecommunications to distant locations, PLATO and TICCIT are the most common networks.

Computer For this study this term includes the use of both computers alone and video disc inhanced computers.

Demonstration Use of computers to demonstrate a new skill or operation.

Drill and practice reinforcement of prior conducted training.

Instructional games computer games designed with an instructional purpose, i.e. war games.

Micro-computers Home type computers which are stand-alone units with a price range of $500 to $5000.

Mini-computers Professional computers designed specifically for educational use. The main processor is located locally and has the capability for several perpheral input/output devices. Price range of about $5000 to $220,000.

Scrolling text the use of computers to record and play back text, like turning the pages of a book.

Simulation Using the computer to create life-like training situations, i.e. helicopter flight simulators.

Tutorial Using the computer in place of a live trainer, to teach new skills.

Video disc Laser read discs which have large storage of pictures and sound. For this study only those video discs which are connected to computers are considered.

QUESTION	FIELD	COMMENT
ID	1,2	identification number
1	3,4	number of MOS courses
2	5	1=combat arms 2=combat support 3=combat service support 4=combined, 1,2 5=combined, 2,3 6=combined, 1,3
3	6	1=yes; 2=no
4	7	1=dramatic increase 2=increase 3=no change 4=decrease 5=dramatic decrease
5	8	1=yes; 2=no
6	9,10,11	number of student stations
7	12,13,14,15	average student population
8	16,17,18	number of months CBI has been used.
9	no field needed	
10-A	19,20,21	course administration
B	22,23,24	demonstration
C	25,26,27	drill and practice
D	28,29,30	simulation
E	31,32,33	instructional games
F	34,35,36	tutorial
G	37,38,39	scrolling text
11-A	40,41,42	group mode
B	43,44,45	individual mode
12-A	46,47,48	civilian contractors
B	49,50,51	local instructors
C	52,53,54	other army agnecy
D	55,56,57	other

13	58	1=microcomputer 2=minicomputer 3=centralized networks 4=simulators 5=other 6=multiple systems
14	59	1=yes; 2=no
15	60,61	scheduled hours
16	62,63	non-scheduled hours
17	64	1=before arrival 2=local training 3=no training 4=other
18	65	1 - 5 (strongly agree to SD)
19	66	" "
20	67	" "
21	68	" "
22	69	" "
23	70	" "
24	71	" "
25	72	" "
26	73	" "
27	74	" "
28	75	" "
29	76	" "
30	77	" "
31	78	" "
32	79	" "
33	80	1=positive 2=negative 3=neutral

APPENDIX B

COVER LETTERS AND REMINDER

S: 08 Nov ^4

24 Oct 84

Subject: Survey of Computer Based Instruction Use in Initial Entry Advanced Individual Training (AIT).

(Addressee)

1. The purpose of the enclosed survey (Encl 1) is to determine the current level of computer use in the Army's Military Occupational Speciality (MOS) producing schools.

2. The Project Management Office (PMO) for computer based instruction is sponsoring the survey. The data will assist that office in planning for Army wide system standardization. The Army Communicative Technology Office (ACTO) has also expressed an interest in this survey.

3. I will also use the data as part of my masters thesis.

4. All directors involved in MOS training are being surveyed. Because the number of directors is limited, each response is critical. Please take a few minutes now to candidly answer this short survey. All responses will be held in strict confidence. I have coded the response sheets for administrative control.

5. A glossary is included (Encl 2) as an aid in defining terms as they apply to this survey.

6. If you want a copy of the results of the survey, please note that desire at the end of your comments. Thanks for your help.

James A. Eldredge

James A. Eldredge
Captain, FI

3 Encl
1 as
2 as
3 return envelope

DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is TAGO.

REFERENCE OR OFFICE SYMBOL	SUBJECT
	Army CBI Survey Reminder

TO ATZI-SD FROM Cpt Eldredge DATE 31 Oct 84 CMT 1

1. This is a brief reminder that if you have not yet returned the CBI survey we sent you last week, we are counting on your help. If it is already in the mail, please accept this letter as a note of thanks.

2. If by some chance your questionaire was lost or misplaced, please give me a call at 801-942-3192 and I will send you another copy at once. Your participation in this effort is important to everyone who cares about the quality of training in the Army. Thanks for your help.

J.A. Eldredge
Captain, FC

S: 22 Nov 84

08 Nov 84

Subject: Survey of Computer Based Instruction Use in Initial Entry Advanced Individual Training (AIT).

(Addressee)

1. The purpose of the enclosed survey (Encl 1) is to determine the current level of computer use in the Army's Military Occupational Speciality (MOS) producing schools.

2. The Project Management Office (PMO) for computer based instruction is sponsoring the survey. The data will assist that office in planning for Army wide system standardization. The Army Communicative Technology Office (ACTO) has also expressed an interest in this survey.

3. This is a second request. It is possible that the first request was lost in the mail. If you have already completed the survey and sent it in, disregard this letter. If not would you please expedite this request.

4. All directors involved in MOS training are being surveyed. Because the number of directors is limited, each response is critical. Please take a few minutes now to candidly answer this short survey. All responses will be held in strict confidence. I have coded the response sheets for administrative control.

5. A glossary is included (Encl 2) as an aid in defining terms as they apply to this survey.

6. If you want a copy of the results of the survey, please note that desire at the end of your comments. Thanks for your help.

James A. Eldredge

James A. Eldredge
Captain, FI
Project officer
(phone 801-942-3192)

3 Encl
1 as
2 as
3 return envelope

APPENDIX C

LIST OF SURVEY RECIPIENTS

COMMANDANT US ARMY ORDNANCE CENTER AND SCHOOL ATTN: ATSL-O-P ABERDEEN PROVING BROUND, MD. 21009 09-02101	5 NOV 84
COMMANDANT US ARMY ENGINEER SCHOOL ATTN: ATZA-TE-OAC (CPT. FONTANA) FORT BELVOIR, VA. 22060 09-01101	9 NOV 84
COMMANDANT US ARMY INFANTRY SCHOOL ATTN: ATSH-IP (CPT. ESPER, RM 540) FORT BENNING, GA. 31905 09-35101	3 DEC 84
COMMANDANT US ARMY INTELLIGENCE SCHOOL ATTN: ATSI-SPD FORT DEVENS, MA. 01433 09-34101	NOT RECEIVED
COMMANDANT US ARMY TRANSPORTATION SCHOOL ATTN: ATSP-PN FORT EUSTIS, VA. 23604 09-33101	9 NOV 84
COMMANDANT US ARMY SOLDIER SUPPORT CENTER ATTN: ATSG-AG (ADJUTANT GENERAL SCHOOL) FORT BENJAMIN HARRISON, IN. 46216 09-32101	7 NOV 84
COMMANDANT US ARMY SOLDIER SUPPORT CENTER ATTN: ATSG-FS (FINANCE SCHOOL) FORT BENJAMIN HARRISON, IN 46216 90-31101	9 NOV 84
COMMANDANT US ARMY INTELLIGENCE CENTER AND SCHOOL ATTN: ATSI-SP (CPT SAUM) FORT HUACHUCA, AZ. 85613 09-30101	13 NOV 84

COMMANDANT 3 NOV 84
US ARMY QUARTERMASTER SCHOOL
ATTN: ATSM-ACZ
FORT LEE, VA. 23801
09-29101

COMMANDANT NO RESPONSE
US ARMY MILITARY POLICE SCH/TNG CENTER
ATTN: ATZN-MP-P
FORT MCCLELLAN, AL. 36205
09-28101

COMMANDER 16 NOV 84
US ARMY AVIATION CENTER AND FORT RUCKER
ATTN: ATZQ-P
FORT RUCKER, AL. 36205
09-27101

COMMANDER 7 DEC 84
US ARMY FIELD ARTILLERY CENTER AND FORT SILL
ATTN: ATSF-SF (COL MERCHANT)
FORT SILL, OK. 73503
09-26101

COMMANDER 8 NOV 84
US ARMY AIR DEFENSE CENTER AND FORT BLISS
ATTN: ATSA-DAC-SPO
FORT BLISS, TX. 79916
09-25101

COMMANDANT 13 NOV 84
US ARMY ELEMENT, DEFENSE LANGUAGE INSTITUTE
ATTN: ATFL-DT-LPO
PERSIDIO OF MONTEREY, CA. 93942
09-24101

COMMANDANT NO RESPONSE
US ARMY MISSILE AND MUNITIONS CENTER AND SCHOOL
ATTN: ATSK-TP
REDSTONE ARSENAL, AL. 35803
09-23101

COMMANDANT 8 NOV 84
US ARMY CHEMICAL SCHOOL
ATTN: ATZN-CM-AP
FORT MCCLELLAN, AL. 36205
09-22101

COMMANDANT 9 NOV 84
US ARMY AVATION LOGISTICS SCHOOL
ATTN: ATSQ-PN (MSG. WELLS)
FORT EUSTIS, VA. 23604
09-21101

COMMANDER
JFK SPECIAL WARFARE CENTER
ATTN: ATSU-SP
FORT BRAGG, NC. 28307
09-20101

24 NOV 84

COMMANDANT
SCHOOL OF MUSIC
ATTN: ATTG-SM-CMT
NORFORK, VA.
09-19101

19 JAN 85
(RECEIVED TOO LATE)

COMMANDER
US ARMY SIGNAL CENTER AND FORT GORDON
ATTN: ATZH- PO
FORT GORDON, GA. 30905
09-18101

9 NOV 84

ASSISTANT COMMANDANT
US ARMY ARMOR CENTER AND FORT KNOX
ATTN: TECHNICAL DIRECTOR (DR. JACKSON)
FORT KNOX, KY. 40121
09-16101

14 JAN 85

COMMANDANT
US ARMY TRAINING CENTER AND FORT JACKSON
ATTN: DIRECTOR OF TRAINING DEVELOPMENT
FORT JACKSON, SC. 29207
09-14101

7 DEC 84

COMMANDER
US ARMY TNG CEN ENGR AND FORT LEONARD WOOD
ATTN: DIRECTOR OF TRAINING DEVELOPMENT
FORT LEONARD WOOD, MO. 65473
09-13101

13 NOV 84

COMMANDER
US ARMY TRAINING CENTER AND FORT DIX
ATTN: ATZD-GCP
FORT DIX, NJ. 08640
09-11101

NO RESPONSE

COMMANDANT
US ARMY CHAPLAIN CENTER AND SCHOOL
ATTN: DIRECTOR OF TRAINING DEVELOPMENT
FORT MONMOUTH, NJ. 07703
09-10101

30 NOV

COMMANDANT INFORMATION SYSTEMS ATTN: ATSI-CC-SGS FORT HUACHUCA, AZ. 85613 09-09101	NO RESPONSE
COMMANDER WILLIAM BEAUMONT ARMY MEDICAL CENTER ATTN: DIRECTOR OF MOS TRAINING EL PASO, TX. 79920 09-03101	8 NOV 84
COMMANDER ADADEMY OF HEALTH SCIENCES ATTN: HSHA-INU (MAJ HAMER) FORT SAM HOUSTON, TX. 78234 09-36101	7 DEC 84

VITA

Name	James A. Eldredge
Rank	Captain, U.S. Army
Birthplace	Salt Lake City, Utah
Birthdate	December 24, 1945
College 1967, 1970	University or Utah Salt Lake City, Utah
1975-1977	University of Maryland Hanau, Germany
Degree	B.S. Business Management
Member	Kappa Tau Alpha Society of Professional Journalists/Sigma Delta Chi
Major military schools	
1975	Officer Candidate School
1978	Finance Officer Advanced Course
1983	Command and General Staff College
Military assignments	
1969-1970	Recon sergeant, Viet Nam
1973-1975	Pathfinder, 82nd Airborne Div.
1975-1978	Disbursing officer, Germany
1978-1979	Operations officer, Personal and Pay Services Division
1979-1980	Commander, Student Detachment
1980-1983	ROTC instructor, Ricks College

the classrooms. AEDS Journal, 13, 222,232.

Suppes, P. (1980). The teacher and computer assisted instruction. In R.P. Taylor (Ed.), Computers in the classroom: Tutor, tool, tutee (pp. 232-239). New York: Teachers College Press.

Suppes, P. & Morningstar, M. (1977). In Schramm, W. Big media, little media (p. 30-31). Beverly Hills: Sage Publications.

Sustik J. (1981, October). Videodisc - a technology tutorial: A summary of comments from a demonstration at the EDUCOM conference. Kansas City, MO. (ERIC Document Reproduction Service No. ED 222 165)

Taylor, R.P. (1980). The computer in the classroom: Tutor, tool, tutee. New York: Teachers College Press.

Taylor, S. & O'Neal, F. (1978, March 30). Authoring systems and large-scale instructional development for CAI. Paper presented at the American Educational Research Association annual meeting, Toronto, Canada.

Thomas, D. (1979). The effectiveness of computer assisted instruction in secondary schools. AEDS Journal, 12, 103-116.

TRADOC Regulation 10-41. (1981, February). Organization and functions of the U.S. Army Training and Doctrine Command. Fort Monroe, VA: Headquarters, TRADOC.

Walker, D. (1983). Reflections on the educational potential and limitations of microcomputers. Phi Beta Kappan, 65, 103-107.

White, D. (1983). Use and selection of simulation games for instruction: An analysis of programs in military history. Doctoral dissertation, University of Utah, Salt Lake City.

Weiskoff, J. (1984, September-October). Enlisted career management. Soldier Support Journal, 11, 24.

Zigil, B. (1984, July 19). Strong arguments against children's learning by computer. USA Today, Education section.

Holt, Rinehart and Winston.

Ragosta, M. (1982). Computer - assisted instruction and compensatory education: The ETS/LAUSD study (contract no. 0400-78-0065). Princeton, NJ: Educational Testing Service.

Reducing training costs. (1984, July-August). Armor, XCV, 28-31.

Rich, J. & Van Pelt, K. (1974). Survey of computer applications in Army training.(report number CTS-TR-74-3). Fort Monroe, VA: US Army Training and Doctrine Command.

Samojeden, E. & Rauch, M. (1982, November 6). The use of computers in the classroom. Paper presented at the Minnesota Reading Association conference, Osseo, MN.

Sandeen, C.A. (1983-1984). Teaching instructional innovation: Past, present and future. International Journal of Instructional Media, 11, 39-50.

Sax, S. (1983).Development trail of CBE dataphone II. Colorado: Business Services Training and Education Center.

School microcomputers triple since 1980, NCES study shows. (1982, December). Phi Beta Kappan, 64, 294

Schramm, W. (1977). Big media, little media. London and Beverly Hills: Sage Publications.

Seidel, R.J. (1971). Current status of computer administered instruction work under project IMPACT. Paper presented at the U.S. Continental Army Command training workshop, Fort Gordon, GA.

Skinner, B.F. (1958, October). Teaching machines. Science, 128, 969-977.

Simutis, A. (1979). CAI an adjunct to teach basic skills. Doctoral dissertation. (ERIC Document Reproduction Service No. ED 171 326)

Spuck, D. (1981). An analysis of the cost-effectiveness of CAI and factors associated with its successful implementation in higher education. AEDS Journal, 15, 10-22.

Stevens, D.J. (1980). How educators perceive computers in

Journal of Educational Technology, 8, 242-252.

Miller, J., Hess, J. & DePrima, J. (1983). U.S. Army program management office for computer based instruction. Virginia: Advanced Technology.

Mitchell, L. (1982). So complicated they're simple: A reassuring word on classroom computers. Principle, 62, 39-41.

Molnar, A. (1979-1980). Intelligent videodisc and learning society. Journal of Educational Technology Systems, 8, 31-39.

Montross, L. (1960). War through the ages. New York: Harper and Row.

Naisbitt, J. (1982). Megatrends. New York: Warner Books.

Noble, D.D. (1984, October 3). Jumping off the computer bandwagon. Education Week, p. 24-26.

O'Neal, F. (1984, March 2). Personal interview, Orem, Utah.

O'Neal A.F. (1983). The future applications of distributed systems to training. Unpublished manuscript.

O'Neal, F. & Lipson, J. (1982). Instruction with the intelligent videodisc. Paper presented at the annual ASEE conference.

Orlanski, J. (1982). Current knowledge and projection of assessing the effectiveness of training. Arlington, VA: Institute for Defense Analysis. (ERIC Document Reproduction Service No. ED 230 170)

Papert, S. (1980). Teaching children thinking. In R.P. Taylor (Ed.), The computer in the school: Tutor, tool, tutee (pp. 160-171). New York: College Press.

Poore, J., Qualls, J. & Brown, B. (1981). The educational effectiveness and economics of delivery of the PLATO basic skills mathematics lessons: A field study. AEDS Journal, 15, 31-51.

Pressey, S.L. (1926). A simple aparatus which gives tests and scores and teaches. School and Society, 23, 373-376.

Preston, R. & Wise, S. (1979). Men in Arms. New York:

uncomplicated simulators. Aviation Week & Space Technology, 115, 27-29.

Kribs, D. (1979-1980). Authoring techniques for interactive videodisc systems. Journal of Educational Technology Systems, 8, 211-219.

Lieblein, E. (1983, January-February). The military computer family. Army Research Development and Acquisition, 24.

Longhouser, J. (1984, Spring). Tank gunnery proficiency on the way everyday. Army Trainer, 3, 14-16.

Longo, A.A. (1976). Guidelines for optimum utilization of computerized training systems as based on an analysis and evaluation of such programs in the U.S. Army. Nova University: Doctoral dissertation. (ERIC Document Reproduction Service No. ED 129 312)

Longo, A.A. & Guinti, F.E. (1972, August 8-10). A sequential evaluation of computer assisted instruction in U.S. Army basic electronics training. Paper presented at the annual convention of the Association for the Development of Instructional Systems, Quebec, Canada.

Luxenberg, S. (1979). Computerized teaching. Change, 11, 59-61.

Masters Abstracts. (quarterly). Ann Arbor, MI: University Microfilms International.

May, T. (1976, September). Training devices become big business. Military Review, LVI, 79-84.

Mena, L. (1984, Spring). COFT feedback. Army Trainer, 3, 17.

Menosky, J. (1984, May). Computer workshop. Science, p. 45.

Miles, R. (1977). Computers in military training. British

Field Manual 101-5. (1979, September). _The Army staff_. Washington, DC: Department of the Army.

Freeman, W.F. (1969). Computer support of instruction at the U.S. Army infantry school. _Educational Technology_, _IX_, S7-S13.

Funk, S. (1980). Soldiers and computers. _Military Review_, _LX_, 61-63.

Gibbons, A. & Cavagnol, R. (1983). _Simulators: Cost effective training supplements_. Utah: WICAT Systems.

Gibbons, A., Cavagnol, R. & lines, V. (1983). _The distributed instructional system for HAWK training_. Unpublished manuscript.

Gibbons, A., Olsen, J. & Cavagnol, R. (1982). _HAWK training system evaluation report_. Utah: WICAT Systems.

Hall, K.A. (1971, June). Computer assisted instruction: Problems and performance. _Phi Delta Kappan_, _10_, 628-631.

Hayman, R. & Levin, H. (1973). Economic analysis and historical summary of educational technology costs. In A. Melmed (Ed.), _Productivity and efficiency in education_ (Appendix C). Washington, DC: Federal Council on Science and Technology.

Hillkirk, J. (1984, August 1). Computers help teachers span country. _USA Today_, p. 3B.

Hitchens, H. (1979). The evolution of audio-visual education in the U.S.A. since 1945. _Educational Media International_, _3_, 6-12.

Holmgren, J., Dyer, F., Hilligoss, R. & Heiller, F. (1979-1980). The effectiveness of Army training extension course lessons on videodisc. _Journal of Educational Technology Systems_, _8_, 263-274.

Information Services Coordinating Group, videodisc: A revolution that isn't. (1982, December). _Canadian Library Journal_, _39_, 357-364.

Kimberlin, D. (1983). _The U.S. Army air defense school distributed instructional system project evaluation_. Fort Monroe, VA: Training Development Institute.

Kolcum, E.H. (1981, December 14). Services seek low cost of Educational Technology Systems, 8, 241-262.

Braun, L. (1979-1980). Some bases for choosing a computer system: Suggestions for educators. Journal of Educational Technology Systems, 8, 7-30.

Brown, M. (1984, May). What's new. Soldier, 39, 55.

Brown, M. (1984, July). What's new. Soldier, 39, 2.

Bunderson, C., Olson, J. & Baillio, B. (1981). Comparative evaluation of a prototype intelligent videodisc system. Utah: Learning Design Laboratories.

Bunderson, V., Campbell, O. & Farr, B. (1980, June). Instructional systems development model for interactive videodisc training systems. Alexandria, VA: U.S. Army Research Institute for the Behaviorial and Social Sciences.

Campbell, J. (1982). Instructional system development for interactive videodisc. Utah: WICAT Systems.

Carnegie Commission on Higher Education. (1972). The fourth revolution. New York: McGraw-Hill Book.

Computerized home education movement to take off. (1983). Futurist, 17, 69.

Constitution of the United States, Art. 2, Sec. 2, Clause 1.

Dissertation Abstracts International. (Quarterly). Ann Arbor, MI: University Microfilms International.

Dean, C. & Whitlock, Q. (1983). A handbook of computer-based training. London: Kogan Page.

Denlinger, L. (1984, February 10). Computer based instruction (CBI-PLATO). Personal letter.

Dwyer, T. (1980). Developing computer software for the classroom. In R.P. Taylor (Ed.), The computer in the school: Tutor, tool, tutee. New York: College Press.

Edwards, J., Norton, S., Taylor, S., Weiss, M. & Van Dusseldorp, R. (1975). How effective is CAI? A review of research. Educational Leadership, 33, 147-153.

Emmens, C. (1982). Video disc software: Current developments. School Library Journal, p. 39.

The Army needs to improve individual soldier training in its units. (1981). Report to Congress by the Comptroller General of the United States. Washington, DC: U.S. Government Printing Office.

Army Regulation 10-5. (1981). Organization and functions, Department of the Army. Washington, DC: Headquarters, Department of the Army.

Army Regulation 10-10. (1970). Organization and functions, class I installation organization. Washington, DC: Headquarters, Department of the Army.

Army Regulation 10-41. (1982). Organization and functions, US Army Training and Doctrine Command. Washington, DC: Headquarters, Department of the Army.

Army Regulation 340-21. (1975). The Army privacy program. Washington, DC: Headquarters, Department of the Army.

Army Regulation 350-1. (1981). Army training. Washington, DC: Headquarters, Department of the Army.

Army Regulation 351-1. (1984). Individual military education and training. Washington, DC: Headquarters, Department of the Army.

Army Regulation 601-210. (1982). Advanced individual training installations. Washington, DC: Headquarters, Department of the Army.

Army Regulation 611-201. (1984). Enlisted career management fields and military occupational specialties. Washington, DC: Department of the Army.

Berkowitz, M. & O'Neal, H. Jr. (1980). A formative evaluation plan for the automated instructional system (AIMS). Alexandria, VA: U.S. Army Research Institute for the Behaviorial and Social Sciences. (ERIC Document Reproduction Service No. ED 215 666)

Bernd, R. (1983). Interactive video disc in the Army. Paper presented at the fifth meeting of the Society for Applied Learning Technology. Fort Eustis, Va.

Bork, A. (1980). Interactive learning. In R.P. Taylor (Ed.), The computer in the school: Tutor, tool, tutee (pp. 53-65). New York: College Press.

Branson, R. & Foster, R. (1979-1980). Educational applications research and videodisc technology. Journal

SELECTED BIBLIOGRAPHY

PMO The program management office for computer based instruction is the TRADOC staff office responsible for standardizing training cound computer hardware.

TRADOC The U.S. Army training and doctrine command is the major command responsible for training throughout the Army.

ACTO Army communication technology office, the TRADOC staff office responsible for research and implementation of videodisk technology into Army training.

AIT Advanced individual training, schooling designed to give enlisted personnel their specific job skills.

Basic Training A compulsory 8 week course designed to acquaint enlisted members with fundamental soldier skills.

CA The combat arms branch consists of the specialities concerned with fighting the battle, i.e., infantry.

CS Combat support, the specialities assigned to directly support combat soldiers in the field, i.e., signal corps.

CSS Combat service support, the specialities not directly involved in a combat role, i.e., personnel management.

Installation An Army post or fort. Training installations are those posts with the principal mission of institutional training.

MOS Military occupational specialty, a job skill that soldiers are trained for and work in throughout their career.

NCO Noncommissioned officer, a generic designation referring to corporals and all ranks of sergeant.

APPENDIX E

GLOSSARY

```
******   DATA/LIST   ******         177100*CONNECT$PF(1).DATA/LIST [DAT]

010322110005200000100000000000000000000                 211000335324331 1 3445
02433222                                                       155155123543455 1
03112 32                                                        344325243434233
1003322102701800010600100300000000000000007502500002500007512100522552551215454251
13131232                                                       4542352243444553
16  1 12                                                       1551 51425555451
1885322106575001201000000000000000000000002507503504002500061002023552542424344342
201212210250400036100000000000000000000000100100000000000021202024444444443443444
21743211155984009000003303300000000340000650350351000000000522000215515514 5353 5
22032212                                                        145355325453344
24043212                                                       1551551355555552
2558111102445000480100200250250000200000200800750000000025112610214415414254554 51
27052212                                                       1551451143435551
29083312                                                       3541451242525451
3002231101011000240100100000200000600000500500400400200000610040215515412135555 51
310232110220035003000015085000000000000002008000000001000002205002154244244524445
32053212                                                       4542454343343352
3318322100420001800000000000100000000000010000000001000000000420300224424423244344 41
350412110006500009100000000000000000000000000000000000000000100520000245424233333335
380132110000750    10000000000000000000000         0000001000003200002143155 11 3344531
2630122106705870480350050370050120050010250750820180000006115032244245233444444 41
14043222                                                       3543332233433451
```

APPENDIX D

SPSS COMPUTER LISTING

END

FILMED

7-85

DTIC