

1-1-1993

Florida Teletraining Project: Reconfiguration Of Military Courses For Video Teletraining Delivery

Barbara L. Martin

Find similar works at: <https://stars.library.ucf.edu/istlibrary>
University of Central Florida Libraries <http://library.ucf.edu>

This Research Report is brought to you for free and open access by the Digital Collections at STARS. It has been accepted for inclusion in Institute for Simulation and Training by an authorized administrator of STARS. For more information, please contact STARS@ucf.edu.

Recommended Citation

Martin, Barbara L., "Florida Teletraining Project: Reconfiguration Of Military Courses For Video Teletraining Delivery" (1993). *Institute for Simulation and Training*. 98.
<https://stars.library.ucf.edu/istlibrary/98>

INSTITUTE FOR SIMULATION AND TRAINING



Florida Teletraining Project:
Reconfiguration of Military Courses for
Video Teletraining Delivery

Contract Number N61339-85-D-0024
Delivery Order 10
Defense Institute for Training Resources Analysis

IST-CR93-20
June 1993

Barbara L. Martin, Ph.D.



IST

INSTITUTE FOR SIMULATION AND TRAINING

Florida Teletraining Project: Reconfiguration of Military Courses for Video Teletraining Delivery

Contract Number N61339-85-D-0024
Delivery Order 10
Defense Institute for Training Resources Analysis

IST-CR-93-20
June 1993

Barbara L. Martin, Ph.D.

Institute for Simulation and Training • 3280 Progress Drive • Orlando, Florida 32826

University of Central Florida • Division of Sponsored Research

Contract Number N61339-85-D-0024
Delivery Order 10
Defense Institute for Training Resources Analysis
June 1993

Florida Teletraining Project: Reconfiguration of Military Courses for Video Teletraining Delivery

Institute for Simulation and Training
3280 Progress Drive
Orlando FL 32826

University of Central Florida
Division of Sponsored Research

IST-CR-93-20

ACKNOWLEDGEMENTS

This report was made possible through government contract No. N61339-85-D-0024, Delivery Order 10 awarded by the Defense Training and Performance Data Center (TPDC) and the Defense Institute for Training Resources Analysis (DITRA) to the Institute for Simulation and Training (IST) at the University of Central Florida. Overall project direction for TPDC and DITRA was provided by Dr. Stephen C. Skiles. The IST Project Director was Dr. William J. Bramble. This report was produced by the Institute for Simulation and Training University of Central Florida, with assistance from the Florida Community College in Jacksonville (FCCJ). Dr. Barbara L. Martin, the Florida Teletraining Project (FTP) Instructional Design Specialist, drafted the report.

Special thanks are due to Dr. William Bramble, FTP Project Director at IST, for his direction during the preparation of the document and for his critical review and editing of the various drafts of the report.

Thanks are also due to Mr. Neill Foshee, FTP Military Training Specialist at IST, for his contributions to the military portions of this document and also for his review of several of the drafts of this report.

The Institute for Simulation and Training also wishes to thank Mr. Douglas Kerley, Instructional Manager at the Florida Community College at Jacksonville (FCCJ) and Ms. Kathy Clower, Media Production Manager at FCCJ, for their input into the report and their critical review of the final draft of the report. Their assistance on the report contributed to its veracity and its scope.

Finally, thanks are due to Ms. Mary Lou Grover, FTP Project Secretary at IST, and Eric Llewellyn, Student Assistant, for their patience and expertise in producing the tables, figures, and final version of this report.

EXECUTIVE SUMMARY

This report describes the processes and procedures used by the Florida Teletraining Project (FTP) to reconfigure five military courses for delivery over the U.S. Army's Teletraining Network, TNET. The five courses were presented to personnel from the U.S. Army Reserve Component, U.S. Navy, U.S. Marine Corps, U.S. Coast Guard, and the Air National Guard.

Three U.S. Army MOS-awarding courses and two U.S. Navy special topics short courses were assigned to the FTP to be reconfigured for TNET. The MOS-awarding courses were adapted from U.S. Army Reserve Component Configured Courseware (RC³): 71L10, Administrative Specialist; 76Y10, Unit Supply Specialist; and 95B10, Military Police. The two special topics courses were adapted from U.S. Navy Total Quality Leadership (TQL) and Handling Hazardous Waste--Activity Level (HazWaste) courses.

Overall project management was performed by the Defense Institute for Training Resources Analysis (DITRA). The Institute for Simulation and Training (IST) at the University of Central Florida served as the project's prime contractor. IST provided the contracted managerial, technical, design, and evaluation tasks of the project. IST subcontracted with the Florida Community College at Jacksonville (FCCJ) to serve as the lead community college for developing and offering instruction to the military personnel. FCCJ subcontracted with two other Florida community colleges, St. Petersburg Community College and Valencia Community College in Orlando, to provide two remote (receive) sites and instructional personnel required for course delivery. FCCJ provided a third remote site, referred to as FCCJ2.

For the MOS-awarding courses, military subject matter experts, who also participated in course delivery, were provided to the project from the 3391st Army Reserve Forces (USARF) School. Military instructional coordinators who assisted in course delivery at the remote sites were provided by the 3391st and the 3388th USARF Schools located in Jacksonville and Tampa, Florida, respectively.

Proponent schools provided existing materials and expert review for the three MOS-awarding courses. These were: U.S. Army Soldier Support Center, Fort Benjamin Harrison, IN (71L10), the U.S. Army Quartermaster School at Fort Lee, VA (76Y10), and the U.S. Army Military Police School, Fort McClellan, AL (95B10).

For the special topics courses, subject matter experts and the military instructional assistants were provided by Naval Air Station, Cecil Field in Jacksonville, Florida (HazWaste), Naval Training Systems Center (NTSC) in Orlando, Florida (TQL), and the Little Creek Amphibious Base in Norfolk, Virginia (TQL).

There are three primary sections of this report. The first section presents a review of the literature on distance education, instructional systems design (ISD), media selection, design, and

use, and describes the teletraining research conducted by the military. A description of TNET is also included. Some of the key findings from the review of the literature are:

- The courses selected for presentation via video teletraining (VTT) should be shorter rather than longer in length, be primarily cognitive rather than psychomotor, and have high student demand.
- VTT courses must be highly planned and organized; instructional systems design should be implemented for this planning.
- VTT courses should use sound instructional techniques, e.g., feedback and interaction, that are grounded in learning theory.
- VTT courses should use a variety of media, e.g., graphics and visuals, that support the instructional message.
- VTT courses should be pilot tested and the instructional materials should be validated.
- Instructors must learn to teach over a VTT system, and students must learn how to learn from VTT.
- Contingency plans (e.g., for system outages) are crucial to the success of VTT.
- It takes a team of people to design and deliver good VTT instruction. These include at a minimum: a management team, instructional designers, course developers, subject matter experts, VTT instructors, site facilitators, graphic artists, word processors, and evaluators.
- A staff training program is required for all personnel involved in the design and delivery of VTT courses. This training must include instruction in the technology to be used and in VTT course design and delivery.
- Record-keeping procedures and scheduling requirements must be coordinated for all personnel and students.
- Roles and responsibilities of all personnel must be carefully delineated and in large scale projects the various management and organizational functions must be coordinated.

The second section of this report describes the conceptual model that served as the basis for reconfiguring the five courses. The five-component Systems Approach to Training (SAT) model was adapted for use in reconfiguring the courseware. In the adapted model, the same five functions of the SAT were included: Analysis, Design, Development, Implementation, and

Evaluation. Two functions were added: Revise Instruction and Management. These functions were added to the model based on the literature review and due to the complexity of the reconfiguration effort. The adapted model is based on learning and instructional theory, specifically the cognitive information processing approach described by Robert M. Gagne in *The Conditions of Learning* (Gagne, 1985). The adapted model is presented in Figure 3 in the report.

In general, the adapted SAT model includes the same tasks and is used in the same iterative manner as the SAT model. That is, the reconfiguration process started with the Analysis phase, and then proceeded to Design, Development, and Implementation. However, the instruction was revised at several different times during the reconfiguration process, not just during Development as shown in the SAT model. The Revise Instruction phase was added to make this explicit. A Management phase superimposes the entire model. It was added to the model because the coordination of personnel and tasks in a project of this complexity could not be left to chance.

In the third section of this report, each phase of the reconfiguration process is described in detail. Major tasks that were completed, personnel required to perform the tasks, and the staff training that was provided during each phase, if any, are described. Summary tables are also provided in the body of the report for each phase where there were extensive tasks to be completed. The major tasks completed during each phase were:

- **Analysis:** The five courses that were to be reconfigured in the Florida Teletraining Project were assigned by the government. Therefore, traditional tasks performed during this phase of the SAT model were not conducted during this project. However, six factors were used to analyze the five courses in regards to their suitability for presentation over TNET. These factors were: length of the course, whether the course was primarily cognitive rather than psychomotor, whether the course had high demand/throughput, how appropriate the course was for video teletraining, how appropriate each course was for the expertise of community college personnel, and the extent to which the instructional components that were included in the courseware received from the military were adequate. This analysis was used to formulate the design procedures for course reconfiguration, e.g., how to develop courses that were interactive, motivating, provided instructional feedback, etc.
- **Design:** During this phase, the military Plans of Instruction (POIs) and syllabi were analyzed to determine the adequacy of the course materials from an instructional design perspective. Minor modifications were made to the courseware when needed. Global media and instructional strategy selections were made that would facilitate student learning and that matched the instructional conditions for VTT.

Staff training was conducted to teach the course developers Instructional Systems Design (ISD) skills, the capabilities of TNET, and to describe VTT instructional learning activities and strategies. The ten tasks performed during the Design Phase are listed in Table 11 in the report.

- **Development:** All course materials were developed during this phase of reconfiguration. Complete instructor, instructional coordinator, and student interactive study guides were produced. Daily lessons plans were developed and included in the instructor and instructional coordinator guides. All screen and print graphics and all support media were also produced. Initial validation and approval of the courseware from the appropriate military agency were obtained.

On-the-job staff training for the course developers/teleteachers was implemented and training was begun for all remote (distant) site personnel. Table 14 summarizes the tasks performed during this phase.

- **Implementation:** Preparation for the delivery of instruction was the primary goal for this phase of the reconfiguration process. There were a number of critical tasks that had to be performed to prepare for delivery of training. These included acquiring all military and instructional materials and equipment, scheduling labs and facilities, organizing for instruction, including planning for contingencies, preparing all paperwork and record-keeping, and delivering all courseware in sufficient quantities to the remote sites.

Final staff training was conducted for all project personnel at the origination and remote sites. This training focused on the roles and responsibilities of the various participants. Over-the-network training was also provided to give all participants a "dry run" in implementing the courses prior to actual delivery. The seven key tasks performed during this phase are listed in Table 17 in the report.

- **Revise Instruction:** This phase was added to the adapted model because there were several revision and validation cycles that were performed during the reconfiguration process. The functions of this phase are continuous, not discreet. The specific tasks performed during this phase are listed in Table 18 in the report.
 - During the Design phase, minor modifications were made to the military POIs and syllabi to align the objectives, performance test items, and practical exercises.
 - During the Development phase, process (e.g., readability) and product (e.g., performance) data were collected during several expert reviews of the print and non-print course materials, and during trial runs of some key instructional strategies. Prototype units were validated by the Army proponent schools and by the Navy organizations responsible for

performing this task. Final versions of the course materials were prepared during this phase.

- During the Implementation Phase, a pilot-test site, called an Intensive Site, was established at the remote site, FCCJ2. The purpose of this site was to collect data so that the courses could be modified and revised during delivery. Final courseware revisions were made to each course after the training was delivered.
- **Management:** This phase was added to the adapted SAT model because of the complexity of this project. The major tasks performed during this phase were to (a) coordinate all personnel and functional groups associated with the project, e.g., the community colleges and the military organizations, and (b) manage all project tasks, e.g., pre-course development, course design and development, implementation of the courses, and the evaluation component of the project.
- **Evaluation:** This phase of the SAT and the adapted model are not specific components of the reconfiguration process. While it was included in the model to reinforce its importance in a project of this magnitude, evaluation, in the context of the model, refers to broader project evaluation issues, such as conducting an internal and external evaluation.

The key personnel required for this project, by phases, are:

- **Analysis:** An expert instructional designer, a military training expert, an instructional manager, five course developers, and experts in the technology.
- **Design:** For converting the courseware: all of the above, plus five military subject matter experts; for staff training: a consultant in VTT design strategies and experts in TNET.
- **Development:** The following personnel were added to design and development teams to complete the reconfiguration: a second instructional designer, graphic artists, word processors, an editor and proofreader, TV studio personnel who ran the equipment during microteaching sessions, and video technicians for producing the videotapes.
- **Implementation:** All personnel needed to conduct the courses at the origination site had been on the project since the Design phase. However, a production and distribution manager and one assistant were added at the origination site to insure that all materials were reproduced in sufficient quantities and delivered to the remote sites. During this phase, all remote site personnel were in place. Each remote site had the same personnel: civilian and military site facilitators, technical personnel, a facilities coordinator, and an administrative POC.

- **Revise Instruction:** All personnel needed to deliver the instruction were available at the origination and remote sites. These were described above. However, for validating and revising the instruction, an evaluation expert and the respective proponent school and Navy school training personnel participated in this task.
- **Management:** No new personnel were added to perform this phase. These tasks were performed by the project manager at DITRA, the IST project director, and the FCCJ project director and the FCCJ logistics manager.

In summary, this report presents the adapted SAT model and processes and procedures used by the FTP to reconfigure five military courses for delivery over TNET. A review of the literature is included in the report that presents the key factors that should be and were considered when converting courses to VTT. The tasks performed and the personnel needed to reconfigure courseware are described in detail and are included in the body of the report.

TABLE OF CONTENTS

| | |
|--|-----|
| Executive Summary | iii |
| Foreword | 1 |
| Review of Literature | 8 |
| Introduction | 8 |
| Distance Learning | 10 |
| Instructional Design | 16 |
| Media Selection, Design, and Use | 20 |
| Teletraining Research in the Military | 32 |
| Summary of the Review of Literature | 36 |
| Conceptual Model for the Reconfiguration Process | 39 |
| Overview of Courses Selected for Reconfiguration | 41 |
| Overview of TNET Delivery System | 43 |
| Implementing Instruction Using TNET | 47 |
| Key Distance Learning and Instructional Design Variables | 49 |
| Adapted SAT Model for the Reconfiguration Process Using TNET | 50 |
| Summary of the Adapted SAT Model | 54 |
| Course Reconfiguration Process | 56 |
| Analysis Phase | 56 |
| Design Phase | 60 |
| Development Phase | 70 |
| Implementation Phase | 87 |
| Revise Instruction Phase | 100 |
| Management Phase | 106 |
| Summary of the Course Reconfiguration Process | 113 |
| Summary of the Report | 116 |
| General Lessons Learned for Future Configuration Projects | 121 |
| Reference List | 123 |
| Acronym List | 130 |

Appendices

| | |
|--|-----|
| A. Information Sheet: Lesson Plan | 132 |
| B. Sample Lesson Plan Pages From 71L10 Instructor Guide (IG) | 138 |
| C. Sample Pages From 71L10 Interactive Study Guide (ISG) | 146 |
| D. Checklist: Lesson Elements for Review/Approval | 154 |

LIST OF TABLES AND FIGURES

| | | |
|-----------|--|-----|
| Table 1: | Project Participants | 5 |
| Table 2: | Organizational and Educational Factors for Successful Distance Education Programs | 12 |
| Table 3: | Conditions of Learning for Five Categories of Outcomes | 17 |
| Table 4: | The Events of Instruction | 18 |
| Table 5: | Factors in Media Selection | 23 |
| Table 6: | Media Possibilities with TNET | 25 |
| Table 7: | Principles of Media Selection: Illustrations | 26 |
| Table 8: | Message Design Principles: Graphics | 27 |
| Table 9: | Media Design Principles: Audio-Visual Packages | 28 |
| Table 10: | Principles for Designing Effective Video Teletraining Courses | 31 |
| Table 11: | Tasks Performed During the Design Phase | 62 |
| Table 12: | Conditions of Learning for Different Types of Learning | 64 |
| Table 13: | Components Included in the Surrounding Materials | 83 |
| Table 14: | Tasks Performed During the Development Phase | 88 |
| Table 15: | Contingency Plans | 92 |
| Table 16: | Roles and Responsibilities | 97 |
| Table 17: | Tasks Performed During the Implementation Phase | 101 |
| Table 18: | Tasks Conducted During the Revise Instruction Phase | 107 |
| Table 19: | Development and Production Tracking Chart | 111 |
| Figure 1: | Systems Approach to Training Model (SAT) | 21 |
| Figure 2: | Example of a Word Picture | 30 |
| Figure 3: | Adapted Systems Model for the Reconfiguration Process | 40 |
| Figure 4: | Schematic of a TNET Remote Site | 44 |
| Figure 5: | Schematic of the TNET Origination Site | 45 |
| Figure 6: | Sample Tasks in the Reconfiguration Process | 52 |
| Figure 7: | Example of Word Pictures and Screen Graphics | 75 |

FLORIDA TELETRAINING PROJECT: RECONFIGURATION OF MILITARY COURSES FOR VIDEO TELETRAINING DELIVERY

FOREWORD

Scope of Work

The Department of Defense (DoD) was directed by Congress in the FY 1991 Department of Defense Appropriations Bill to conduct a pilot program to test the feasibility of using a telecommunications training network to deliver military programs of instruction to the armed services in Florida. The bill states that the pilot program could be developed and implemented by two-year colleges in collaboration with armed forces schools.

Having been tasked to carry out the project, the DoD determined that the pilot program would satisfy the congressional direction by using a teletraining network to deliver military programs of instruction (a) to both the Active and Reserve Components of the services and (b) that address specific military duties. In addition, it was directed that the program should have a scientifically valid evaluation. The project was directed to identify, collect, and evaluate telecommunications and pilot project test data that could be used to:

- (1) ascertain the merit of using telecommunications training provided by non-military sources for training military personnel
- (2) quantify the value of the instruction received
- (3) guide future government and DoD decisions related to distance learning.

Purpose of the Project

The purpose of this project was to assess the feasibility of using two-year community colleges to offer military programs of instruction that address specific military duties and content. These programs of instruction were presented over a telecommunications network. For this project, the personnel were professors and staff at a community college, the military programs were courses for three U.S. Army Military Occupational Specialties (MOS) and two special topics short courses designed to serve students from all services. The special topics courses were reconfigured using U.S. Navy courseware. The telecommunications network utilized by the FTP was the U.S. Army Teletraining Network (TNET) (Schall, 1991).

Five courses were reconfigured for delivery on TNET. The three MOS-awarding courses were U.S. Army Reserve Component Configured Courseware (RC³): 71L10, Administrative Specialist; 76Y10, Unit Supply Specialist; and 95B10, Military Police. These courses were delivered once each to Army National Guard and Army Reserve soldiers who were seeking to be reclassified in these MOSs. The two special topics courses were: Total Quality Leadership (TQL) and Handling Hazardous Waste--Activity Level (HazWaste). The latter courses addressed

joint services needs and were made available to members of interested services and components, i.e., National Guard, U.S. Marines, Air Guard and U.S. Navy. TQL and HazWaste were offered two and three times respectively.

Two out-of-state sites participated in the project during the final administration of the special topics courses. The Rhode Island National Guard and the Alabama National Guard provided TNET sites and students for the final administrations of these courses. Both TQL and HazWaste courses were presented in Rhode Island. Only HazWaste was presented in Alabama. In Rhode Island, the students who participated in the project were from four different branches of the military: Rhode Island Army National Guard, U.S. Marines, Rhode Island Air National Guard and U.S. Navy. In Alabama, the students enrolled in the course were Alabama Army National Guard and U.S. Marines.

Project Management

Overall project management was initially assigned to the Defense Training and Performance Data Center (TPDC). With the September 1992 closing of TPDC the project was reassigned to the Defense Institute for Training Resources Analysis (DITRA). These two agencies provided overall project management. The Institute for Simulation and Training (IST) at the University of Central Florida served as the project's prime contractor. IST assisted by performing the contracted managerial, technical, design, and evaluation tasks of the project. IST subcontracted with the Florida Community College at Jacksonville (FCCJ) to serve as the lead community college for developing and offering instruction over the teletraining network. (FCCJ also provided one of the three remote sites). FCCJ in turn subcontracted with two other community colleges in Florida to provide classroom sites to receive courses offered by the project. St. Petersburg Junior College (SPJC) and Valencia Community College (VCC) in Orlando participated in the project in this manner.

Purpose of this Report

The purpose of this report is to describe the conversion process that the Florida Teletraining Project (FTP) used to reconfigure the five courses for delivery over TNET. Included in the report is: (a) a discussion of the relevant research and literature upon which the conversion process is based, (b) a description of the conceptual model used by IST and FCCJ to reconfigure the courses, and (c) a description of the reconfiguration procedures, including the checklists and guidelines that were developed and used to reconfigure the courses.

This report specifically addresses the course conversion process. The evaluation design for the project, including instrumentation, methodology, and data collection to assess the value of the instruction provided as a result of course conversion, and the results of the evaluations, will be described in other project reports.

Developing a Course Reconfiguration Process

The process of developing a plan for converting military courseware for delivery via video teletraining requires a comprehensive understanding of military training, instructional design, distance learning strategies, and TNET system capabilities. To this end and in order to design a viable process for reconfiguring military courseware, IST and FCCJ personnel conducted an extensive review of relevant literature, contracted with an expert consultant in the conversion of military courses for teletraining delivery, visited several key military teletraining facilities, and were trained by personnel from the U.S. Army Extension Training Directorate (AETD) on the technical and instructional use of TNET. The consultant, Dr. Thomas Cyrs, Director, Center for Educational Development and Professor, Educational Management and Development, at New Mexico State University, presented a two-day workshop for the project staff.

Site visits were made to four primary military teletraining network facilities and to two U.S. Army proponent schools responsible for the MOS courses that were to be converted. The three network facilities visited were: (a) U.S. Army Training Support Center (Fort Eustis, VA), TNET, (b) Satellite Education Program (SEP), U.S. Army Logistics Management College (ALMC), Fort Lee, VA., (c) U.S. Navy Chief, Naval Education and Training (CNET) Electronic Schoolhouse Network (CESN) (Dam Neck, VA) and (d) Fleet Training Center, Mayport, FL. Two proponent schools were also visited: the U.S. Army Quartermaster School at Fort Lee, VA (76Y10) and the U.S. Army Military Police School, Fort McClellan, AL (95B10). Representatives from the U.S. Army Soldier Support Center, Fort Benjamin Harrison, IN (71L10) met with project staff in Florida. Project staff also visited the Naval Air Station, Cecil Field, Jacksonville, Florida to prepare for the Handling Hazardous Waste--Activity Level course and met with representatives of the U.S. Navy at the Naval Training Systems Center (NTSC) in Orlando, Florida to prepare for the Total Quality Leadership (TQL) course.

Information from the activities above provided valuable background for the design of the conversion plan.

General Issues: Course Reconfiguration

The overall course design and reconfiguration plan was influenced by several factors. First, a portion of the courseware selected for reconfiguration contained military content atypical of courses offered by community colleges. For example, a majority of the Program of Instruction (POI) for 76Y10, Unit Supply Specialist, is not offered at community colleges. By contrast, many aspects of 95B10, Military Police, are addressed in general law enforcement programs at community colleges. However, each of the five selected courses contained a military component not present in the community college curriculum. For this reason, it was necessary to include military subject matter experts (SMEs) to provide the necessary context and content background for the reconfiguration effort.

Second, a great deal of coordination was needed among participating military groups and between civilian and military groups (Table 1 lists some of the military groups who participated in this project). As an example of the complexity of these relationships, the need for military expertise, the requirements for selecting students and facilitating their participation in courses, and validating and approving the courses resulted in the necessity for the significant involvement of a number of key military groups. The involvement of military organizations such as the U.S. Army Training and Doctrine Command (TRADOC), U.S. Army Reserve Forces (USARF) schools, Army proponent schools, and CNET was required for project success. These agencies accomplished the following tasks:

- identified the students
- arranged for student participation
- selected appropriate SMEs
- provided needed course and reference materials
- provided military content and doctrine review
- defined and established the approval processes for the reconfigured courses, and certified the instruction.

The responsibilities of the various organizations and their respective roles influenced course and system selection, timelines, and virtually all other aspects of the project. Adaptations and modification of the course conversion procedures were made on the basis of these needs.

Third, the teletraining system selected by DITRA, TNET, is a two-way audio and two-way video distance learning system. The TNET system is operated by the AETD at Fort Eustis, VA. TNET video is compressed and digitized. The system is configured to facilitate interaction among students and instructors by allowing them to see and hear one another. This feature of TNET simulates face-to-face instruction.

The origination and remote sites were identically configured except for a set, special lighting for the instructor, a multimedia computer to send graphics, a VCR to play videotapes, an audio cassette to play music, and an extra video monitor to preview video from the graphics stand housed only at the origination site. Each site included the following equipment:

- two 35" monitors
- a graphics stand with camera
- a desk-top controller unit
- a PC

TABLE 1

PROJECT PARTICIPANTS

(Partial Listing)

DOD

Office of the Assistant Secretary of Defense
Force Management and Personnel (OASD/FM & P)
Defense Institute for Training Resources Analysis (DITRA)
National Guard Bureau
U.S. Forces Command (FORSCOM)
U.S. Army Reserve Command (USARC)
2nd Army
81st Army Reserve Command (81st ARCOM)
Florida Army National Guard (FLARNG)
U.S. Army Training and Doctrine Command (TRADOC)
U.S. Army Training Support Center (ATSC)
U.S. Army Extension Training Directorate (AETD)
U.S. Army Military Police School
U.S. Army Quartermaster School
U.S. Army Soldier Support Center
Chief, Naval Education and Training (CNET)
Naval Training Systems Center (NTSC)
Commander, Naval Aviation Activities, Jacksonville
Orlando Naval Training Center (NTC, Orlando)
Naval Air Station, Cecil Field, Jacksonville
Headquarters, U.S. Air Force
Marine Corps Combat Development Center

CIVILIAN EDUCATION INSTITUTIONS

University of Central Florida, Institute for Simulation and Training
Florida Community College at Jacksonville
Valencia Community College
St. Petersburg Community College

- a remotely controlled camera
- a unit for encoding and decoding the compressed digitized signal transmitted at 256 kbps.
- an antenna and feedhorn.
- an audio system (including student microphones)

During instruction, students viewed a motion image on one television monitor (e.g., an instructor, or videotape). On the second monitor students saw still graphics (e.g., slides, transparencies, print copies of pages, photographs, illustrations, or computer generated still frames). The instructor used the same set of equipment. On the motion monitor, the instructor saw one selected remote classroom. The instructor could switch among the sites as desired or needed. On the graphics monitor, the instructor saw exactly the same graphics that the students saw. The instructor also had the option of seeing a picture-in-picture (PIP) of what the students were seeing on their motion monitor.

The selected teletraining technology influenced the overall design of the instruction. For example, motion media, such as videotapes, had to be carefully selected to be used effectively over the system, that is, to be compatible with the video transmission rate. In addition, student fatigue can be a problem when training sessions are too long. Care had to be taken to insure a variety of instructional activities were used and that the selected activities met the requirements of the military POI.

Finally, course design was also affected by other factors. These included:

1. Three remote sites, with a maximum of 15 students at each site, were selected for delivery of the instruction for the MOS-awarding courses. (During the final course delivery, TQL was offered at four sites; HazWaste at five sites.) Participating or directing interactive course activities in a classroom with 45+ students is difficult; the problem is compounded in a teletraining mode with the same number or more students divided among several remote sites. Site facilitators were required to assist the course instructor and were trained to perform instructional support roles.

2. The possibility of system failures during course delivery had to be addressed. Contingency plans were required. Thus alternative instructional strategies and activities were designed and developed.

3. Course content and objectives for the MOS-awarding courses had to be consistent with the established military POI to satisfy the course certification and validation processes. Since the POIs had already received formal approval by TRADOC and the respective proponent schools, the task of the project was to reconfigure, not redesign, the courses for use over TNET. Changing objectives or test items was not feasible since this would necessitate a re-certification of the courses. While no formal certification process existed for the special topics courses, these

courses also had to be consistent with established standards and approved for use in the pilot test by the appropriate Navy agencies.

Summary

The purpose of this report is to describe the procedures used to reconfigure five military courses for presentation over TNET. A variety of inputs influenced the design of the course conversion process (e.g., reviews of research literature, site visits, and expertise from several consultants, and the experience and expertise of the project staff). Given a number of constraints, the conversion process was designed using an instructional design model, the Army's Systems Approach to Training (SAT), that was modified for use with TNET. This model enabled community college faculty to design teletraining courses to meet military training needs and requirements.

REVIEW OF LITERATURE

Introduction

One of the key characteristics of good distance education courses is that they be carefully planned and designed. Instructional Systems Design (ISD) is an accepted method for planning and designing educational courses and programs including those for distant learners and sites.

The military services have proposed increasing the use of distance education as a strategy for bringing training to soldiers when and where they need it (McDonald, Weisenford, Fleeton, Kreinger, & Hodak, 1990; TRADOC, 1987, 1989). Among the conclusions of several comprehensive studies on distance education conducted by the military (Bailey, Sheepe, Hodak, Kruger, & Smith, 1989; Bramble, 1990; Bramble & Bauer, 1991, 1992; Harbour, Daveline, Wells, Schurman, & Hahn, 1990; McDonald, et al., 1990; Sheppard, Gonos, Weisneford, & Hodak, 1990) is the finding that distance courses must be carefully designed and must apply principles of learning and instruction to be effective.

Distance education is usually defined as any teaching-learning environment where the learner and the teacher are physically separated. Thus, distance education could include the range of possibilities from print correspondence courses to courses delivered by satellite television. The current interest in distance education results in part from the fact that new communications technologies are available to educators to facilitate interactive instruction for students at remote (distant) locations.

Most distance education systems share the following: (a) communication between the teacher and learners even though they are physically separated, (b) an organization responsible for planning and delivering the distance learning program, and (c) a technology-based delivery system including print, audio, video, or multimedia that carries the content of the instruction to the learner (Batey and Cowell, 1986; Keegan, 1986).

The need for carefully planned distance courses and programs has prompted several authors (Cyrs & Smith, 1990; Gibson, 1985; Jorgensen, 1986; Moore, 1990) to apply the models and principles of ISD specifically to distance education. Jorgensen (1986) made a strong case for using instructional design principles to design distance learning programs when he stated, ". . . but I assert that most of the teleconferences I have participated in were intended to be learning experiences and suffered most from lack of instructional design" (p. 8). Gibson (1985) recommended that distance educators use the work of learning psychologist, Robert M. Gagne, to produce the most effective learning.

Listed below are eighteen heuristics of instructional systems design (ISD) applicable to all types of distance education courses derived from the current research and literature in ISD and distance education (Cyrs & Smith, 1990; Gibson, 1985; Jorgensen, 1986; Moore, 1990). These heuristics can be broken down into several broad categories: course design considerations,

course and instructional management, and personnel. Each of these categories will be addressed in subsequent sections of this review, but are presented here as an overview:

Course Design Considerations:

1. Distance learning requires better planned learning activities, strategies, and media than are required for platform instruction.
2. Distance education programs should be developed using a systems approach including assessing needs, planning strategies, designing objectives, organizing objectives, and evaluating results for redesign.
3. Meaningfulness must be established for the learning tasks.
4. Learners must have the necessary prerequisites for learning to occur. This will add to their motivation and to their success in the learning environment.
5. Communications, presented either by a human or by technology, must be clear and specific. Learning objectives should be clearly stated, important relationships should be shown, and demonstrations should be explicit.
6. Learning must be active with opportunities for learners to respond.
7. Practice should be distributed over time.
8. Instruction should be presented in short segments.
9. Distance delivery systems that use a variety of media or a total learning strategy approach will be most successful.
10. Feedback and reinforcement are essential to successful learning. Alternative routes to reach objectives are desirable.
11. Students need a "mindset" for instruction, e.g., an introduction, an advance organizer, etc. so that they know precisely what to look for during the distance learning program.

Course and Instructional Management Considerations:

12. Structured notes or outlines of the content should be provided; these will serve to guide the students through the content that is covered during the instruction.
13. Students need to be taught how to learn from a distance learning system.

14. Opportunities should be provided for the learner to interact with the teacher, other students, and the instructional materials.
15. The instruction should be humanized by creating an environment that breaks down the distance and facilitates rapport between all the participants in the program -- instructor, students, and site facilitator.
16. Instructional materials should be pilot-tested and validated prior to being implemented.

Personnel Considerations:

17. Instructors and site facilitators need training on how to teach in a distance environment and how to use the technology.
18. A design team, including the course developer, the instructor or presenter, a subject matter specialist, and production and technical personnel must work together for the academic integrity and instructional quality of the final product.

These heuristics for instructional design for distance education are presented here as an introduction to the instructional factors necessary for an effective distance learning course or program. These heuristics have served as useful guidelines for designing the five video teletraining courses for this project. Each one will be discussed in more depth throughout the remainder of this report both in the review of literature section and in the discussion of the procedures used to reconfigure the courseware.

Distance Learning

"In sum, distance education ought to be regarded as education at a distance. All of what constitutes the process of education when teacher and student are face to face also constitutes the process of education when teacher and student are physically separated. . . . The task of distance education is to find means by which to introduce these necessary conditions, or to simulate them so closely as to be acceptable proxies" (Shale, 1988, p. 26).

The application of educational principles to distance education courses is the first and most important consideration when designing distance courses. Shale (1988) and others (Clark; 1983; McCleary & Egan, 1989) argue that it is the educational variables and the design of distance education courses and programs that are important and account for the success of distance education programs, not the distance factor. The fact that education occurs when teacher and learners are physically separated is merely one variation of the myriad ways that education can be conducted.

Moore (1993) contends that distance education programs should be thought of as total systems with many integrated parts that interact with each other. The components "should be thought of as a network of knowledge sources, processors, managers, communication media, and students" (p. 4). A systems perspective of distance education means organizing, or reorganizing, all educational resources into a total delivery system in order to maximize the effectiveness of distance education.

Successful distance education programs can be characterized by a set of factors that fall into two primary categories: organizational and instructional/educational. While the two categories are not distinct, the **organizational factors** relate more broadly to the administration of a distance education program and the particular technology system selected for providing the program. The **educational characteristics** relate more specifically to the design and development of specific courses and programs. These general organizational and educational factors of successful distance education programs are summarized in Table 2.

Educational Characteristics for Distance Education

The research on distance learning breaks the educational characteristics of successful programs into three broad and sometimes overlapping categories: instructional considerations, management of the instruction, and personnel. The omission of a specific technology from the list of educational characteristics mirrors what instructional technologists have long contended; that is, technological delivery systems are merely a means to an end (Clark, 1983; 1989). While new delivery systems may make an educational program more cost efficient, more effective, and may enhance the quality of the instruction, ultimately it is how the instruction is designed and developed to make the best use of the technology, not the technology itself, that is the major factor in successful educational programs and courses. Based on research in distance learning, the important educational variables are listed below. The instructional considerations are similar to some of the heuristics of ISD for distance education presented earlier.

Instructional Characteristics:

1. Distance education programs require instruction that is **more highly planned, organized, and delivered** than traditional instruction. Goals and objectives should be clearly defined. (Atman; 1987; Barker & Platten, 1988; Cyrs & Smith, 1990; Howard, 1987; McCleary & Egan, 1989).

2. **Interaction** is a key element of any educational program. Distance students tend to experience less involvement, less ability to ask questions, and less overall enjoyment of the instruction, even though their performance may not be adversely affected (Ritchie & Newby, 1989; Willis, 1989). Therefore, distance education programs must strive to provide as much interaction between the students and the instructor, among the students, and between the student and the instructional materials as possible to increase student satisfaction and learning (Moore, 1989; Stoffel, 1987). Group activities, asking and answering questions, and taking notes are ways of increasing interaction.

TABLE 2

**ORGANIZATIONAL AND EDUCATIONAL FACTORS
FOR SUCCESSFUL DISTANCE EDUCATION PROGRAMS**

ORGANIZATIONAL FACTORS:

- An identified set of needs
- Initial capital and sustained funding
- Start small, expand with experience and acceptance
- Cooperative ventures among various agencies at different levels
- Careful planning including well-organized management and programmatic support
- Staff development and in-service training for:
 - the technology
 - educational applications of distance education

EDUCATIONAL FACTORS:

- Application of current educational theory and practices
- Use of multimedia programs
- A motivated, energetic, and knowledgeable instructor
- Methods of facilitating student interest and involvement
- Methods of involving the learner with:
 - other students
 - the instructor
 - the educational materials

Note. Condensed from Batey & Cowell, 1986; Bramble 1990; OTA, 1989.

3. Providing appropriate **instructional feedback** to learners at a distance is of critical importance to insure that student learning outcomes are achieved and that students have positive perceptions of the instruction (Howard, 1987; McCleary & Egan, 1989; Stoffel, 1987). Feedback should be designed to take into account the type of objective being taught, whether the feedback is given during practice or after evaluation, and whether immediate feedback is appropriate for the task. Feedback should be used frequently and in varied format for all distance courses.

4. The use of **advance organizers, overviews**, and other devices designed to orient distance learners to the learning task is needed in all distance education programs (Marland & Store, 1982).

5. **Motivation** is an important element in any distance education program. Students must often immerse themselves in the instruction and provide their own intrinsic rewards (Atman, 1987). The provision of immediate feedback is one way to enhance motivation. Two-way communication with distant students also enhances motivation and student enjoyment of a course (Holmberg, 1983). Quick pacing keeps students interested and focused.

6. **Course characteristics** affect student performance in distance education courses. One study (Diehl, 1987) found that longer courses are problematic for distant learners and length should be a major consideration in course construction. Similarly, courses with multiple segments should be presented with shorter segments first, longer segments toward the end of the course (Willis, 1989).

Personnel: Setting up and organizing a distance education program takes a myriad of personnel with a variety of different skills. There are staff at the organizational or institutional level, instructional and course development personnel, technical installers and operators, and remote site personnel. While each has an important function to perform, in this section we address only the four key personnel directly related to instruction.

1. **Course developers** are those who either (a) take an existing course and redesign it for distance education or (b) design a new course. They must synthesize the principles of learning and instructional design, distance education, and the specific technology into an effective and efficient course (McCleary & Egan, 1989).

2. The importance of the **instructor** in a distance education program cannot be overemphasized (Batey & Cowell, 1986; Bradshaw, 1989; Chute, Bathazar, & Poston, 1988; Cyrs & Smith, 1990; Office of Technology Assessment (OTA), 1989; Shale, 1988). Good teaching is good teaching wherever it occurs and good training is essential to good teaching. Distance instructors often require new or refined skills for distance teaching. Some of these skills are: (a) understanding the basic principles of learning theory, (b) ability to organize and manage the learning environment and the materials, (c) ability to manage course structure, (d) subject matter expertise, (e) ability to project themselves and their personality into the teaching, (f) a knowledge of and the ability to use the delivery technology and (g) effective presentation

skills including questioning strategies, use of student involvement activities, appropriate pacing of the lesson, providing appropriate feedback, and motivating students.

3. The **site facilitator** is another key figure in a distance education program (Batey & Cowell, 1986; Cyrs & Smith, 1990; OTA, 1989). How the facilitator works with the instructor influences the style of the instruction and also affects its success. Cyrs and Smith (1990) state that a facilitator's role falls into two categories: secretarial/administrative/technical and academic/tutorial. Facilitators need to be prepared to direct and manage the students, the classroom, and the technology by: (a) presenting or facilitating classroom activities, (b) troubleshooting the equipment, (c) providing remediation and make-up instruction, (d) evaluating students, and (e) performing a variety of record keeping tasks.

4. A **technical or systems manager** at the origination site and at each remote site are the final key players in presenting a successful distance education program. Depending on the situation, this person can be an engineer, an administrator, someone from an instructional resources center, television, or production facility, or at the remote site, the facilitator can perform this role. As Willis (1989) states, there *will be* technical problems. These problems can stall a system for hours, even days, delaying the instruction and frustrating the students and instructional personnel. Whoever is responsible for insuring that the system is operative must be ready at a moment's notice to provide technical assistance.

Management/Organizational Factors: These factors relate to managing and organizing the instruction, not the broader management issues of distance learning programs previously listed in Table 2.

1. One of the key management factors is **how to quickly and efficiently respond to student questions and how to provide fast and immediate feedback** (Stoffel, 1987). While there are some technological means, such as audio and video feedback and facsimile machines, to facilitate responses to students and to provide corrected student work, additional means should be developed by each distance program.

2. There are a number of factors in this category related to **humanizing or personalizing** the instruction for the learners (Batey & Cowell, 1986; Moore, 1990; OTA, 1989). Such considerations as getting to know the students and letting them get to know the instructor, treating students as much like you would students in a non-distance setting, asking students at each site to respond, and possibly even making a site visit to each remote site are ways to personalize the instruction (Willis, 1989).

3. **Contingency plans** must be made in the event there are equipment failures. Willis (1989) states that technical problems will occur when using technology. It is important to be prepared for this and to have instructional contingencies planned.

4. Typically, **it will take longer to present a course in a distance education mode** than in the traditional education mode (Willis, 1989). Care must be taken not to rush through the

content. Students must also be given adequate time to respond to questions and to interact with the instructor and other students.

5. **Student record keeping procedures** that are manageable and not greatly time-consuming need to be developed (Batey & Cowell, 1986).

6. Opportunities must be provided for instructors to **communicate with site facilitators** (Batey & Cowell, 1986; OTA, 1989). Instructors and site facilitators are key instructional personnel. They must discuss the success of the program, whether changes need to be made, how to help students who need it, plus issues related to evaluation, the equipment, etc. A plan for promoting interaction between them is needed in every distance education program.

7. **Scheduling instruction** is also a major factor in distance programs (Batey & Cowell, 1986). Some of the key factors related to this are establishing lines of responsibility and authority, scheduling classes and staff, managing program changes and updating content, cooperating with technical and remote site personnel, and supervising students.

8. **Certifying and accrediting** new types of programs and instructors is required of many distance education programs (Batey & Cowell, 1986). Distance programs may not be considered *business as usual* by any one of a number of people or organizations. Coordination of disparate groups and formalizing agreements with key units may be a major organizational factor at the instructional level.

Summary

Distance education is broadly defined as instruction presented when the teacher and the learner are physically separated. Successful distance education programs can be characterized by a set of organizational and instructional factors. Several conclusions can be made:

1. The quality of course design is as important, if not more so, than the technology.
2. Interaction, student involvement, and providing feedback are crucial to an effective program.
3. Without effective teachers, distance education courses are doomed to failure.
4. Instruction must be personalized and students must be motivated to get the most out of a distance education program.
5. Equipment failures occur. Contingency plans must be prepared.
6. There are a number of organizational and record keeping functions that must be performed. The site facilitator often handles some of the responsibilities.

Instructional Design

Overview of Instructional Design

Instructional systems design (ISD) is an approved method for developing good educational programs; it can be used to plan effective distance education courses, programs, and systems. ISD, as defined by Briggs (1977), is "the entire process of analysis of learning needs and goals and the development of a delivery system to meet the needs" (p. xx). Briggs includes in his definition the development of instructional materials, tryout and revision of instruction, and learner evaluation strategies. Romiszowski (1981) states that ISD must include three main characteristics: the presence of precise goals and objectives, careful preplanning, and testing out.

ISD is based on and grounded in learning and instructional theory, primarily the behavioral and information processing theories. The fundamental application of behavior theory to instructional design is the reliance on behavioral objectives and criterion-referenced testing (Richey, 1986).

Information processing theory has been used extensively by Robert M. Gagne, a noted educational psychologist, to design a theory of instruction applicable to ISD. In his book, *The Conditions of Learning* (Gagne, 1985), he makes two points of particular interest to instructional designers. First, he maintains that there are five different categories of human capabilities -- the learning of (a) verbal information, (b) intellectual skills, including the categories of concepts and rules, (c) motor skills, (d) attitudes, and (e) cognitive strategies. He maintains that different instructional strategies are required to promote learning in each of the five categories. Gagne refers to these different strategies as the **conditions of learning**. These conditions govern the occurrence of learning and remembering and promote a change in learner performance. Table 3 gives an example of a different instructional strategy used to promote each of the five types of learning.

Second, Gagne contends that internal processes of learning occur in phases, i. e., attention, expectancy, retrieval, selective perception, encoding, responding, reinforcement, and retrieval. During learning, instructional events must be designed for each learning phase in order for instruction to be successful. He refers to these as the **events of instruction** and states that instructional designers must carefully develop instruction to take into account these events (See Table 4).

In summary, ISD is a process that can be used to design effective distance learning courses and programs. It is based on behavioral and information processing theory. The key aspect of behavioral theory used by instructional designers is the specification of behavioral objectives and criterion-referenced testing methods. Gagne (1985) has made two important applications of information processing theory to ISD: the conditions of learning and the events of instruction. Gibson (1985) has stated that both the conditions of learning and the events of instruction are important concepts that should be included in the design of any distance learning program.

TABLE 3

| CONDITIONS OF LEARNING FOR FIVE CATEGORIES OF OUTCOMES | |
|--|---|
| <u>Learning Outcome</u> | <u>Instructional Technique</u> |
| Intellectual skill | Give varied concrete examples of concept or rule |
| Cognitive strategy | Provide verbal description of strategy, followed by example |
| Verbal information | Elaborate content by relating to larger bodies of knowledge; use images mnemonics |
| Attitude | Human model describes or demonstrates action choice, followed by observation of reinforcement of model's behavior |
| Motor skill | Continued practice |

Note: Taken from Gagne (1985).

TABLE 4

| THE EVENTS OF INSTRUCTION | |
|-----------------------------------|--|
| <u>Learning Process</u> | <u>Instructional Event</u> |
| Attention: Alertness | 1. Gaining attention |
| ↓ | |
| Expectancy | 2. Informing learner of the objective; activating motivation |
| ↓ | |
| Retrieval to Working Memory | 3. Stimulating recall of prior knowledge |
| ↓ | |
| Selective Perception | 4. Presenting the stimulus material |
| ↓ | |
| Encoding: Entry to LTM Storage | 5. Providing learning guidance |
| ↓ | |
| Responding | 6. Eliciting performance |
| ↓ | |
| Reinforcement | 7. Providing feedback 8. Assessing performance |
| ↓ | |
| Cueing Retrieval | 9. Enhancing retention and transfer |

Note: Taken from Gagne (1985, p. 304).

Instructional Design Models

The purpose of a model is to abstract and simplify a specific referent system (Hayman, 1974). In the case of instructional design models, the primary purpose is to describe, predict, or explain effective instruction. That is, if the activities of the instructional design model are followed, the intended learning will or should occur.

In their review of over 40 models of instructional design, Andrews and Goodson (1980) observe that models come from industry, military, education, and a variety of other sources. A key characteristic of any ISD model is that it must be grounded in **general systems theory**. This means that the components of the model are interdependent and interrelated and a change in one component requires a concomitant change in the other components.

Andrews and Goodson list 14 common components that are necessary for effective instructional design and should be included in all ISD models (p. 5):

1. Formulation of goals and objectives stated in observable terms
2. Development of a pretest and posttest matching the goals and subgoals
3. Analysis of the goals for types of learning/skills required
4. Sequencing goals and subgoals to facilitate learning
5. Characterization of the learner population
6. Formulation of instructional strategy to match subject matter and learner requirements
7. Selection of media to implement strategies
8. Development of courseware based on strategies
9. Empirical tryout of courseware with learner population, diagnosis of the results, and courseware revision
10. Development of materials and procedures for installing, maintaining, and periodically repairing the instructional program
11. Assessment of need, problem identification, occupational analysis, competence, and training requirements
12. Consideration of alternative solutions to instruction
13. Formulation of system and environmental descriptions and identification of constraints
14. Costing instructional programs

One of the major problems that instructional designers face when selecting a model to use is the proliferation of ISD models. Andrews and Goodson suggest that users select a model that matches their context and is firmly grounded in systems theory. While the authors do not endorse any particular model, they do state that the models reported by Bishop (1976), Briggs (1975), Briggs and Wager (1979), Gagne and Briggs (1974), Roberts (1978), Scanland (1974), and Teague and Faulkner (1978) provide enough information and data that potential users can apply them as they were intended.

Systems Approach to Training. The instructional design and development model used by the Army is the Systems Approach to Training (SAT) (TRADOC, 1988). (Figure 1). TRADOC states that the SAT is applicable to all training developed or conducted in any Army institution or unit whether it is individual or collective, resident or nonresident, active or reserve component, peacetime or mobilization. The basic goal of Army training is to develop the skills, knowledge, and attitudes of its military and civilian personnel. It is intended that the application of the SAT will result in soldiers with the knowledge, skills, and attitudes to win on any battlefield (TRADOC, 1988).

The SAT is a systematic training process that prescribes policies for the development of training programs and materials. The SAT is an orderly process for gathering and analyzing performance requirements and responding to identified needs. There are five interrelated and interdependent processes or phases of the model: Evaluation, Analysis, Design, Development, and Implementation. In addition, the model is characterized by feedback loops among the phases. Use of the model should result in effectively and efficiently determining who, what, where, when, why, and how tasks should be taught.

The SAT model, with its five phases and multiple subcomponents, plus the management system that supports it, is an instructional design model that is based on systems theory. It includes the 14 common components outlined by Andrews and Goodson (1980). While it is not readily apparent from TRADOC Reg 350-7 (TRADOC, 1988) whether or not the SAT is grounded in a particular theory of learning or instruction, nor whether the model has been formally validated, the SAT has had widespread use (Knirk & Gustafson, 1986). Coupled with instructional design principles grounded in learning theory and applied to distance learning, the SAT appears to be a valid and useful instructional design model adaptable to this project.

Media Selection, Design, and Use

One of the components of all ISD models is the selection, design, and use of media to support the instruction. In the SAT model media selection occurs in the Development Phase. Because distance learning programs are highly dependent on media for their success, an understanding of media selection criteria is important.

Researchers have often attempted to determine if a particular medium is best suited to teaching various types of behavioral objectives. Typically the results have not been definitive (Reiser & Gagne, 1983; Wilkinson, 1980). That is, when two or more media are used to present instruction, students often learn equally well from either or any of them. There have been a number of reasons given for these rather consistent findings: (a) the research has been poorly conducted, (b) the wrong questions have been asked, or (c) the research reflects the actual situation, i.e., there is no one best media (Reiser & Gagne, 1983). Gagne (1970) has even stated that "most instructional functions can be performed by most media" (p. 364). Clark (1983) concurs, but also states that the wrong questions have been asked in the research. He contends that it is the instructional design elements incorporated into an instructional program that are

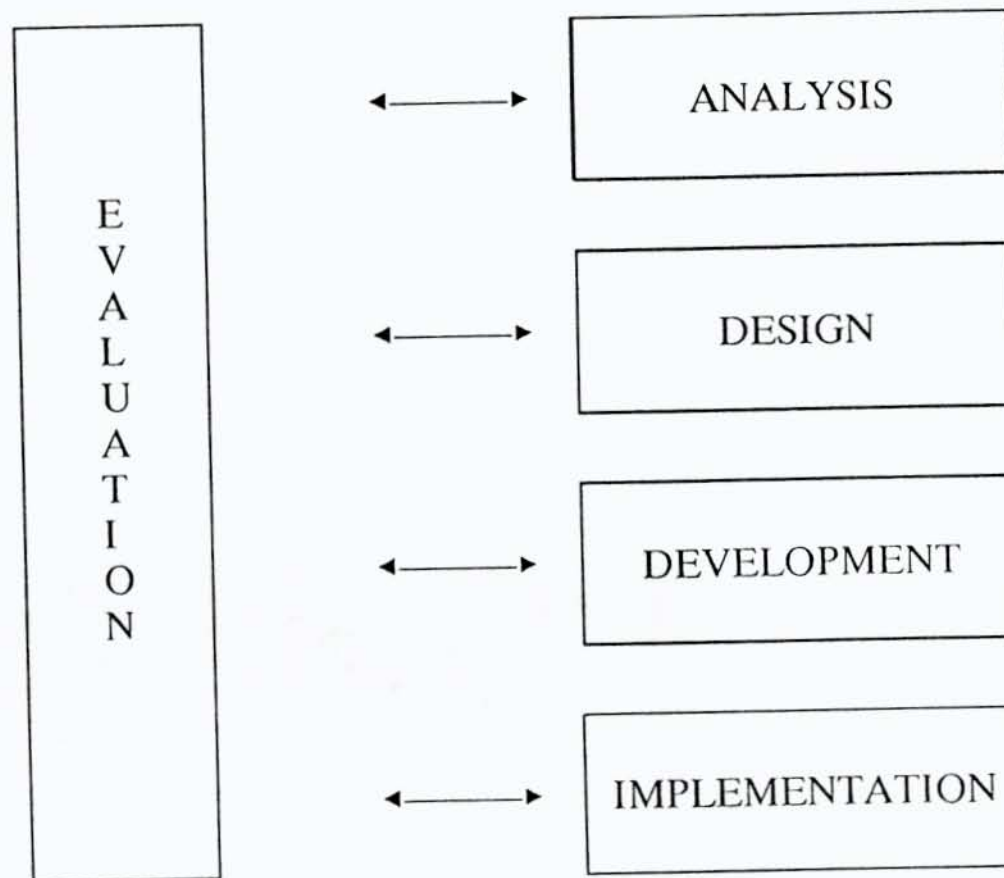


Figure 1: Systems Approach to Training Model (SAT)

important when comparing different media, not the media themselves. The media are simply delivery devices.

Although a major contention of instructional media theorists is that there is not one best media for a given objective, Schramm (1977) states that this does not mean that one medium may not be more useful than another in a given situation. For example, given a specific group of learners, and a specific objective or set of objectives, various media may differ in terms of their instructional effectiveness. Based on that premise, a number of media selection models have been developed.

Media Selection Models

Media selection models usually appear in one of three formats: flowcharts, matrices, or worksheets. All are intended to be decision-making models. Reiser and Gagne (1983) state that the flowchart models are typically easiest to use. These models assist the user in narrowing down the choice of appropriate media from which to select.

Media selection models usually require the designer to consider three different factors: (a) the physical attributes of the media, e.g., sound, color, (b) the learner, setting, and task characteristics, e.g., reading ability, classroom size, and (c) practical factors, e.g., cost. These factors are summarized in Table 5.

One of the media selection models used by the military is a flowchart model, the Media Elimination & Design Intelligent Aid (MEDIA) Version 2.1 (TRADOC, 1990b). The model is computer based and is intended to provide media recommendations based on the task, the learners, the environment, type of interaction, equipment required, facilities, etc. The manual states, "The MEDIA system does not try to produce a single best medium. . . . Studies indicate that even media experts will often disagree as to the one best medium for teaching a specific objective. . . . MEDIA is designed as an aid to the training developer. MEDIA provides recommendations to training developers who then utilize their own expertise and knowledge to make their final selections which they will recommend to the training manager for review" (TRADOC, 1990b, p. 2).

Since most experts believe that no one best media can be selected for a particular learning task, it is useful to understand principles of media selection and use that relate directly to particular systems. Romiszowski (1988) states that media must be selected within the context of instructional systems design. It is not so much which medium is used, but the way it is used and for what purpose that determines its effectiveness.

Illustrations, Graphics, and Audio Visual Packages

The teletraining system being used in this project, TNET, simulates conventional classroom instruction by using two-way audio and two-way video interaction among instructors

TABLE 5

FACTORS IN MEDIA SELECTION

Physical Attributes

- Includes the attributes of the media: audio, visual, color, sound, and motion capabilities.
- Rule of thumb: If a learning task is dependent upon a particular attribute of a medium, then that medium should be employed.

Learner, Setting, and Task Characteristics

- Learner: Characteristics such as reading ability, age, gender, ethnic or racial group, physical or mental handicaps, etc.
- Setting: Characteristics include aspects such as group vs. individual instruction, classroom size, number of students, personnel, etc.
- Task: The type of learning outcome to be trained, e.g., concept, rule, attitude, etc.
- Rule of thumb: Media should be selected after it has been determined that the media can support a particular event of instruction.

Practical Factors

- Includes things such as cost, equipment availability, and convenience.
- Rule of Thumb: The first and most important consideration when selecting media must always be that the media promote the desired learning outcome.

Note: Condensed from Reiser & Gagne (1983).

and learners. The instructor is presented *live*, in real time, by a technology delivery system. The instructor can also use a wide variety of media with the system (see Table 6). Because graphics can be used extensively, the principles related to selecting and using graphics and other visuals are very important. In general, illustrations and graphics can aid in the comprehension and recall of information when they present essential information. They are best when they are simple rather than complex and when they reinforce the ideas in the text or presentation.

Audio-visual packages refer to courses or programs that use a combination of media or a media mix, to present or reinforce instruction. TNET can be thought of as an audio visual package because of its capability to use combinations of media. Audio-visual packages are most effective when high quality visuals are used to highlight important information, when the information to be learned is presented in small segments, and when learners are guided through the material with overviews and summaries.

Specific principles for the effective use of illustrations are summarized in Table 7, graphics in Table 8, audio-visual packages in Table 9. These principles can serve as useful guidelines for designing a distance learning course using TNET.

Television, Video, Interactive Television

The key finding from the research on television, video, and interactive television is that students can and do learn from these media. In a major study by Chu and Schramm (1967), *Learning from Television*, the authors stated, "The effectiveness of television has now been demonstrated in well over 100 experiments, and several hundred separate comparisons, performed in many parts of the world, in developing as well as industrialized countries, at every level from pre-school through adult education, and with a great variety of subject matter and method" (p. 1).

Interactive television, also known as two-way interactive television and video teletraining, is an application of distance education presented via a two-way audio and two-way video system. Using a myriad of media--print, audio, video, computers, supplemental technologies (e.g., the telephone and facsimile machine), and off-line equipment (e.g., video players)--provides instructors and students with a means for communicating and learning that may be almost as good as being there.

At the core of interactive television is the concept of interactivity. Interactive television is defined by the fact that good instruction, whether it is presented in a classroom or at a distance, stresses interaction among the participants in the teaching-learning process. Moore (1989) states that there are three primary types of interaction: student to teacher, teacher to student, and student to student. Each type should be planned for during instruction. Stoffel (1987) also states that student interaction with the instructional materials leads to positive outcomes in satisfaction and achievement. Some investigations have shown that in classrooms with higher levels of interaction, students have higher levels of achievement and more positive attitudes (Ritchie & Newby, 1989).

TABLE 6

| Media Possibilities with TNET | | |
|-------------------------------|--------------------|---------------------------------|
| <u>Motion Media</u> | <u>Audio Media</u> | <u>Still Media</u> |
| Instructor | Audio Tape | Slides |
| Film | | Photographs |
| Videotape | | Transparencies |
| Computer-generated animation | | Print copies of Pages |
| | | Illustrations |
| | | Computer generated still frames |
| | | Charts |
| | | Maps |
| | | Cartoons |
| | | 3-D objects |

TABLE 7

PRINCIPLES OF MEDIA SELECTION: ILLUSTRATIONS

- Illustrations that provide *text-redundant information* will increase learning. Pictorial embellishments not related to content will not enhance learning.
- Relevant illustrations can *aid in comprehension, recall, and transfer of information*.
- Illustrations can sometimes be *effective substitutes for words or ideas*. Photographs, diagrams, drawings, maps, and other visual forms can carry some kinds of information more effectively than words.
- *Complex illustrations may not be used effectively* if they are not brought to the learners' attention and if learners are not prompted to use them appropriately.
- Illustrations are a good change of pace and often *increase motivation and facilitate positive attitudes* toward the instruction.
- Illustrations may be especially *helpful for poor readers*.
- It is better to *provide a good illustration than to ask learners to design one*.

Note: Condensed from Levie & Lentz (1982).

TABLE 8

MESSAGE DESIGN PRINCIPLES: GRAPHICS

- Include *only essential information* in graphics; eliminate extraneous information.
- *Link new information* with what students already know.
- Use *short concise statements* at an *appropriate reading level*.
- Use *active language*.
- Use *bullets, numbers, or white space* to separate and focus attention on key ideas and words.
- *Simplicity* is very important in graphs and diagrams for instructional use.
- *Complex diagrams should be built in stages* over several figures.
- *Do not use diagrams that have no real function* as they do not enhance understanding or motivation.
- *Limit the number of points to be made* in a visual employing words.
- Use *key words*, not sentences.
- List items in *columns*.
- Research shows that *color creates interest* and that people prefer color to black and white.
- Use *color and highlighting to emphasize* relevant cues, to emphasize important information, and to make distinctions in content.

Note. Condensed from Romiszowski (1988). Visual design principles such as letter size and composition are not included here because they are typically dependent on a specific technology.

TABLE 9

MEDIA DESIGN PRINCIPLES: AUDIO-VISUAL PACKAGES

- Use a logical organization and *divide complex information into small units*.
- Provide clear *summaries, overviews, introductions*.
- Use *visual and verbal cues plus repetition* to emphasize key points.
- Be sure the *visual and verbal messages* are communicating the *same message*.
- Use *familiar examples* and the *learners' point of view*.
- Use *questions to increase motivation and involvement*.
- Use *variations in size, color, shape, and brightness* to attract attention, hold interest, and emphasize important material.
- Use *moderately complex* rather than very simple or very complex **visuals**.
- *High quality graphics and visuals can increase the expectation that the materials being presented is important.*
- When using a film, videotape, or audiotape as a component of an AV package, *introduce the media to the learners, direct their attention to what is important, and provide a summary or follow-up after the presentation.*

Note. Condensed from Romiszowski (1988).

Interaction during instruction delivered using VTT must be carefully planned because distance students tend to experience less involvement, less opportunity to ask questions, and less overall enjoyment of the instruction, even though they may perform the tasks required of them adequately (Ritchie and Newby, 1989; Willis, 1989). During the design and development of the instruction, opportunities must be provided that encourage and facilitate students asking and responding to questions, participating in group activities, discussing ideas, and taking notes.

Cyrs and Smith (1990) endorse the use of an interactive study guide with word pictures to ensure that students are involved in the learning process when taking a teletraining course. Word pictures are graphic representations of the content with key words omitted; students fill in the important points as the instruction progresses. (See Figure 2 for an example).

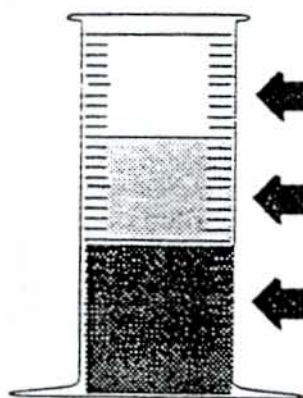
No research exists that specifies how extensive note taking can or should be during teletraining. While it may be important for students to be actively involved in learning by writing down key points as the lesson proceeds, it is also important to remember that students can only do so much while engaged in televised instruction. Heinich, Molenda, and Russell (1990) state that students should not be asked to take more than an occasional note. Romiszowski (1988) states that in order to effectively use television and film students should be briefed and debriefed about what to look for in the program. Regardless of whether note taking is used when a television, film, or video sequence accompanies classroom instruction or whether it is used during video teletraining, it is important to remember that if students take extensive notes while participating in a television program they are bound to miss some of what is said. The word picture concept was designed to promote active learning, facilitate some notetaking while providing a complete set of student notes, and at the same time reduce the possibility that students would miss important content.

Another key factor for successful video teletraining is that instructors must involve and motivate learners. Cyrs and Smith (1990), in their book, *Teleclass Teaching: A Resource Guide*, list a number of different activities and strategies for presenting content and involving learners. Some of the most common strategies presented by Cyrs and Smith (1990), Ostendorf (1991) in her book, *The Two-Way Video Classroom*, and the Defense Language Institute (1992), *Video Teletraining Strategies* are: visualized lecture, interview, panel discussion, physical or visual demonstration, case study, role play, brainstorming, reading, answering written or oral questions, on-line discussion, off-line discussion, instructional games, theatrics, and multimedia presentations, such as watching a videotape or slide presentation.

Effective teletraining courses are similar to other effective distance education programs. Among other things, they must be well-designed, provide opportunities for interaction and involvement, make good use of visuals, and be media based. The principles specified in Tables 7, 8, and 9 are applicable to the design of interactive television courses. Because the principles for designing successful video teletraining courses are similar to the design principles for other types of distance learning already discussed, Table 10 is included to summarize the components for successful VTT programs and courses.



Specific Gravity (S.G.)



← S.G. < 1

← (S.G. = 1)*

← S.G. > 1

methylene chloride



Specific Gravity and Spills

- Oil
- Specific gravity < 1
- Not water (soluble)*
- Can spread great distance on (surface)* of water
- Deadly to water fowl

*Student fills in word as shown on the screen graphics.

Figure 2: Example of a Word Picture

TABLE 10

PRINCIPLES FOR DESIGNING EFFECTIVE VIDEO TELETRAINING COURSES

- Teletraining course typically require *much more detailed pre-planning* than traditional courses. Student activities and strategies, including the questions that will be asked, must be pre-planned for maximum effectiveness.
- *Instructors for a teletraining course may provide the highest rate of return* of any investment that can be made for a telecourse, and they require considerable training and practice to be effective.
- Instructors in a teletraining course must *intentionally initiate interaction with students* at the distant sites.
- The *provision of feedback* to students is crucial in developing instructional programs using two-way interactive television.
- *A student study guide should be provided for students.* The intent of the study guide is to focus the learners' attention on important information presented in the materials and also to keep the learners motivated.
- *Visual materials must be used to support the presentation.* Use of visuals will improve learning and motivate students. Visuals should be specifically designed to make the best use of the technology being used.
- Teletraining courses must be *designed to be appealing/motivating* to the learners.
- Care must be taken to *humanize the instruction* when it is presented via two-way interactive television. It is easy to make "second class" citizens out of the learners by not involving them or speaking directly to them through the camera.
- *Clearly defined roles and responsibilities for the site facilitator* must be given.

Note. Condensed from Barker & Platten, 1988; Bramble, 1990; Chute, Balthazar, & Poston, 1988; Cyrs & Smith, 1990; McCleary & Egan, 1989; Ostendorf, 1991.

Summary

Media selection is typically a process of narrowing down a list of possible media to suit a particular learning task, students, and environment. In general, there is not one best medium for a given task. However, media can be selected based on the physical attributes of the media, the characteristics of the task, learners, and setting, and on some practical factors such as cost and availability.

Research has shown that there are important principles of media design, selection, and use that make a given medium effective. For example, illustrations and graphics should reinforce the verbal or oral message, complex graphics should be broken down into digestible units, graphics should be logically organized, and well designed visuals can be used to attract attention, motivate learners, and highlight important information. In addition, the research has shown that learning is possible via television. However, students should not be asked to take extensive notes at the expense of attending to the televised presentation.

Teletraining Research in the Military

Recent interest has been shown by the military in methods of distributed training, i.e., courses of instruction packaged for delivery at remote locations, including video teletraining. The primary purpose of proposing to increase the use of teletraining is to enable the military services to train soldiers when and where they need it. TRADOC (1990a) states that the goals of a distributed training strategy are to "increase training opportunities, improve the quality of instruction, increase standardization, and reduce the time soldiers spend away from their units" (p. 2-16).

Two of the key reasons for reliance on a distributed training strategy are (a) the importance and size of the reserve component (RC) and (b) dwindling resources. It is estimated that the RC constitutes more than half of the Army's combat arms units and more than two-thirds of the Army's combat support and combat service support units (TRADOC, 1990a). These soldiers must be trained to active component standards, yet they do not train on a daily basis. Training must be developed to meet both the Army's needs and the time frames available to train RC soldiers.

The need for cost effective solutions to training has prompted the military services, industry, and academics to research several different distance education strategies, including audio teleconferencing, computer-based teleconferencing, and video teleconferencing. While the research is in its infancy and many of the studies have limitations, researchers have drawn two primary conclusions: (a) students typically do as well on learning outcomes using these methods as they do when taught by conventional methods and (b) student satisfaction is equal or higher than classroom instruction (DeLoughry, 1988; Fahl, 1983; Grimes, Neilsen, & Niss, 1988; Keene & Cary, 1990; Kruh, 1983; Partin & Atkins, 1984).

The need to find cost effective and efficient learning strategies has led to conclusions about what technologies are viable and effective, what courses should be selected for video teletraining, and what variables are key when designing distance learning courses. This review will revolve around these issues.

What Technologies are Viable and Cost-effective?

Both the Navy and the Army have used video teletraining to provide faster, more efficient, and more cost effective training. TRADOC (1987) supports the use of VTT and maintains that it is both an effective and cost efficient method for presenting instruction to RC forces.

The Army has two VTT systems, the TRADOC Satellite Education Program at the U.S. Army Logistics Management Center (ALMC) at Fort Lee, VA and the TNET system operated by the Army Extension Training Directorate (AETD) at Fort Eustis, VA. The systems are different in that the former uses one-way, full motion analog video and the latter uses two-way, compressed digitized video. *Training Strategies for the 90's* (TRADOC, 1991) summarizes the studies that have been done on the two systems and states that both are cost and learning effective. The reports states, "VTT appears to be the solution to a myriad of problems involved in sustaining a well-trained force."

The U.S. Navy CNET Electronic Schoolhouse Network (CESN) at the Fleet Combat Training Center, Atlantic (FCTC,LANT) located in Dam Neck, VA, also uses compressed digitized video, however, it is only one of the VTT configurations the Navy has experimented with (Maloy & Perry, 1991). CESN interconnects major fleet training facilities, e.g., schoolhouses, rather than distributing training over a widely dispersed network.

The Naval Training Systems Center (NTSC) has conducted a series of studies that address different aspects of VTT (Bailey, et al., 1989; McDonald, et al., 1990; Sheppard, et al., 1990). In general, they conclude that VTT is a viable alternative for providing high quality and cost effective instruction to distance learners.

In addition to VTT, the military services have developed and used computer-based technologies for distance education. SMART, System for Managing Asynchronous Remote Training, was one of the successful systems developed to provide computer-mediated instruction to reservists (Harbour, et al., 1990).

What Courses Should be Selected for Video Teletraining?

The Naval Training Systems Center (NTSC) developed a course selection model for Navy video teletraining (McDonald, et al., 1990). The major recommendations from this study were: (a) select courses that have a high potential for savings, e.g., courses with high throughput and short duration, (b) an extensive review of each course should be conducted before selection to insure that there is an appropriate mix of lecture and laboratory, equipment usage, and

curriculum modification requirements, (c) courses that are equipment intensive should be avoided, and (d) courses that require substantial curriculum modification should be avoided because they are very labor and time intensive and may not be cost effective.

One reason the Navy's CESN two-way audio and video teletraining network in Dam Neck, VA has been found to be both cost effective and efficient is because of appropriate course selection (CNET Handout, 1992). System utilization has increased from 46% in 1989 to 90% in 1992. The factors that have raised the utilization rate are delivery of teletraining courses that:

1. are single sited (delivered from a single schoolhouse and only presented via CESN)
2. have high demand (throughput)
3. average about one week in length, and
4. are designed primarily to address cognitive rather than psychomotor skills.

What are the Key Design Variables for Distance Learning Courses?

Studies conducted by the Army and the Navy conclude that distance education courses typically require more extensive planning than platform instruction. Haarland and Newby (1984) state that the increases in student performance and satisfaction found in the research may be due to improved course design and teaching performance rather than as a function of a specific technology. TRADOC endorses the systems approach to training for the design of courses and states that effective course delivery must take into account proper management of the design, resourcing, development, production, distribution, and evaluation of VTT programs.

In a comprehensive review of the literature on computer-mediated communications (CMC), Wells (1990) for the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI-Boise) discussed the factors relevant for an instructor and course designer in a distance learning environment. She states that (a) students and instructors must be provided with an orientation to CMC in order for a program to be effective, (b) instructors must play a motivational and facilitative role, including maintaining personal contact with students, (c) students must be provided with consistent and regular feedback, and (d) interaction with other students typically has a positive effect on completion rates and performance.

In addition, Wells (1990) in discussing a particular distance education approach, states that (a) topics which lend themselves to discussion rather than rote memorization are best, (b) the first unit of a course should not be too long or more difficult than later units, (c) using a variety of media is important, (d) completion rates are generally higher when the instructor rather than the student sets the schedule and pace, and (e) a successful CMC class is not dependent upon any face-to-face meetings.

In a discussion of course design issues for VTT, NTSC (Bailey, et al., 1989; McDonald, et al., 1990; Sheppard, et al., 1990) concluded the following: (a) the role of group dynamics is very important in VTT, (b) student involvement activities need to be carefully structured, (c) lecture segments should not exceed 20 minutes, (d) visual aids must be adapted for television viewing, and (e) careful planning is required to handle student questions and discussions.

Because military projects are often large, management issues when using VTT are of utmost importance. Maloy and Perry (1991) address the policy and management issues of a large Navy project. They found that a large teletraining project requires a team approach. Some of the key team members to be included are an educational specialist (e.g., an instructional designer or evaluation expert), engineer, budget analyst, audio-visual specialist, security specialist, researcher/analyst, resource sponsor specialists (to provide support at the highest level), and representatives from civilian personnel, fleets, training command, and reserves.

Findings from TNET Studies

Several comprehensive studies have been conducted using TNET, the system selected for this project. A number of these have been conducted in conjunction with the Defense Language Institute Foreign Language Center (DLIFLC) (Bramble, 1990; Bramble & Bauer, 1991, 1992).

DLIFLC investigated the use of Computer Assisted Study (CAS) and Video Teletraining (VTT) to address the language training needs of practicing military intelligence (MI) linguists. Three types of training technology were employed: CAS, VTT, and combined CAS/VTT. Bramble and Bauer (1992) make the following general conclusion, "the pilot tests demonstrated the potential of the CAS and VTT technologies to provide outstanding resources for on-site training for military linguists" (p. 103).

The findings from the DLIFLC German pilot test (Bramble & Bauer, 1991) are indicative of the general findings regarding TNET when it is used for linguists training:

1. VTT courses must be carefully preplanned and designed.
2. Adequate training for site facilitators and instructors was necessary. This included both training in the technology, in new instructional techniques, and for on-camera teaching.
3. The equipment and communications links were sufficient to support VTT training. However, contingencies were needed in the event of equipment failures.
4. Army National Guard MI linguists met the instructional objectives.
5. Participants were highly satisfied with the superior quality of the course and the instructors. They judged the course to be interesting and motivating.

6. The media available with the system provide an excellent media mix for language instruction.
7. The accessibility of the training to students was high.
8. Results indicated that VTT has the potential to support nonresident military language training.

Another major study involved TNET instruction for the Basic Noncommissioned Officer Course (BNCOC) Common Leader Training. This course was designed and delivered to the Kentucky Army National Guard. The purpose of the study was to determine if VTT was as effective as traditional instruction for the reserve components. The course was designed using the word picture approach (Cyrs & Smith, 1990). One goal of the program was to foster interaction between the instructor and students and to use a variety of interactive and highly participative techniques, such as group exercises and role-plays. The POI and tests were the same for all the groups. TRADOC (1992) concluded, "VTT worked, students liked VTT, instructors like VTT, VTT test scores were as good if not better than traditional test scores, and reconfigured materials produced higher post test scores than traditional materials."

Summary

In general, the military findings are compatible with the findings of non-military studies regarding the use of VTT (DeLoughry, 1988; Fahl, 1983; Grimes, Neilsen, & Niss, 1988; Keene & Cary, 1990; Kruh, 1983; Partin & Atkins, 1984). Both students and instructors tend to like VTT instruction and students do learn from the courseware. Courses should be selected that are compatible with VTT. Some researchers suggest that shorter, more cognitive courses lend themselves best to VTT.

The military studies also address course design issues. Research states that VTT courses must be carefully planned, provide for interaction and feedback, and must be motivating and appealing. Instructors and site facilitators are critical to successful VTT, as are well planned and well designed student materials. Key to the well planned materials are the visuals that are used in conjunction with the content presentation. A student study guide, preferably one that is interactive, is also required.

Summary of the Review of Literature

The summary that follows lists the key factors gleaned from the research on distance education, military research, instructional design, and media selection, as it pertains primarily to two-way video teletraining.

Course Selection

1. Shorter rather than longer courses are most appropriate.
2. Courses that are cognitive are preferable to courses that have emphasis on psychomotor skills.
3. Courses that have high throughput are desirable because of the extensive development costs.

Course Design

1. VTT courses must be more highly planned, organized and delivered than traditional instruction.
2. The systems approach to instructional design should be implemented.
3. The design of successful VTT programs is often grounded in learning theory.
4. Courses should include the following instructional techniques: involvement and motivational activities, interaction with the instructor and other students, feedback, advance organizers, group and individual activities, and opportunities for students to ask questions.
5. Courses should be divided into short segments of approximately 20-30 minutes.
6. A student study guide should be developed. It is preferable that this study guide facilitate interaction between the student and the instructional materials.
7. Graphics and other visuals must be used to support the instructional message. They must be carefully designed to compliment the verbal and oral message and should be easy to understand.
8. VTT courses should use a variety of media.
9. Care should be taken to humanize the instruction.
10. Courses should be pilot tested and the instructional materials validated.

Course Implementation/Delivery

1. Instructors should make an effort to get to know their students and to reduce the perceived distance between them by treating students as much as possible like non-remote students.

2. Feedback and responses to students must be provided quickly and efficiently.
3. Students will need to learn how to learn from a VTT course.
4. Instructors will need to intentionally initiate interaction with remote students.
5. VTT courses often take longer to present than traditional instruction and should not be rushed.
6. Contingency plans must be made in the event of equipment failure.
7. All personnel, instructors, site facilitators, and technicians must communicate with each other to present effective instruction.

Personnel

1. It takes a team of people to design and deliver a good VTT course. These include a management team, instructional designers, graphic artists, word processors, technicians, site facilitators, subject matter experts, evaluators, etc. A military training expert may be required when designing or converting military courseware. Care should be taken to select a team with the necessary skills to produce and deliver a course.
2. The instructor is a key element in the success of a VTT program. He or she must have good on-camera skills, plus a willingness to spend extra hours in preparation for instruction.
3. The site facilitator is a critical person in the delivery of instruction. The roles and responsibilities of this person should be carefully delineated.
4. All personnel associated with the design and delivery of the program should receive adequate training in the technology and in VTT instruction. Instructors should have ample opportunities to practice before presenting the instruction.

Course Organization/Management

1. Record-keeping procedures must be manageable and not too time consuming.
2. Instructor and course certification are often required and these issues need to be addressed before course conversion begins.
3. Instruction needs to be carefully scheduled to meet all system requirements and to coordinate all personnel and students.
4. In large scale projects, all the various management and organization functions need to be coordinated. Roles and responsibilities should be clearly delineated.

CONCEPTUAL MODEL FOR THE RECONFIGURATION PROCESS

The conceptual model developed for the FTP was based on the findings from the literature review on distance education, instructional design, military uses of video teletraining, and the SAT model. It was adapted specifically for use on this project.

This modified instructional design model, adapted from the Systems Approach to Training (SAT) model and formulated for use with TNET, was used to reconfigure five courses for the FTP. The adapted model is presented in Figure 3. It has six phases or functions: Analysis, Design, Development, Implementation, Revise Instruction, and Management. All functions of the adapted model are based on learning and instructional theory. The Evaluation component supports the model, but is not directly related to course reconfiguration.

The model was adapted rather than originated, consistent with the recommendation of Andrews and Goodson (1980) that model evolution is preferable to model proliferation. In addition, Andrews and Goodson recommend selecting or adapting a model that matches the dimensions of a project and one that is grounded in theory. The adapted model meets these criteria: (a) it was modified, based upon an already existing model, rather than developed, and is a model that has been used extensively to develop military courseware, (b) it fits the context of the reconfiguration component of the Florida Teletraining Project, that is, it includes all the components necessary for reconfiguring courseware and is appropriate for use with a large scale project, (c) it is grounded in systems, learning, and instructional theory, and (d) it is adaptable to any media including TNET.

While the functions of the model are depicted as linear, the model, like all ISD models, is iterative. The model is read from left to right. The arrows linking the functions of the model are included to show that the components and processes are interrelated; it is based in systems theory.

The model is based on four factors that influenced the reconfiguration effort. Each factor will be discussed in detail in later sections of the report. The factors are:

- the instructional requirements of the five courses selected for delivery
- the characteristics and capabilities of TNET
- the key design variables required for distance learning instruction via video teletraining (VTT), and
- the principles of instructional design, including learning and instructional theory.

Adapted Systems Model for the Reconfiguration Process

Management/Organization

Learning/Instructional Theory

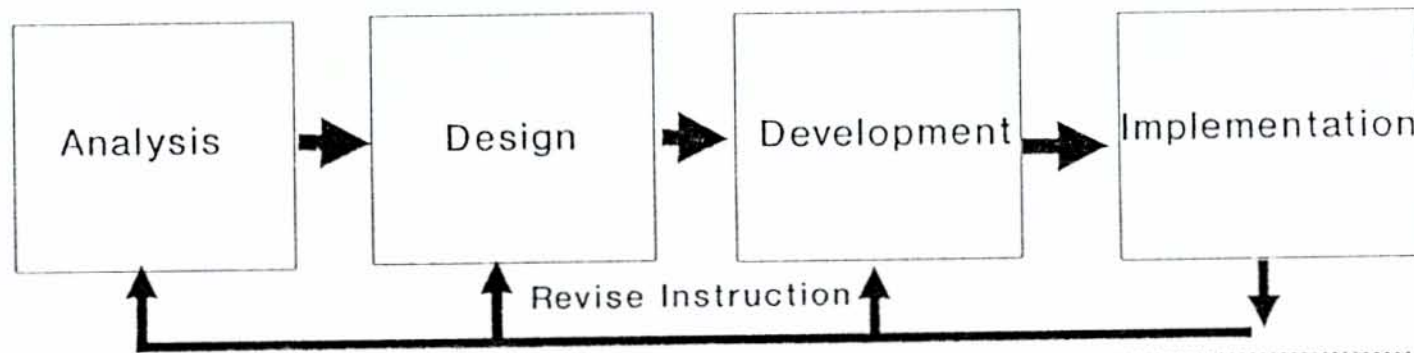


Figure 3

Overview of Courses Selected for Reconfiguration

Five courses were selected by DITRA for reconfiguration and were assigned to the project based on military needs. Course nominations were requested from the services; from these nominations, five courses were selected.

There were three U. S. Army RC³ MOS-awarding courses: 71L10, Administrative Specialist; 76Y10, Unit Supply Specialist; and 95B10, Basic Military Police (MP). They were presented to Army National Guard and Army Reserve personnel. There were two special topics courses: Total Quality Leadership (TQL) and Handling Hazardous Waste--Activity Level (HazWaste). These were presented to personnel in the U.S. Navy, Army National Guard, Air National Guard, and U.S. Marine Corps.

The **71L10 Unit Administrative Specialist** course is a single-phase course that can be taught in either the Inactive Duty Training (IDT) Phase or the Active Duty Training (ADT) Phase (U.S. Army Soldier Support Center, 1991). This course was presented in an ADT mode. It was a 73-hour course and was presented during a two-week block from 17 October to 31 October 1992.

The Administrative Specialist is responsible for the routine office administration of an activity. He or she works at various organizational levels throughout the Army, from company through division, installation, or higher headquarters.

In order to achieve MOS qualification and to be able to perform required functions of the MOS during mobilization or national emergency, the 71L10 student must master the critical tasks required of Administrative Specialists. Students must type straight copy, understand the provisions of the privacy act, prepare military correspondence, maintain a security container check sheet, request resupply of publications and blank forms, safeguard "For Official Use Only" (FOUO) material, type a memorandum, type a special purpose memorandum, type an endorsement to a memorandum, type a letter, assemble correspondence, type a joint messageform, receipt and transfer classified material, route incoming and dispatch outgoing distribution, and establish and maintain files.

The **76Y10 Unit Supply Specialist** course is a dual-phased (IDT and ADT) course (U.S. Army Quartermaster Center and School, 1989). Only the Inactive Duty Training (IDT) phase was presented during the project. This phase of the course was 96-hours and was presented during a two-week block from 7 November to 22 November 1992. For MOS-award, the 76Y10 student must also take the ADT phase. Arrangements for completing the ADT phase were made independently of this project.

The Unit Supply Specialist performs unit and organization supply procedures. These include the tasks of request, receipt, storage, issue and accountability of individual, organizational, installation, and expendable, durable supplies and equipment.

In order to achieve MOS qualification and to be able to perform required functions of the MOS, the 76Y10 student must master the critical tasks required of Unit Supply Specialists. Students must understand unit and organization supply procedures, unit supply file procedures, use the Army Master Data File Retrieval Microform System (ARMS), request supply status for high priority requests, request for cancellation of supplies, maintain due-in status files, prepare and maintain hand/subhand-receipt, issue supplies and equipment to hand-receipt holders, obtain relief from responsibility/adjustment documents, request, receive, store, issue, account for, and preserve organizational clothing and equipment, prepare and process personal clothing requests, and prepare and maintain Organizational Clothing and Individual Equipment (OCIE) records and determine serviceability of organizational clothing and individual equipment.

The **95B10 Basic Military Police** course is also a dual-phase (IDT and ADT) course (U.S. Army Military Police School, 1991). Only the Inactive Duty Training (IDT) phase was taught during this project. This phase of the course was 66-hours and was presented during a two-week block from 5 December to 18 December 1992. The ADT phase was presented by USARF School at Camp Blanding, Florida in the summer of 1993.

The 95B10 MPs are soldiers capable of performing the duties of entry-level military police. The entry level MP performs the tasks of apprehension and search, patrol and traffic operations, investigations, physical security, self-defense, and prepares and gathers military police information, reports, and forms.

In order to achieve MOS qualification and to be able to perform required functions of the MOS, the 95B10 student must master the critical tasks required of the Military Police. These include understanding the history of the MP Corps, the MP Code of Ethics, using communication skills to resolve conflicts, determine if a search and seizure is authorized (and conduct one if necessary), determine who has authority for a lawful apprehension, use the Uniform Code of Military Justice (UCMJ), advise a suspect of Miranda Rights, determine the level of force required, search a building, search a vehicle, determine the type of search required, search suspects using stand up, pat-down, prone and wall searches, apply hand irons, transport offenders, interview suspects, fill out MP forms, record and report information, use proper hand and arm signals to control pedestrian and vehicle traffic, respond to threats including a bomb threat, an alarm, a hostage situation, and a domestic disturbance, protect a crime scene, identify evidence/contraband, collect and process evidence, identify and report suspected child abuse/neglect, control entry and exit from a restricted areas (nuclear physical security/terrorism), and use self-defense and MP club techniques.

Total Quality Leadership is the U.S. Navy's adaptation of Dr. W. Edwards Deming's approach to continuous quality improvement (Mr. Jim Miller, Total Quality Leadership Curriculum Developer, CNET, personal communication, June 2, 1993). A one-day course was presented to provide an introduction to and an awareness of the U. S. Navy's Total Quality Leadership (TQL) philosophy. This course was offered twice, once to the three Florida Teletraining Project remote sites, i.e., Florida Community College at Jacksonville (FCCJ2), Valencia Community College (VCC), and St. Petersburg Junior College (SPJC), on 30 January

1993, and once on 22 February 1993 to the three FTP sites and to one out-of-state TNET site at Camp Fogarty, East Greenwich, Rhode Island.

The topics covered during the course included the background of TQL, TQL as defined by the Navy, basic principles of TQL, methods and tools used in TQL, and how the Navy has implemented TQL. In addition, students participated in a simulation exercise, Life in the Red Bead Factory, that was designed to help students understand TQL concepts.

Handling Hazardous Waste--Activity Level is a U.S. Navy course specially adapted from the Hazardous Waste Coordinator course for the FTP. The topics for the course were taken from among those taught in the Hazardous Waste Coordinator course. The one-day course was designed to give hazardous waste handlers the information necessary to make environmentally and personally safe decisions regarding the disposal of hazardous and regulated wastes. This course was offered a total of three different times, twice to the FTP teletraining remote sites on 27 January 1993 and 5 February 1993. It was offered one additional time on 25 February 1993 to the three FTP sites and to two out-of-state TNET sites, Camp Fogarty, East Greenwich, Rhode Island and Ft. Taylor Hardin, Montgomery, Alabama.

The HazWaste course topics included a review of pertinent laws and regulations and a discussion of the physical and chemical properties of hazardous materials. Personnel were shown the correct techniques for delivering and transferring hazardous materials at the hazardous waste collection site. Pollution and spill prevention, personal protection equipment utilization, and segregation of materials were emphasized. Contingency planning and spill procedures were also discussed.

Critical tasks that students performed were evaluating information in the Material Safety Data Sheet (MSDS), stating procedures to follow when delivering hazardous waste, and stating his/her responsibility in a chemical spill situation.

Overview of TNET Delivery System

The second factor that influenced the reconfiguration effort and the development of the conceptual model was the characteristics and capabilities of TNET. TNET is the U.S. Army's Teletraining Network. TNET is a two-way audio-video transmission medium using Compression Labs, Inc. (CLI) GalleryTM 235 video teletraining (VTT) systems and Hughes Network Services (HNS) satellite communications.

The Gallery 235 is a stand-alone, modular video conferencing system which houses much of the equipment (Figure 4 shows TNET from the classroom/student perspective; Figure 5 shows TNET from the instructor's perspective). The TNET system consists of:

- An antenna and feedhorn (located on a satellite dish or Very Small Aperture Terminal (VSAT))

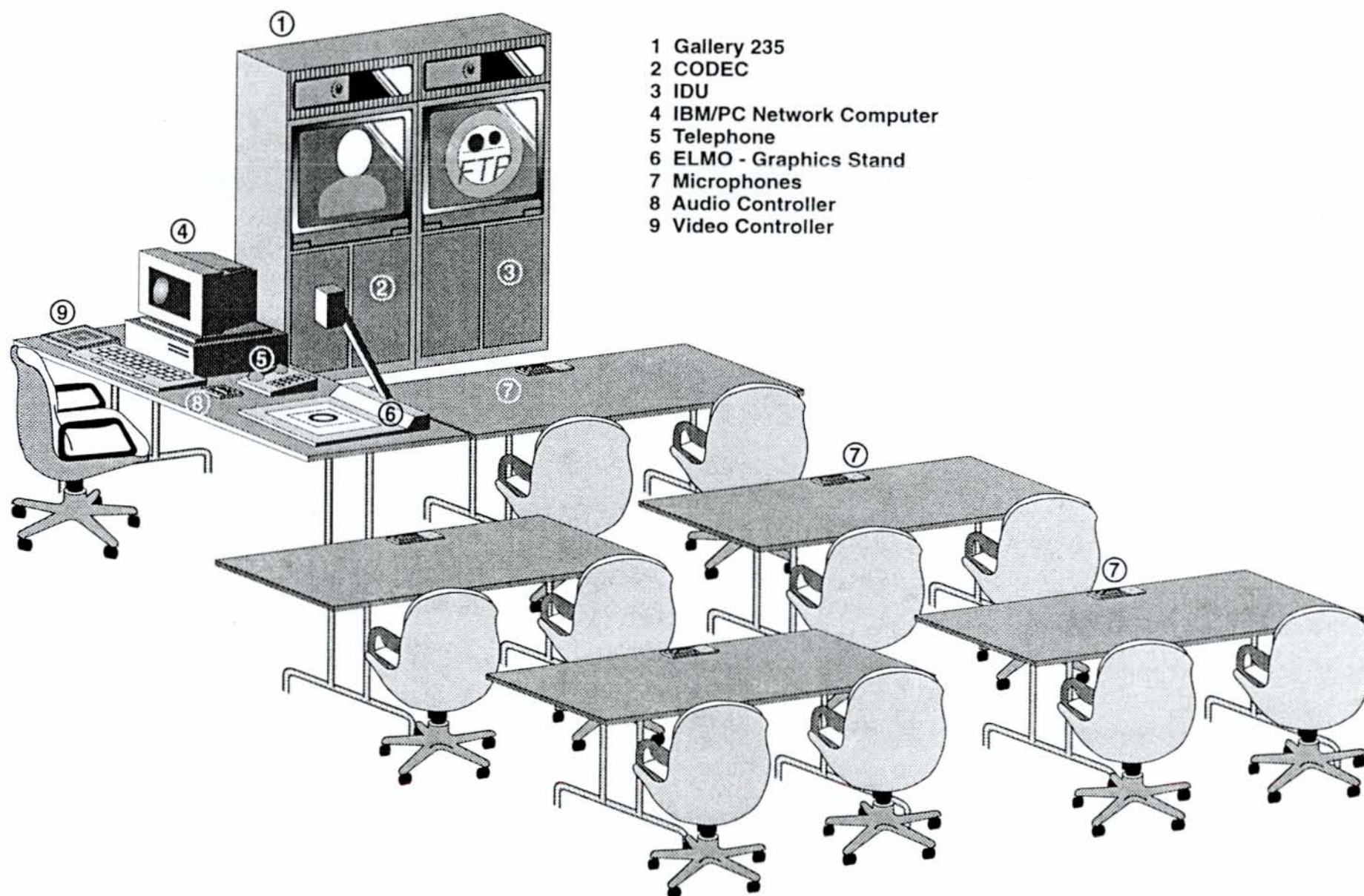


Figure 4: TNET Remote Site

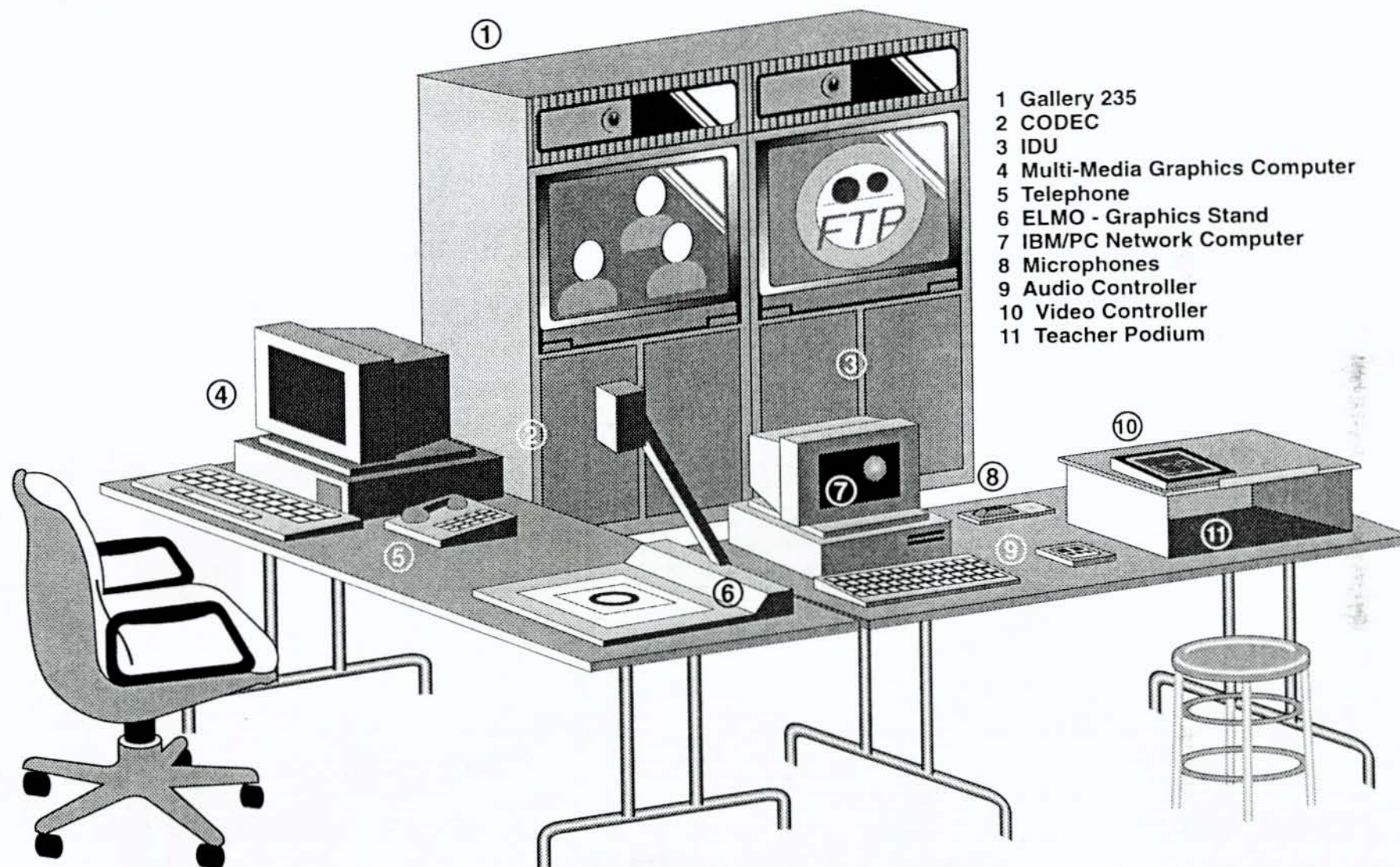


Figure 5: TNET Origination Site

- An IBM PC dedicated to communication
- Two 35-inch television monitors (one for viewing motion, one for graphics)
- A remotely controlled video camera mounted in the Gallery
- A unit for encoding and decoding the compressed digitized signal (CODEC) (CLI's Rembrandt II/06TM)
- An indoor unit (IDU) to receive and process the satellite signal
- A desk-top control unit to handle transmission and reception
- Audio equipment including table-top microphones for student use
- A multi-media (graphics) computer (origination site only)
- A graphics stand with camera (ELMO)
- Two uninterrupted power supply (UPS) units

The HNS TELEconferenceTM System provides a flexible facility for video teletraining using a permanently assigned satellite channel for management and a shared pool of satellite channels scheduled to support video and audio communications among its users. The compressed and digitized signal is sent to SBS-5, a geosynchronous Ku-band satellite owned by Hughes Network System located above the Pacific near Hawaii. The digital transmission rate used was 256 kbps. TNET communication capabilities include:

- Two-way video
- Two-way audio
- Point to multi-point communications
- Year-round, 24-hour-a-day availability
- Interactivity among a maximum of eight sites (1 origination, 7 receive)

During a teletraining conference, audio and visual information is exchanged between two or more sites. Audio information is provided from microphones that pick up voice signals in the room. Visual information is provided from the motion camera in the Gallery, an auxiliary camera such as that on the ELMO, computer generated graphics, or from some other source such as videotape. The audio and visual information, originally in the form of analog signals, must

be converted to digital form (i.e., digitized) in order to be compressed, combined into a single signal and transmitted.

The two-monitor system allows motion to be seen on one monitor, graphics on the other. However, only a single visual signal may be transmitted each way at any given time. This is due to the channel size. The visual signal can be the signal from the main motion camera, from the graphics camera, the multi-media camera, or from another peripheral video input device.

Because only one signal can be transmitted at a time, the motion transmission is temporarily stopped when a graphic image is sent. This appears as a freeze of the image on the motion monitor that lasts approximately four seconds. Once the graphic is received and displayed on the static screen, the motion resumes on the motion monitor.

The TNET audio system has been designed to eliminate the possibility of the room microphones picking up output from the speakers and creating an echo or feedback situation. This is accomplished through the use of an echo canceler or an echo suppressor.

Another important feature of the audio system is automatic sound mixing. The audio system mixes the room sound picked up by the microphones before routing the audio signal to the CODEC for coding and transmission to the other end. With proper placement of microphones, audio in the teletraining room is heard at the other end as if it were taking place there. During teletraining, all sites can hear questions and responses from all of the other sites.

The audio system also includes a feature called audio privacy that allows conference members to confer in private. This feature temporarily mutes the microphones so that the room sound is not transmitted. This privacy function is also referred to as the "master mute."

Because all sites are identically configured, any site can serve as the origination site. To change the point of origination from one site to another, a procedure called "passing the baton" is performed using the IBM PC. It takes several seconds to pass the baton, but the procedure is useful if another site needs to become the origination site for an instructional activity.

In the section below, the features of TNET as they relate to the delivery of instruction will be discussed.

Implementing Instruction Using TNET

Included in the discussion below are some of the key technological considerations that influenced the reconfiguration of the five military courses for use with TNET. These plus the educational principles presented in the next section, formed the basis for the development of the adapted model.

The three MOS-awarding courses were presented during a two-week block of instruction. Practical exercises and hands-on activities had to be adapted to VTT. For example, typing

instruction was included in the 71L10 course content and self-defense instruction and practice was included in the 95B10 course. The courses had to be designed to present the content and to provide time for students to practice the tasks and receive feedback about their progress. Practice portions of the courses were completed off-line to give students an opportunity for hands-on practice; these were built into the reconfigured course design. Similarly, off-line activities had to be adapted for the two special topics courses, e.g., the Red Bead Factory (TQL) and use of the MSDS (HazWaste).

The content included in these five courses contained extensive military information. Because similar courses taught at the community college do not have military content (e.g., criminal justice and leadership courses), extensive military expertise was needed during both the design and development phase of the courses and during course delivery. Also, due to the military content, certification and accreditation agreements had to be made with key military organizations and with the participating community colleges for the MOS courses so that soldiers met the requirements for the MOS and so college course credit could be provided to students. No course credit was given for the special topics courses because they were one-day offerings.

Instruction is presented *live* over TNET. Contingency plans had to be developed to give students the opportunity to make up any missed instruction. For example, students who missed instruction because of illness or for other reasons needed options to retake the missed instruction. In addition, TNET can be sensitive to atmospheric disturbances (especially heavy rainstorms). Such conditions can cause transmission failures. Equipment breakdowns are also possible. Remedial and make-up activities were designed and ready for use to take into account the fact that instruction is presented live, that student absences can occur, and that equipment failures can disrupt delivery.

TNET uses compressed video; the transmission rate was 256 kbps. While appropriate for instructional purposes, video compressed at this transmission rate can be tiring to watch for long periods of time. Regular breaks were planned for and written into the instruction. In addition, any video segments that were presented during instruction had to be produced taking into account the compression factor. For example, a demonstration tape of an experiment or a typing procedure, had to be specially produced for use with TNET so that the compression factor did not detract from the learning objective of the video.

The ability to view the students at multiple reception sites during instructional delivery while using TNET required some accommodation. For example, the instructor can only see one remote site at a time while teaching via TNET (there are no students at the origination site when using the TNET system). To view the classrooms at the various sites, the instructor must switch from site to site. In addition, the TNET audio switching is gated. When using gated audio, only one person can talk at a time. Also, extraneous noise can disrupt the signal if a microphone is left in the on position. Therefore, classroom protocols for asking questions had to be established to ensure optimal use of the gated audio feature.

Key Distance Learning and Instructional Design Variables

Finally, the educational factors relating to ISD and VTT also influenced the reconfiguration process and the development of the adapted model. One key factor of all distance learning courses presented using VTT is that they must be carefully planned and carefully designed (Atman, 1987; Barker & Platten, 1988; Cyrs & Smith, 1990; Howard, 1987; McCleary & Egan, 1989).

Some of the other key factors that influenced the design of the video teletraining courses are presented below. The rationale for each of these factors has been previously discussed in the review of literature provided in an earlier section of this report. The factors are:

- interaction and student involvement with the teacher, other students, and the instructional materials
- instructional feedback
- motivational enhancement
- short course segments
- methods of orienting students to the learning tasks, e.g., advance organizers
- structured notes and outlines of the content
- fast and efficient response time to student questions
- allowing more time to present the content
- personnel requirements, e.g., site coordinators and technicians
- staff and personnel training, and
- record keeping and other organizational tasks.

In addition to these variables, reconfiguring the five courses for TNET had to take into account other factors from instructional design and learning theory (Gagne, Briggs, & Wager, 1989; Romiszowski, 1988):

- general systems theory
- the conditions of learning, i.e., how instruction should be designed for different categories of learning outcomes

- the events of instruction, i.e, the internal and external processes of learning
- the selection and use of media including illustrations, graphics, audio-visual packages, and
- field testing and validating the instruction and the materials.

Adapted SAT Model for the Reconfiguration Process Using TNET

Based on the courses designated for delivery, the TNET equipment, relevant distance learning and instructional design principles, and the SAT model, an adapted model was designed for use with this project. The adapted model is based on the following assumptions generic to all instructional design models including the SAT (Andrews & Goodson, 1980; Gagne, Briggs, & Wager, 1989):

- Change in any component(s) of an ISD process requires a concomitant change in the other components.
- There are different types of learning, e.g., information, skills, attitudes, and motor skills; each one requires different conditions of learning for its development.
- Instruction should be designed to support the internal processes of learning.
- Objectives must be stated behaviorally; they must be observable and measurable.
- Test items and performance measures must exactly match the objectives.
- Instructional strategies and media must be related directly to the stated objective.
- Practice and feedback are critical aspects of the instructional process.
- Learning is most effective when prerequisite knowledge and skills, as well as other student characteristics, are accounted for in the instruction.
- Student and environmental characteristics influence the types of instructional strategies and media selected for instruction.
- All students can achieve mastery of the objectives if students are given adequate time and opportunities, if the instruction is of reasonable quality, and if students are tested frequently so remediation can occur.
- Instruction should be validated and revised based on a formative evaluation plan.

- Complex instructional design projects require design teams for the development and implementation of instruction. Depending on how the instruction is delivered (by an instructor, by a technological delivery system, or a combination) a design team usually includes at a minimum the following personnel: an instructional designer, a production/media specialist, a subject matter expert, and an evaluator. Typically, the roles and responsibilities of the design team are not exclusive.

The adapted model is presented again in Figure 6. Figure 6 includes some of the key tasks that were performed during each phase of the reconfiguration process of the FTP. The tasks presented are based on the list above and are illustrative, not inclusive. A complete description of the tasks will be presented in a later section of this report, Course Reconfiguration Process.

Analysis

The purpose of the analysis phase, or front end analysis, of the SAT model is to determine what is to be trained. The analysis phase is the cornerstone of all subsequent phases of the model. The SAT lists seven outcomes of this phase including perform needs analysis, select critical collective and individual tasks, perform job or duty analysis, and perform critical individual task analysis.

In the adapted model, an analysis phase was included, however, project personnel did not perform a traditional needs analysis. All five courses were nominated by the services based on current military training needs. Final selections were made by TPDC and were assigned to the project.

Design

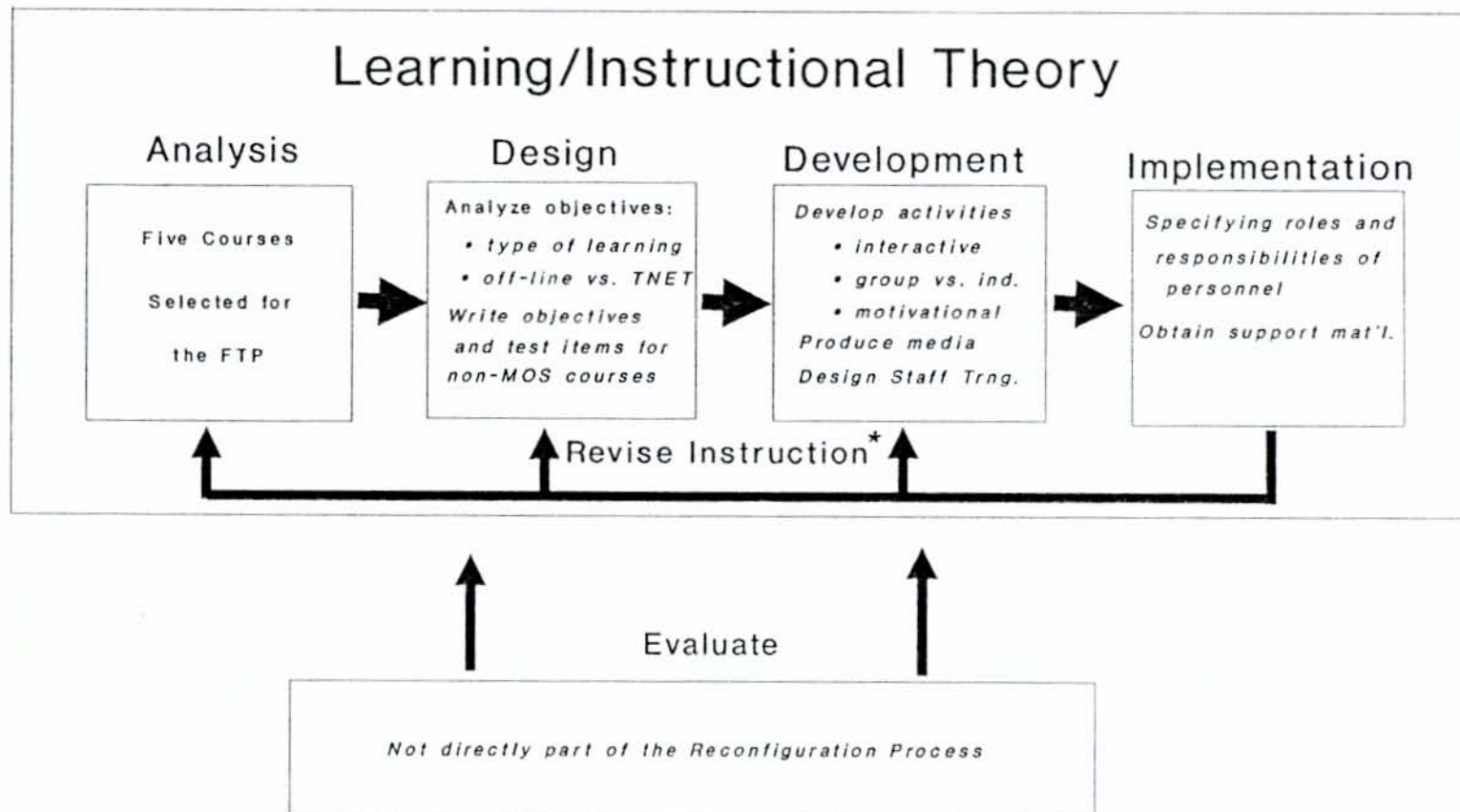
The purpose of the design phase of the SAT is to produce a blueprint or map of the training program that will be developed. There are five actions included in this phase: develop objectives, perform a learning analysis, develop test items, describe entry behavior, and determine the sequence and structure of training.

A design phase was included in the adapted model. However, some of the traditional tasks of this phase were not required for all five courses. For example, validated Programs of Instruction (POIs) were provided for the three MOS-awarding courses. Included in the POI were validated terminal performance and enabling learning objectives, validated test items and performance tests, and a verified training structure and sequence.

The Army has stringent requirements for certifying soldiers in each MOS. The objectives and test items had been previously approved and accepted by the respective proponent schools and TRADOC. Therefore, no objectives or test items could be changed for the MOS courses. Minor improvements to the wording of some objectives were made, but no substantive changes were made to any objective or test item.

Sample Tasks in the Reconfiguration Process

Management/Organization



• Pilot test and validate instructional materials

Figure 6

The U.S. Navy provided course syllabi for the special topics courses, TQL and HazWaste. However, the FTP had some latitude to refine or alter objectives, test items and instructional strategies and media. Specific terminal and enabling objectives, test items, and a training structure and sequence were developed.

During this phase, each objective was analyzed according to its type of learning outcome, e.g., knowledge, concept, procedure (Cyrus & Smith, 1990; Gagne, 1985). In addition, objectives were analyzed to determine whether or not they were appropriate for delivery over TNET or if they had to be delivered off-line.

Development

The purpose of the development phase of the SAT is to produce the training materials that will support the terminal and enabling objectives. There are five outcomes for this phase: review existing materials, revise or develop materials, validate training materials, obtain approval, and plan for staff and faculty training.

During this phase, instructional materials and learning activities were produced that promoted interaction, provided feedback, were motivating, and that used a variety of media. Three different manuals were also developed for each course: an interactive student study guide, an instructional coordinator guide, and an instructor guide.

In the adapted model, two activities in the development phase, validate training materials and obtain approval, were omitted from this phase and included as the major activities of another function, Revise Instruction. These activities were so extensive for this project that a separate phase was deemed necessary. The other three activities of this phase remained as in the original model.

Implementation

The implementation phase of the SAT involves the separate and related functions of preparing for and conducting training. Conducting training is beyond the scope of the reconfiguration effort.

This phase of the adapted model addresses preparing to conduct training. It included specifying the roles and responsibilities of the personnel and training and preparing personnel to perform their roles during the delivery of instruction. It also included ensuring that all training support materials, e.g., military forms and manuals, and all training support equipment, e.g., typewriters, microfiche, MP hand irons, were available and operative at the time of implementation.

Revise Instruction

The SAT includes a revise instruction or feedback function in the Development Phase, however, this function has been made an explicit component of this adapted model. Many ISD models have a separate function for revision. For example, Dick and Reiser (1989) include Revise Instruction in their model for the purpose of revising instruction after it has been implemented.

The primary purpose of this component in the adapted model was two-fold: (a) to insure validation of the training materials as they were being developed and (b) to revise the instruction after delivery. Typically courses longer than two days cannot be tried out in their entirety prior to implementation (Brenneman, 1989); they must be pilot tested and validated in parts as they are being developed. As the arrows included in the model depict, this was not a one time function, but an on-going process during reconfiguration. Several revision cycles and developmental testing were included in the model to aid in the production of instructionally sound materials. This is the component of the model that makes it most dynamic.

Management

There are several management systems that influence the SAT process, but there is no specific management component of the SAT. The complexity of this project, specifically the number and relationships among the various civilian and military groups and organizations (see Table 1), plus the complexity of the technology itself, prompted the inclusion of management as a specific component of this adapted model. Instructional design teams, delivery teams, technical teams, and production teams were all organized and coordinated for the reconfiguration effort.

Evaluation

The Evaluation component of the SAT refers to larger project evaluation issues, for example, development of a general evaluation policy, conducting internal and external evaluation, and conducting evaluation follow-up. This phase is not directly part of the reconfiguration process. Evaluation, however, was included in the model to reinforce the importance of this function in the overall project design.

Summary of the Adapted SAT Model

- The instructional design model was adapted from the Army's Systems Approach to Training (SAT). It is a systems model.
- The model deals explicitly with course design, delivery, and implementation of the instruction. The model does not specifically address the evaluation component of the project. Evaluation will be addressed in a separate report.
- The model is based on learning and instructional theory.

- Five courses were selected for the reconfiguration. Three were Army MOS qualifying courses and two were inter-service special topics courses. These courses were selected on the basis of military service needs, not because of their compatibility with the delivery system.
- The delivery system, TNET, was selected for the project. Design and development of the courseware, including the media and instructional strategies, are based on the characteristics and constraints of the selected technology.
- A Revise Instruction phase was added to the adapted model.
- A Management phase was added because management was required during all phases of course design, development, and delivery/implementation. This is a function of the fact that (a) this is a large scale distance learning project, (b) the military is a many-layered organization with specific protocols, and (c) TNET is a complex delivery system requiring a wide variety of personnel for operation.

The adapted model, while based on learning and instructional theory, and findings from the distance education literature, is generic in the sense that it can be applied to any large scale project using any variety of media. While the model was adapted for use with TNET and for the design of military courseware, it is applicable to any large VTT project. Decisions made in the context of the Florida Teletraining Project can be modified for use with projects using different technology and with other organizational frameworks.

COURSE RECONFIGURATION PROCESS

In the previous sections of this report the factors that provided the basis for the reconfiguration effort were presented. The philosophy and foundations of different theory bases, e.g., systems, instructional design, learning theory, and the results of previous research were provided. The background of the project, the courses selected, the teletraining network used, project participants, and project constraints were also described. These factors were used to adapt the Systems Approach to Training (SAT) model that was used to reconfigure courseware for the Florida Teletraining Project (FTP).

In this section of the report, the decisions, processes, procedures, and personnel used to reconfigure the five courses are described and discussed. This section is organized around the components of the adapted systems model presented in Figure 3.

Analysis Phase

The traditional tasks performed during the analysis phase of the SAT, determining what is to be trained, were performed by the government rather than project personnel. The five courses that were to be reconfigured were then assigned to the project.

The five courses, although selected by the government, were analyzed by project personnel to determine how appropriate each one was for presentation over TNET. This analysis was used to formulate design procedures for course reconfiguration. Six factors (CNET Handout, 1992; Cyrs & Smith, 1990; TRADOC, 1987) were used for this analysis. Courses should:

- be shorter rather than longer
- be primarily cognitive rather than psychomotor
- have high demand (throughput)
- be appropriate for VTT
- be appropriate for the expertise of the community college faculty, and
- have well-stated instructional components, e.g., goals, objectives, and criterion-referenced performance measures.

In general, each course met the criteria for the first three factors. Each course was considered a short course and was primarily cognitive. Each course was also selected because it had high demand. For the MOS-awarding courses, more RC soldiers needed to be trained than there were available slots at the proponent schools and at the USARF schools. The two special topics courses were also selected because a large number of students needed to be trained. Design decisions were made as a result of the last three factors.

Shorter Rather than Longer

Each course was considered a short course. The Navy prefers to present courses no longer than one-week in length via its teletraining system (CNET Handout, 1992). The special topics courses, HazWaste and TQL, were presented as one-day workshops. The three MOS courses were presented during a two-week, 80-hour training period.

Primarily Cognitive

All the courses were primarily cognitive. All courses were knowledge and skill based. Two of the courses, 71L10 and 95B10, had psychomotor components, e.g., typing, demonstrating MP search procedures, but this proved to be an asset from an instructional perspective rather than a liability. The psychomotor aspects of the course will be discussed in reference to the appropriateness of each course for VTT.

High Demand

The five courses were selected because of high demand. The MOS-awarding courses were chosen because soldiers needed to be qualified in these particular MOSs to fulfill important military roles and functions within their assigned units. In addition, other factors were taken into consideration when these courses were selected. These included the expense involved in sending soldiers to proponent schools, RC soldiers' employment schedules and whether or not their work schedules would allow them to take an 8-10 week course, and when classes were scheduled at the local USARF schools, National Guard Academies and the proponent schools (e.g., some classes might not be offered until the following year). The Navy considered the content contained in HazWaste and TQL to be very important; the content was needed by a large number of personnel. The Navy courses were also selected because of their potential interest to multi-service audiences.

While each course met the requirements of the first three factors, instructional design decisions had to be made as a result of analysis of the other three factors--appropriateness of the courses for VTT, expertise of the community college faculty, and the adequacy of instructional components included in the courseware.

Appropriateness for VTT

Two major factors were considered regarding appropriateness of the courses for VTT: (1) the number of off-line activities that could be designed and (2) the stability of the course content. First, the fact that the MOS-awarding courses were presented during a two-week block had the potential of being problematic because students could not be expected to attend to continuous televised instruction for that length of time. However, two of the courses, 95B10 and 71L10, included psychomotor skills and all five courses had practical exercises (PEs) as required course components that allowed and sometimes required students to go off-line for hands-on practice for varying periods of time. Instructionally, this served two functions. Students did not receive VTT instruction for eight hours a day and students had the opportunity to interact with each other and the instructional materials each day.

The psychomotor skills and the PEs were analyzed to determine which could best be completed off-line. Course developers read through each POI or syllabus and initially identified the learning strategies that were appropriate as off-line activities. They then did a simple count of the number of hours that would be conducted off-line. For example, the Military Police (95B10) students were required to demonstrate mastery of a variety of searches, e.g., a prone search; these were designated as off-line activities. Likewise, the Administrative Specialist (71L10) course had built-in, off-line content and/or practical exercises, e.g., typing practice. The other three courses, 76Y10, HazWaste, and TQL, were also analyzed to determine which activities could be conducted off-line.

It was decided, whenever possible, that students would be instructed in these skills on-line, but would practice the psychomotor skills and other appropriate PEs off-line. This allowed instructors to build variety into the instructional strategies, reduce the amount of time students were required to attend to the on-line instructor, and use the most effective methods, e.g., hands-on involvement, for the psychomotor skills. The off-line activities were produced during the Design and Development Phases of reconfiguration.

A second consideration concerning appropriateness of a course for VTT was the stability of the course content. For some of the courses, specifically 76Y10 and to a lesser extent 71L10, the regulations learned in the course change from year to year, sometimes more often. Courses that have frequent content changes are not typically good candidates for VTT (or for any mediated delivery strategy) because the student, instructor, and site facilitator guides, plus the graphics and visuals become out-dated too quickly to make the design and development process cost effective. On the other hand, if student demand is high enough, the cost of revising the instruction is not as great a factor since a course(s) would have considerable use before it becomes out-dated. Therefore, stability of the content is an issue to consider when selecting courses for any kind of mediated instruction; it was addressed as a factor during this project.

To rectify the problem of outdated regulations for 71L10 and 76Y10, the FTP course developers omitted the regulation numbers and pamphlet numbers from the student guide and from the graphics, so that students could write in an updated version number as the course was presented. The instructor and the site facilitator guides had regulation and pamphlet numbers printed in them so the instructors would have a ready reference. In this way, the graphics could be reused without being out-of-date and students had a visual cue that the regulations may change (regulation number had to be written in).

Expertise of the Community College Faculty

Each course was analyzed to determine if the community college faculty selected to teach it had the expertise to do so. The five courses selected for this project had a considerable emphasis on military content. Most of this military content was subject matter that a typical community college instructor would not and did not know. The most striking example was the Unit Supply Specialist course (76Y10). There were no community college courses or programs that mirrored or even approached the content of 76Y10. The course developer could not proceed without the help of a subject matter expert (SME).

The other four faculty had expertise in the general content areas of the other four courses. A faculty member from the criminal justice program and a former MP (who had held the 95B10 MOS years earlier) designed the MP course. An instructor from the office systems technology program designed the 71L10 course. She had expertise in typing and in business forms and writing; she had previously taught a military business education course. With the assistance of an SME, her skills and knowledge were adaptable to the military course. Likewise the HazWaste and TQL faculty were content experts in their respective fields.

Even though four of the five course developers had content expertise, none of them was fully able to reconfigure the military courses without the assistance of a military instructor or SME. The military courses that were selected for the project by the government contained too much military content for the typical community college faculty member to reconfigure the course without assistance. When selecting military courseware for reconfiguration by non-military personnel, it is important to pay attention to the degree of military content in each course and to the military expertise needed by the course developers.

As a result of the analysis of the expertise of the course developers, a decision was made that military SMEs were needed to (a) assist in course design and development and (b) present some of the content on-line with the community college instructor and answer military related questions. The two instructors thus paired for course development were called respectively, the VTT Instructor (community college faculty) and the Military Instructional Assistant (MIA). As the courses were designed, the VTT and MIA had the option of designing "team" (both instructors on camera at the same time) and/or "turn" (one instructor or the other on camera at any given time) approaches to presenting the content. Typically, the instructors relied on a "turn teaching" approach, but "team teaching" was also used occasionally.

In addition to content knowledge, another area of expertise needed by the course developers was instructional systems design (ISD) skills and knowledge. This is actually a personnel selection issue rather than a course selection issue, however, the reconfiguration effort is made more difficult when the staff who are responsible for reconfiguring the courses have neither content knowledge nor ISD skills. Community college teachers, as it turned out, were not trained in instructional design. Those without ISD skills had to be taught basic principles. They then had to apply them and also to learn military content during reconfiguration. When analyzing courses and selecting personnel to reconfigure courses, the course developers' levels of expertise regarding ISD skill should be addressed. If personnel do not have adequate skills additional time will have to be allotted for staff training.

Instructional Components

The Reserve Component (RC³) courseware, including the practical exercises (PEs) and performance tests (PTs), were provided to IST by the Army proponent schools. IST reviewed these materials, extracted the materials necessary to develop the courses, and forwarded them to the community college responsible for course reconfiguration, FCCJ.

Each course was analyzed to determine whether or not the following components were included in the courseware and whether the components were instructionally sound according to ISD theory and practice:

- behavioral objectives, written to include correct action, conditions, and standards statements
- criterion-referenced performance measures that exactly measured the behavioral objectives, and
- practical exercises and content that matched the behavioral objectives and facilitated achievement of the performance measures.

At this point in the process, the course developers were analyzing the courseware for correct instructional components. The lack of content knowledge and ISD skills of some of the course developers sometimes made this analysis of instructional components difficult.

Personnel Needed for the Analysis Phase

The managerial and technical design direction for the project came from the Institute for Simulation and Training (IST). This team consisted of experts in ISD, military training, distance education, and knowledge of TNET; they provided direction and assistance to FCCJ in course design and development.

At FCCJ, the personnel needed for this phase were course developers (one for each course), an instructional manager, and a technical equipment/delivery expert. The instructional manager was tasked with coordinating the efforts of the key personnel involved in the analysis and subsequent phases of the reconfiguration effort.

The key personnel needed during the Analysis Phase were:

- an expert instructional designer, IST
- a military training expert, IST
- an instructional manager, FCCJ
- five course developers, one for each course, FCCJ
- experts in the technology, IST and FCCJ

Design Phase

The purpose of the Design Phase is to produce a blueprint or map of the course including specify objectives, perform a learning analysis, develop test items, describe entry behaviors, and determine the sequence and structure of the training. During the previous phase, Analysis, the

military POIs (MOS-awarding courses) and syllabi (special topics courses) were analyzed to determine the adequacy of the course components. During the Design Phase, staff training was begun and the course developers began the actual design process. The following tasks were performed:

- minor corrections were made to any objectives and performance measures that did not meet established instructional design criteria
- terminal and performance objectives were analyzed to determine their type of learning, e.g., knowledge, comprehension, application, critical thinking, and psychomotor skills
- the conditions of learning and the events of instruction for each objective or group of objectives were specified
- global media selections and global instructional strategies based on the requirements of the objectives were made
- media mixes were chosen based on the learners, setting, learning tasks, TNET, events of instruction, and the conditions of learning

During the Design Phase, staff training was conducted to teach instructional design skills, to explain the capabilities of the technology, and to describe video teletraining instructional activities and strategies, and to describe military training requirements. Group meetings were held so that course developers could share ideas, brainstorm strategies, and identify ideas that were likely and unlikely to work.

These tasks and functions are listed in Table 11 as an overview and summary of the Design Phase, but are also described below.

Objectives, Prerequisites, Performance Tests, Learning Sequences

The objectives for each of the MOS courses were established by the respective proponent schools and were included in the POIs. Project personnel were tasked with making minor modifications or corrections to improve learning objectives and performance tests, but did not alter the essence of the objectives. For the special topics courses, objectives and performance tests were developed or rewritten as necessary.

Each modified and rewritten objective had the following components:

- An action statement with a measurable, observable behavior.
- A conditions statement including the tools, situations, and constraints under which the action was to be performed during testing.

TABLE 11

TASKS PERFORMED DURING THE DESIGN PHASE

Reconfiguring Courseware

- write or modify learning objectives and criterion referenced tests
- identify the conditions of learning and the events of instruction
- specify media and instructional strategies to be used
- select media mixes for all objectives or groups of objectives
- identify military forms and equipment needed to conduct instruction
- determine student entry behaviors

Course Developer and Instructional Staff Training

- present overview of teletraining instruction and design strategies
- present overview of military structure and training
- introduce TNET and its instructional capabilities
- teach principles of instructional design and development
- provide opportunities for micro-teaching

- A standards statement specifying how well and how often each learner had to perform the behavior to master the objective, that is, receive a "go" on the objective.

Performance test measures were evaluated to insure that each matched the objective. Performance items for the MOS courses could not be modified in any way other than simple word changes, so objectives were modified to match performance tests where necessary. New performance measures, based on the learning objectives, were written for the special topics courses. All changes and modifications were submitted to the appropriate government agency, e.g., the proponent school, for approval.

Some enabling objectives (EOs) were derived from terminal objectives. Enabling objectives were included to break large segments of content down into more manageable skills and tasks. These EOs were written as behavior or action statements only and did not include conditions or standards statements. The enabling objectives were not used to define mastery of the final objective and therefore were not formally tested. Some in-process evaluation items in the form of questions or ungraded quizzes were presented to insure that students were mastering the content. These in-process evaluation measures directly matched the enabling learning skills.

Learning sequences were established by the Army POIs and the Navy course syllabi. These were not modified by the course developers. When enabling objectives were written, prerequisite relationships among the objectives formed the basis for the training sequence and structure among the tasks (see Gagne, Briggs, & Wager, 1989).

Conditions of Learning

In order to recommend instructional strategies and media for the objectives, each objective was analyzed to determine the instructional requirements for the different types of objectives (Gagne, 1985; see Table 3). For example, concept and rule-using objectives (a subcategory of the type of learning called intellectual skills) require the provision of examples and non-examples to facilitate learning. These examples and non-examples were designed into learning activities to help learners distinguish key aspects of the concepts and rules to be learned. Each type of learning has different conditions of learning. These conditions of learning are presented in Table 12. The names of the categories of objectives, e.g., Comprehension, were taken from Bloom (1956) and adapted by Cyr and Smith (1990).

During the next phase of course design, Development, these conditions of learning were translated into instructional methods and strategies. These conditions also provided direction for selecting appropriate media to support the instruction. This is a direct application of information processing theory and instructional systems design to course design and development (Gagne, Briggs, & Wager, 1989).

TABLE 12

CONDITIONS OF LEARNING FOR DIFFERENT TYPES OF LEARNING

Knowledge Objectives

- present an advance organizer to provide meaningful context
- provide increasingly more distinctive cues to reduce interference of similar learning
- provide opportunities for repetition
- use mnemonics or mental images

Comprehension Objectives

- use an advance organizer to provide meaningful context
- provide spaced reviews of information
- help the learner paraphrase ideas and draw inferences and conclusions
- point out key differences in ideas, forms, techniques, and procedures

Application Objectives (Concepts and Rules)

- provide the learner with examples and non-examples
- present a broad range of distinctive examples
- point out key differences
- demonstrate the rule(s)

Critical Thinking Objectives

- help the learner break the problem down into manageable parts
- help the learner set the parameters for successful solutions
- help the learner group ideas into categories
- describe or demonstrate a strategy or solution

Psychomotor Objectives

- demonstrate the procedure
- practice difficult part-skills separately
- practice the whole procedure
- provide the learner with corrective feedback

Events of Instruction

A second application of information processing theory to the design phase of this model is the use of the events of instruction. The events of instruction support the internal processes of learning (Gagne, 1985; see Table 4). They are presented to learners by either an instructor or by instructional methods and/or media. When designing a learning or instructional program, it is necessary to plan the events of instruction for each objective or set of related objectives. All nine events do not have to be planned for each objective (Gagne, Briggs, & Wager, 1989).

Five key events of instruction were designed into each lesson:

- Event 3, Stimulating recall of prerequisites
- Event 4, Presenting stimulus materials
- Event 5, Providing learning guidance
- Event 6, Eliciting performance
- Event 7, Providing feedback

Specifying Methods and Media

The methods and media produced for this project were designed to be appropriate for video teletraining. TNET is a distance education technology system, that is, taken as a whole, it is a sophisticated audio-visual package (See Table 9 and 10). For example, it uses a two screen system that can use any combination of live presentation, video segments, prepared graphics, 3-D objects, slides, and computer animation. In addition, computer graphics can be displayed as instruction is occurring to make a specific point. Graphics can be generated by the multi-media computer or projected over the ELMO (a graphics stand with a camera). Graphics projected using the ELMO can be used as a presentation medium as the instruction is progressing.

In addition to being an A-V package (Romiszowski, 1988), TNET also uses individual media, specifically illustrations and graphics, but the system also has the capability of presenting video segments, slides, etc. Graphics and illustrations had to be designed to be effective as stand-alone media (see Tables 7 and 8) and to work in conjunction with the entire system.

There is general agreement among researchers that there is not one best medium for a given instructional task. Rather, there are a number of different media that can perform adequately. Selection criteria and strategies can and should be used to define a range of media options.

The course developers used the following recommendations for making initial selections of media and methods (See Tables 9 and 10) (Barker & Platten, 1988; Bramble, 1990; Cyrs & Smith, 1990; Ostendorf, 1991; Romiszowski, 1988):

A. General requirements for any distance learning program

1. Interaction and involvement techniques must be used.
2. Highly motivating materials are necessary.
3. Multimedia approaches are desirable.
4. Feedback opportunities must be designed into lessons.
5. Advance organizers and overviews are necessary.
6. Instruction must be personalized for remote students.
7. Meaningfulness must be established for the learning tasks.
8. Materials must be designed to take into account (a) who will be administering them, i.e., the site facilitator or instructor, (b) where they will be used, e.g., a lab, at home, in a classroom, and (c) for what size group, e.g., individual, small group, large group.

B. Specific requirements for selecting media and methods for VTT programs:

1. Visual materials must be used to support the instruction.
2. A student study guide is required.
3. A site facilitator's guide is necessary.
4. Typically, questions that will be asked of students over the air should be pre-planned, although spontaneous questions can also be used.
5. Both on-camera and off-line activities and strategies must be designed.
6. Contingency plans must be planned; these may or may not require additional instructional strategies and media.
7. Students need to be active learners, but must not take notes at the expense of missing the instruction.

C. Specific requirements for selection and design of visuals. Graphics and visuals should:

1. Support the text/information provided to the learners.
2. Present only one or two ideas.
3. Include essential and important information.
4. Be logically organized to promote major points.
5. Use short, concise, active language, especially key words and phrases rather than sentences.
6. Use color to create interest.
7. Use variations in size, shapes, brightness, color for emphasis and for motivation. Also use bullets, numbers, or white space to focus attention.

D. Specific requirements for selecting and designing videotapes.

Because TNET uses a 256 kbps transmission rate, videotapes had to be specially prepared for each course if they were to be used. Only one commercially produced video tape (a Public Broadcasting System tape previously developed by FCCJ) was used in the HazWaste course. This video presented the Hipps Road chemical dumping site in Jacksonville, Florida and was suitable for presentation over TNET. Two videotapes were edited from tapes that were supplied with the courseware. One presented content in the 71L10 course and the other was a segment of a presentation by the Chief of Naval Operations on the topic of TQL.

The videotapes specifically produced by the FTP for the project were short, single-concept videotapes, two or five minutes in length. They were produced to make a particular point or to demonstrate a single procedure when other materials did not exist or were inadequate for teaching the content.

There were two primary reasons for producing a videotape; a third reason was deemed acceptable if one of the first two conditions were met:

1. A videotape was produced when it was more effective than a live presentation because a procedure could be shown from multiple angles, when the procedure would be shown more than once, or when a live presentation might fail or be done incorrectly, for example, an experiment.
2. A videotape was deemed necessary in the case where an expert or a special setting was needed to present a scenario or demonstrate a procedure. A videotape

eliminated the need to get a cast together on any particular day for a live presentation, or to go to a particular location.

3. Videotaped vignettes were developed for motivational purposes, for example, to illustrate consequences of incorrect job performance.

Military Forms and Equipment

During this phase of reconfiguration, the course developers listed all the military forms and equipment needed to support the instruction. This list was given to the Military Training Specialist at IST who was responsible for ordering all military support materials and equipment. Procurement of the materials was essential for conducting the courses and it was a difficult task. These procedures will be discussed in the Implementation Phase of this section.

Describe Entry Behaviors

In order to determine the entry behaviors of the students, a student background questionnaire was designed. Demographic information and course specific information, such as prerequisite skills and previous courses taken in the content area, were requested. The student questionnaire was mailed to each student who had pre-registered in the MOS courses. Other students completed the questionnaire during the first hour of these courses.

Standard military aptitude scores, such as the Armed Services Vocational Aptitude Battery (ASVAB) were also intended to be used to determine student entry levels. These were requested through the military command structure, however, they were impossible to obtain prior to course design. Course design and development were, therefore, based on general student descriptions derived from a TPDC database rather than on specific individual student data.

Course Developer and Instructional Staff Training

The expertise of the course developers was discussed in the Analysis Phase of this section of this report. Decisions about what to include in course developer training were based largely on the course developers' expertise or lack of it. The training for the FCCJ course developers and the instructional team, e.g., instructional manager, technical personnel, consisted of four two-to-three day blocks of instruction. The first, second, and third training sessions were presented before the reconfiguration process was started; the final blocks of training were presented as the courses were being reconfigured. The purposes of the training were to accomplish the following:

- provide an overview of video teletraining instruction
- present strategies for reconfiguring courseware
- provide an overview of military training

- teach the course developers the principles of instructional design and development
- introduce the TNET system and its instructional and technical capabilities
- provide an opportunity for the course developers, who also were the on-camera instructors, to practice teaching in a teletraining mode and to become familiar working with the TNET system

The first block of instruction was presented by Dr. Thomas E. Cyr, New Mexico State University. His two-day workshop, *Essential Skills for Television Teaching: There is a Difference*, focused on how to design interactive learning strategies, prepare on-line and off-line questions for students, develop word pictures, and produce an interactive student study guide. He also described the components and processes needed to modify courses for television teaching, e.g., pre-planning, course design, and staff training, and he demonstrated how to present a positive image on television.

The second and third blocks of instruction were presented by personnel from the Institute for Simulation and Training. The military training specialist presented a short workshop on key aspects of military training, e.g., the difference between individual and collective training, and the training command structure. He also explained the Army's requirements for Reserve and Guard training, IDT vs. ADT, and explained the components of a standard Army syllabus, the POI.

The ISD specialist presented a series of short (half-day) workshops on basic principles of learning theory and instructional design. These included how to analyze and write an objective and the purpose and use of the conditions of learning and the events of instruction. Principles of media selection and utilization were also presented. Finally, an overview of the TNET system and its instructional capabilities was provided.

Two additional blocks of instruction were presented by the Army Extension Training Directorate (AETD) and the staffs of IST and FCCJ that (a) provided an in-depth technical orientation to the TNET system and (b) provided practice presenting instruction over the system. Personnel from AETD presented a three-day workshop on the technical capabilities of TNET and methods to provide quality instruction over the TNET system. The staffs of IST and FCCJ presented a final workshop intended to help instructors "put it all together." During this workshop, FCCJ course developers engaged in microteaching practice sessions. Each course developer presented a short segment of instruction in loopback mode (the instruction was not transmitted). FCCJ personnel taped each presentation for review and critique.

Personnel Needed During the Design Phase

The following personnel were required to perform the functions and tasks during the design phase:

For Reconfiguration

- an instructional designer, IST
- a military training expert, IST
- an instructional manager, FCCJ
- five course developers, one for each course, FCCJ
- five military SMEs/Military Instructional Assistants (MIAs)
- experts in the technology, IST and FCCJ

For Staff Training

- an instructional designer, IST
- a military training expert, IST
- an instructional manager, FCCJ
- a consultant in video teletraining design strategies
- experts in TNET capabilities and TNET course design strategies

Summary of the Design Phase

Refer to Table 11 for the tasks included in the Design Phase of the adapted model for reconfiguration.

Development Phase

The purpose of the development phase of the SAT is to produce the training materials that will support the terminal and enabling objectives. There are five outcomes during this phase: review existing materials, revise or develop materials, validate training materials, obtain approval, and plan for staff and faculty training.

The SAT and the adapted model are iterative; that is, the functions and processes do not occur in one stage only. In the Analysis and Design Phases, the course developers began reviewing materials and planning for course reconfiguration. Likewise, staff training was begun during the Design Phase to prepare the course developers for the tasks they had to perform to analyze the military courseware and to make initial recommendations for reconfiguring the courses. In the Development Phase, the key function is to develop materials and to continue

staff and faculty training. While some validation of training materials was begun during this phase, a new phase was added to the adapted model to emphasize the importance of making course revisions, and pilot testing and validating the courseware.

During the Development Phase the following key functions were conducted:

Develop Materials

- Develop learning activities and strategies
- Produce media including graphics and videos
- Develop lesson plans
- Develop surrounding materials, e.g., introduction to the student study guide, explanation of audio protocols used during instruction, etc.
- Produce complete instructor guides, student interactive study guides, and site facilitator guides

Obtain Initial Validation and Approval from the Proponent Schools

Continue Staff Training

- Produce an in-house job aid, *The Quick Reference Guide to Course Conversion* for the course developers
- Conduct training for civilian and military site facilitators and other community college personnel involved with implementation

For each course, the following instructional materials were developed:

- The Instructor Guide (IG)
- The Instructional Coordinator Guide (ICG)
- The Interactive Study Guide (ISG) (the student manual)
- Screen and print graphics, and word pictures
- Support media, e.g., videotapes, charts, posters

Lesson plans were included in the IG and the ICG. The lesson plans were developed by each course developer. Each lesson plan was based on an objective or set of objectives identified in the POI or syllabus. Included in the lesson plans were the learning activities and strategies, the practical exercises, and the graphics and word pictures. The lesson plans included in the IG and ICG were identical (lesson plans will be described more fully in a later section).

Each lesson plan was scripted. This enabled the instructional coordinators at each site to follow the instruction as it was being presented. This was one strategy designed as an instructional contingency plan. That is, if there was an equipment failure, an instructional coordinator could present the instruction, reading from his or her manual and using the ELMO to project the graphics.

The process for developing the individual components of the courseware is described below.

Develop Learning Activities and Strategies

During the Analysis and Design Phases, objectives, learning activities, learning strategies, and media were reviewed to ascertain their appropriateness for VTT. Practical exercises (MOS courses) and suggested activities (special topics courses) were categorized. Three categories emerged:

- **Appropriate for presentation over TNET.** These objectives and activities were primarily cognitive, had visual media such as graphics, slides, and videotapes already produced, and relied on individual, rather than collective, learning strategies.
- **Appropriate for off-line instruction.** These were objectives and activities that had a psychomotor component, relied heavily on demonstration, and/or that required the use of off-line facilities, e.g., a lab or a gym, to reach the objective. Typically these objectives could be taught over TNET, but students had to go off-line to practice and demonstrate the skills. Such skills usually required direct and immediate feedback from a site coordinator.
- **Adaptable for TNET presentation.** Visual support and/or learning activities for these objectives was not available and had to be developed.

Learning activities and strategies were developed or adapted using the following guidelines (Batey & Cowell, 1986; Cyrs & Smith, 1990; McCleary & Egan, 1989; Stoffel, 1987):

- Practical exercises and other learning activities were redesigned to be interactive (e.g., question and answers) and to promote involvement with the instructional

materials (e.g., the ISG) and with other students and/or the instructor (e.g., group problem-solving tasks).

- Content presentation and the text of the POI or the syllabus was adapted for VTT. The content was scripted using the information from the POI or syllabus. The course developers read each section of the POI or syllabus and broke the content down into small units (Romiszowski, 1988) called frames. A frame typically contained one key concept, one piece of information, or one key idea. Learning strategies were then designed to teach the information in a frame or a group of frames (See a discussion of the conditions of learning and the events of instruction in Gagne, Briggs, & Wager, 1989) and they were designed to promote involvement and motivation.
- Instructional feedback was planned (Cyrus & Smith, 1990; Howard, 1987; McCleary & Egan, 1989; Stoffel, 1987). Students were given on-line quizzes and tasks that required students to perform certain skills. Questions and answers were written that students would be asked and that related directly to the learning objectives. Instructors and site facilitators provided feedback by presenting the correct answers (or having a student give the answers) and then either the instructor or a student explained why a response was correct or incorrect.
- The following is a list of learning strategies that met the above guidelines, and were used in the courseware:
 - role plays
 - instructional games
 - demonstrations
 - interviews
 - mediated vignettes
 - group work/cooperative learning sessions
 - inquiry/discovery exercises
 - individualized strategies (e.g., readings, workbooks)
 - case studies (on-line and off-line)

Produce Media Including Graphics and Videotapes

Screen and Print Graphics. Three types of graphics were developed and produced for presentation. Graphics presented over the TNET system were referred to as screen graphics. Graphics presented in the student's interactive study guide (ISG) were referred to as print graphics.

There were two types of print graphics presented in the ISG: word pictures (Cyrus & Smith, 1990) and printed screen graphics. The word pictures were the same as the screen graphics except that key words and/or concepts were omitted so that students could fill in the

missing words as the instruction progressed (two examples of word pictures are presented in Figure 7). Although there is no research that specifies how often to use word pictures or how many words/ideas per picture to leave blank, one word picture was developed for each frame or group of frames. Pilot tests performed during materials development of the word picture concept indicated that students could fill in only a few words, two or three, per graphic. Otherwise, students missed the instructional message while filling in the word pictures.

The other type of print graphics was printed screen graphics. These printed graphics were exactly the same as the projected screen graphics and were used when word pictures were not needed. Printed screen graphics, rather than word pictures, were used when:

- a concept was being built over several frames and a word picture was presented in the first frame
- one screen graphic was presented in several sequential frames
- a word picture was repeated as a printed screen graphic in a later frame
- another type of visual, such as a slide, was used on the screen
- the screen graphic was informational, e.g., directing the student to complete a PE or PT, complete an off-line task, take a break, etc.

Graphics were used extensively in all the courses. The number of screen graphics used in each course is presented below. Graphics were presented at an average rate of approximately 40/hour for the on-line VTT presentations for the five courses. Of the screen graphics approximately 85% were also produced as word pictures. The other 15% of the print graphics used in the ISG were printed screen graphics and were used as needed, as explained above.

| <u>Course</u> | <u>Screen Graphics</u> |
|---------------|------------------------|
| 71L10 | 1200 |
| 76Y10 | 1180 |
| 95B10 | 880 |
| HazWaste | 211 |
| TQL | 220 |

After initial development, review, and revision of the screen graphics and word pictures, a production team created the final media for use during instruction. The team consisted of the course developer, a word processor, an instructional designer, and a graphic artist.

The following hardware and software were used to create the graphics:

Hardware: TNET Multi-Media Computer (CompuAdd 420's)
TNET ELMO
Video Tape Recorder/Player

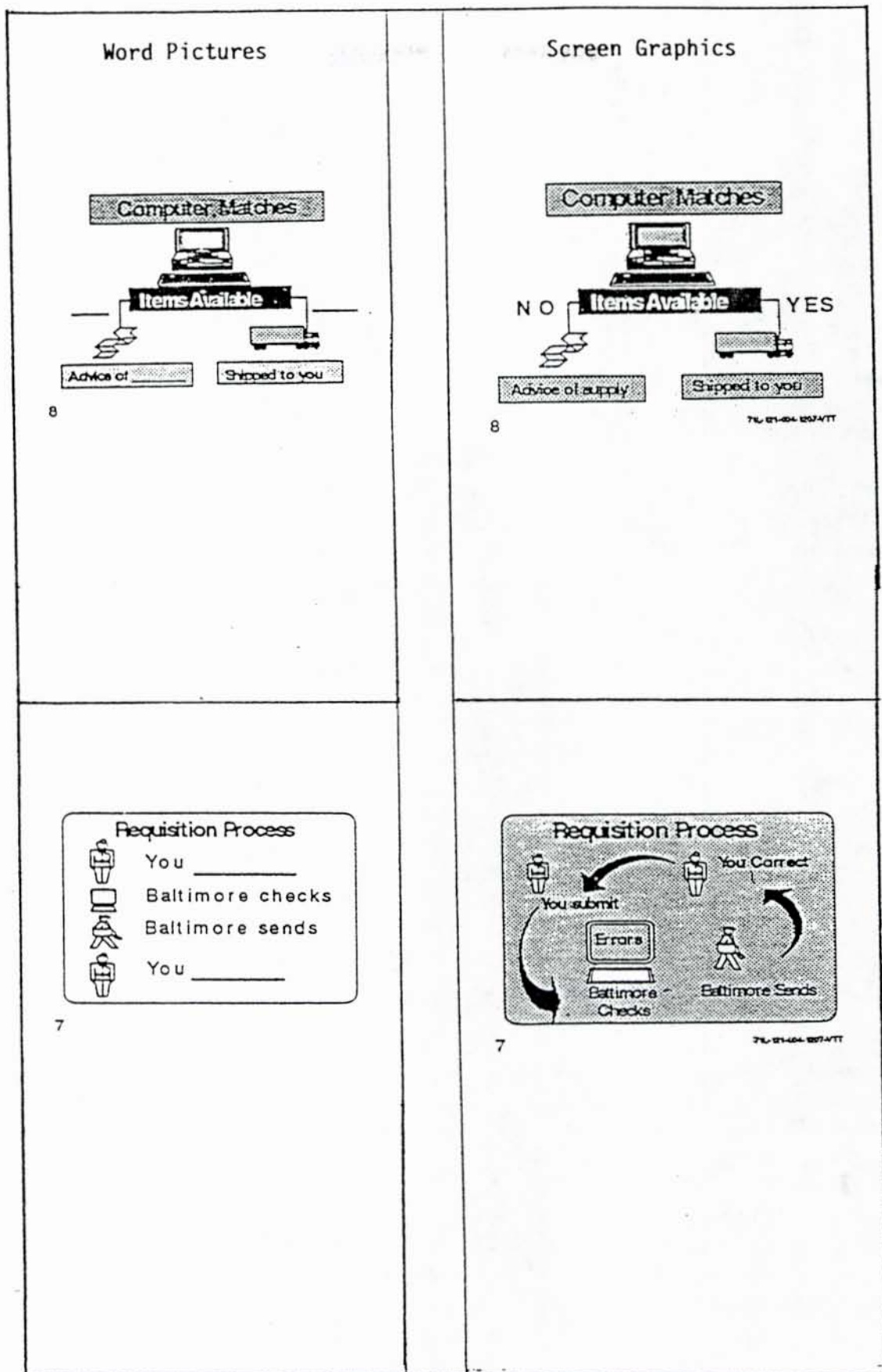


Figure 7: Example of Word Pictures and Screen Graphics

Software: CompuAdd TV
 Arts & Letters Decipher®
 Arts & Letters Clip Art 3.1®
 PowerPoint 3.0®
 Freelance 3.0®
 PageMaker 3.0®

Freelance software was used to create the graphics with some clip art imported from the Arts & Letters Decipher® program. The graphic images were then imported into Aldus PageMaker® to print the student, instructor, and site facilitator guides. Media that were already produced and were to be printed in the instructional guides, e.g., 35mm slides and still video images, were captured using CompuAdd TV software, converted to bitmap (BMP) images using Arts & Letters Decipher®, and then imported into PageMaker®.

35mm Slides. In addition to the screen and print graphics and word pictures, 35mm slides were used in 95B10 and HazWaste courses. The courseware from the military contained slides that were instructionally appropriate for use. While these could have been projected using the ELMO, having all the graphics together in the same computer file was seen as an advantage for ease of access, so each 35mm slide was captured as a graphic image by using the ELMO connected to the TNET Multi-Media computer. This was accomplished by putting the slide on the ELMO and capturing it as a computer file using the CompuAdd TV software program. The file was then converted to a "paintbrush" (PCX) image using the Arts & Letters Decipher® software before importing it into the PowerPoint® program. PowerPoint® is the software that was used to create the "screen shows." The PowerPoint® screen shows were used to display the graphics on the Multi-Media computers so that the instructor could send a graphic to the receive sites during instruction. This same process was used to capture some still images from video tape. The videotape player replaced the ELMO as the input device.

The quality of the original slides was directly related to the quality of screen graphics made from the slide. Poor quality slides reproduce as poor quality graphics. Given poor quality slides, it would be best to redesign them as sketches or schematics rather than reproducing the slides for use as screen graphics.

Videotapes. Two different kinds of videotapes were produced: video vignettes and countdown tapes. Countdown tapes were made for each course. These were used to "count down" the amount of time given by the instructor to (a) work on off-line activities, (b) complete PEs or PTs, and (c) take a break or to have lunch. The countdown tapes were made in segments of 15, 30, 60, 120 minutes.

Three types of video vignettes were made: (a) demonstration or how-to tapes that showed a step-by-step procedure, e.g., MP searches, (b) off-site situations where examples, materials, etc. were not readily available or too dangerous or expensive to bring on-site, e.g., handling hazardous materials, and (c) motivation, e.g., to show the advantages of performing a procedure in a particular way. All videotapes produced by the FTP were short, 2-5 minutes in length,

except for three: an edited 25 minute tape on the Modern Army Record Keeping System (MARKS) used in the 71L10 course, a 19 minute tape of the Chief of Naval Operations for the TQL course, and a 2 minute Hipps Road Site, Jacksonville, Florida, videotape produced by FCCJ for a PBS series, used for the HazWaste course.

Video vignettes were taped at a location appropriate for the scene being shot; for some scenes, the cantonment area at Camp Blanding Training Site, Florida, was used, e.g., barracks were filmed in the background of the 95B10 tapes, scenes were filmed in a unit supply room for 76Y10. Some 71L10 sequences were taped in an office on the FCCJ downtown campus. The videos were shot and edited by the Television Production Department at FCCJ. The production and editing equipment used to produce the videotape are housed in the television production offices and are listed below.

The video vignettes produced were:

| <u>Course</u> | <u>Number of Videos</u> | <u>Total Minutes</u> |
|---------------|-------------------------|----------------------|
| 71L10 | 5 | 10.5 |
| 76Y10 | 4 | 5.5 |
| 95B10 | 6 | 18.75 |
| HazWaste | 12 | 26.5 |
| TQL | 0 | 0 |

The production equipment used was:

- 2 Sony M-7 chip cameras
- Sony SP portable record decks
- Lights, wireless microphones, and other standard ancillary field equipment, such as monitors
- Consumables, such as tape stock and batteries
- Teleprompter (in studio productions)

The post-production equipment used for editing was:

- Sony SP editor and decks
- CEL for DVE (Digital Video Effects)
- Ross Switcher
- Amiga 2500 (Toaster) for character generation and some animation
- Dubs were made on 1/2 inch VHS decks
- Compact Disc (CD) player and cleared music library were used for music source

Design Lesson Plans

Before the final selection and production of the instructional strategies, media, and materials, the course developer wrote a lesson plan. The purpose of writing an initial lesson plan was to analyze each lesson before it was produced.

Each lesson plan was evaluated to determine if (a) key instructional design components were included, e.g., objectives, practical exercises, performance tests, interactive and motivating activities, summaries and overviews, and (b) if the components worked together to enable the learner to reach the specified objectives.

Each lesson plan was also analyzed and evaluated to insure that the media selected (a) enabled the learner to complete the task specified in the objective (Reiser & Gagne, 1983), (b) was an appropriate audio-visual package (Romiszowski, 1988; see Table 9), and (c) used correct principles of graphics, illustrations (see Tables 7 and 8) and interactive television (see Table 10). Media revisions were made at this stage.

Finally, each lesson plan was evaluated to determine if the instruction changed pace about every 20-30 minutes (Cyrs & Smith, 1990). Changes could be made in the type of instructional activity, e.g., from content presentation to an on-line or off-line group or individual activity, or the instructor could give students a 15 minute break. Although the military usually gives students a 10 minute break every hour, the hourly breaks were modified to 15 minute breaks every 90 minutes. (This allowed all students at all sites an adequate break time because some students had to go farther to restrooms and smoking areas; 10 minutes was not sufficient for the students at some sites.)

A final lesson plan was made up of an objective or task or a group of related objectives and tasks. As a general rule, the objective(s) or task(s) that comprised a lesson plan came directly from the POI (MOS courses) or syllabus (special topics courses). The lesson plan included the following components:

- objective(s) for the lesson
- the text of the lesson broken down into frames
- the interactive strategies and media that were designed
- practical exercises and tests for the lesson
- drafts of the screen and print graphics and word pictures
- equipment and materials needed to support the objectives, and
- the time needed to complete the lesson.

In addition, an information sheet adapted from the ones presented in the Army POIs was included at the beginning of each lesson that included the lesson title, course name, where the lesson was found in the military POI or syllabus, e.g., Annex A, the training aids and equipment needed to support the lesson, instructor's references needed, the date the lesson was prepared and by whom, the objectives of the lesson, and other pertinent introductory information. An example of an information sheet is included in Appendix A.

The text and the graphics that made up the lesson plan from the IG and ICG were presented in a two-page spread and are read across two pages. An example of a two-page spread taken from the 71L10 course is presented in Appendix B. Referring to page one, the instructor's directions and lesson plan are provided. Reading across to page 1A, the first column presents the information that is included in the ISG, in this case the learning objective, the second column specifies whether the instructor or some support media, e.g., a videotape, will be seen on the left or motion screen of the TNET system, and the third column shows the graphic or visual that will be seen on the right or static screen of the TNET system. Each section of the guide is called a frame and is numbered the same across the two-page spread. Referring to frame 3, the instructor was seen on the motion camera introducing the memorandum. Frame 4 also shows the instructor on the motion screen presenting content information. On the static screen the student would see the graphic. In their ISG, students had a word picture that corresponded to the graphic on the screen.

Develop Interactive Study Guide (ISG)

The lesson elements of the ISG contained two primary elements: word pictures or printed screen graphics and a Notes column. The word pictures were the same as the screen graphics except that word pictures had key concepts and ideas omitted that students filled in as the instruction proceeded (sample pages from an ISG are included in Appendix C).

Design and Development of a Prototype Unit

A prototype unit was the first unit developed for each course. The prototype unit consisted of the lesson plan from the IG, the ISG lesson, and black and white copies of the graphics. The prototype unit was used as a model for the development of all other units. Its approval by the respective proponent school (MOS courses) or Navy unit (special topics courses) was essential.

The prototype unit was developed in the following stages:

- A first draft of the unit was produced by the course developer.
- An internal team of experts reviewed the unit. The team consisted of the course developer, an instructional designer, a military expert, the FCCJ instructional manager, a FCCJ graphics/television specialist, and the MIA.

- The course developers and MIAs conducted initial pilot tests of selective interactive tasks and activities using simulated VTT equipment (the actual equipment had not yet been installed at FCCJ). IST and FCCJ staff acted as the students.
- The unit was revised based on the expert review and the pilot test.
- A second review was conducted and corrections and adjustments were made.

Obtain Initial Validation and Approval of the Courseware

- The MOS prototype units were presented to the respective proponent school at the school headquarters (71L10 proponent came to FCCJ for the review). The proponent school received the unit approximately one week before the visit. The Navy organizations tasked with reviewing the materials also had approximately one week to review the prototype unit.

Each military group was asked to review the following:

- the content and doctrinal correctness of the unit
 - the specific instructional strategies and methods that were incorporated
 - the graphics used
 - the presentation style presented, e.g., the use of humor, conversational tone, etc.
- After the independent review of the unit by the appropriate group, the IST/FCCJ review team and the military unit SME conducted a frame-by-frame review of the prototype unit. In reference to the issues listed above (e.g., content, presentation style) specific decisions were made about how to develop the remaining units. These specific decisions varied among the various military groups based on specific needs and requirements of the particular proponent or Navy organization.
- Changes specified by the proponent school were incorporated into the final version of the prototype unit.
- A proofreader made final editing changes.
- Final copies were produced.

Design and Development of All Units

Once the prototype unit was developed and approved, all subsequent units including the IG, ICG, and ISG were developed based on the input received from the proponent schools, the

Navy reviewers and the expert review team. Because different requirements had to be met for different courses, the course developer for a particular course was charged with insuring that the military units' guidelines were met. For example, Soldier Support Center (71L10) requested that references to previous or subsequent units be omitted in the courseware so that the units could be resequenced or that a unit could be used in another course. The 95B10 proponent requested that jokes or humor be omitted from the course materials and the graphics, but they gave the course developer leeway to use humor during the course delivery.

Each unit included the same basic components as the prototype unit. The same procedures were followed for development and review of each unit with two minor changes:

- A checklist was developed (see Appendix D) and used by the internal review team (IST/FCCJ) to evaluate each unit. The checklist was used to ensure that each unit included the necessary basic components: (a) for the lesson plan, e.g., objective(s), an introduction, a motivator, content frames, seques linking frames, graphics, word pictures, questions to be asked, involvement activities, a summary, practical exercises, and performance tests, (b) for the instructor's guide, e.g., content presentation strategies and media options, and (c) for the interactive study guide, e.g., word pictures and practical exercises.
- Units were sent to the proponent school or Navy reviewers and were reviewed as they were received. A two-week turnaround time was allotted. Necessary changes were sent back to the course developer. These were incorporated into the course materials.

Surrounding Materials

For each IG, ICG, and ISG, a set of materials was needed that introduced all participants to the project, to the course, to course personnel, to the TNET equipment, and to the instructional processes used in the TNET delivery system. The surrounding materials were course specific and therefore varied in length. The surrounding materials for the MOS courses were approximately 100 pages long; approximately 60 pages long for the special topics courses because the training schedules were considerably shorter for a one-day course.

Listed below are the major categories of surrounding materials found in the instructional guides:

- Overview of the Florida Teletraining Project
- Introduction to TNET
- Introduction to the IG, ICG, or ISG
- Implementing Instruction Over TNET

- Introduction to the Course
- Practical Exercises and Tests
- Network/Technical Information
- Training Schedule

Table 13 lists both the categories and subcategories of the surrounding materials and indicates which guide (Instructor Guide, Instructional Coordinator Guide, or Interactive Study Guide) contains what information.

Practical Exercises and Performance Tests

For the MOS-awarding courses, the Practical Exercises (PEs) and Performance Tests (PTs) were not designed or developed by project personnel. These were provided by the respective proponent schools to project personnel. The PEs and PTs were not altered except to make minor modifications such as correcting typing errors. The 71L10 proponent school did revise all existing PEs for the course as part of their scheduled revision cycle and sent them to the project for inclusion in the course materials.

The special topics courses did not have PEs and PTs included in the course materials. Included with TQL courseware was one learning activity that was used as an off-line exercise, The Red Bead Factory, but other activities were developed to match the learning objectives using the procedures outlined earlier. (The Red Bead Factory is a simulation exercise designed to demonstrate the need for TQL in the workplace.) All activities were called PEs for consistency across the courses. Mastery tests for these two courses, also called PTs for consistency across courses, were developed from the objectives and were subjected to the content and instructional design review procedures outlined earlier.

Design and Development of Complete Course Package

Once all the units were developed, a complete course package was compiled. A complete course package included the following:

- Print materials: the IG, ICG, and ISG. Each guide was bound in a 3-ring binder. The surrounding material was included in the front of the binder and separated by blue tabs. The lessons were included in the next section separated by yellow tabs. The final section included any handouts; appendices were separated from the lessons with green paper. The number of pages produced for the guides of each of the courses are:

TABLE 13

| COMPONENTS INCLUDED IN THE SURROUNDING MATERIALS | | | |
|--|----|-----|-----|
| | IG | ICG | ISG |
| Overview of the Florida Teletraining Project | ✓ | ✓ | ✓ |
| Introduction to TNET | ✓ | ✓ | ✓ |
| Introduction to the TNET System | ✓ | ✓ | ✓ |
| A Brief history of TNET | ✓ | ✓ | ✓ |
| Description of the System | ✓ | ✓ | ✓ |
| Introduction to the IG | ✓ | | |
| Introduction to the ISG | | ✓ | |
| How to Use the Instructor Guide | ✓ | | |
| How to Use the Instructional Coordinator Guide | | ✓ | |
| The VTT Instructor | ✓ | ✓ | ✓ |
| The Military Instructional Assistant | ✓ | ✓ | ✓ |
| The Instructional Coordinators | ✓ | ✓ | ✓ |
| The Military Coordinators | ✓ | ✓ | |
| Flexibility in Instructional Delivery | ✓ | ✓ | |
| Break Policy | ✓ | ✓ | |
| Introduction to the Interactive Study Guide | | | ✓ |
| Welcome to the Course | | | ✓ |
| How to Use the ISG | | | ✓ |
| Implementing Instruction Over TNET | ✓ | ✓ | ✓ |
| Roles and Responsibilities | ✓ | ✓ | ✓ |
| Chart of Roles and Responsibilities | ✓ | ✓ | |
| Classroom Protocol | ✓ | ✓ | ✓ |
| After Action Review (AAR) | ✓ | ✓ | |
| Make-up and Remediation Plans | ✓ | ✓ | ✓ |
| Contingency Plans | ✓ | ✓ | |
| Introduction to the Course | ✓ | ✓ | ✓ |
| Description | ✓ | ✓ | ✓ |
| Course Lesson Sequence | ✓ | ✓ | ✓ |
| Course Objectives | ✓ | ✓ | ✓ |
| Network/Technical Information | | ✓ | |
| Policies and Procedures | | ✓ | |
| Troubleshooting | | ✓ | |
| Instructional Strategies | | ✓ | ✓ |
| Practical Exercises and Tests | ✓ | ✓ | ✓ |
| Administration | ✓ | ✓ | ✓ |
| Checklist | ✓ | ✓ | ✓ |
| Student Progress Charts | ✓ | ✓ | ✓ |
| Training Schedule | ✓ | ✓ | ✓ |
| Detailed Training Schedule | ✓ | ✓ | ✓ |
| Dates for Performance Tests | ✓ | ✓ | ✓ |
| (MOS courses only) | | | |

IG is the Instructor Guide

ICG is the Instructional Coordinator Guide

ISG is the Interactive Study Guide (student manual)

| <u>Course</u> | <u>IG</u> | <u>ICG</u> | <u>ISG</u> |
|---------------|-----------|------------|------------|
| 71L10 | 1272 | 1272 | 652 |
| 76Y10 | 1179 | 1189 | 555 |
| 95B10 | 1161 | 1235 | 664 |
| HazWaste | 303 | 309 | 166 |
| TQL | 388 | 394 | 274 |

- Practical exercises (PEs) and any learning activities that could not be included in the ISG, e.g., role play activities, instructional games, and hands-on exercises, were packaged in individual manila envelopes.
- All support media, e.g., the computer disks for the graphics and slides, videotapes, charts and posters (71L10 and TQL), were produced and packaged as appropriate for the given media.
- All instructional support materials, e.g. military forms, military pamphlets and regulations, typing paper, and handouts, were packaged as appropriate, e.g. using shrink-wrap.
- Performance tests and scoring keys were packaged in individual manila envelopes.

Checklists were developed for each course during this final production phase to insure that all the components necessary for implementing the course had been developed and were ready for use.

Staff and Instructor Training

Training for the course developers and FCCJ personnel was begun during the Design Phase of the project. The training included topics in instructional design, instructional techniques for teletraining, how to select and/or develop appropriate media and graphics, the capabilities of the TNET system, and teletraining techniques. During the Development Phase of the project, the course developers and the MIAs were actually producing units of instruction. Formal training was replaced with "on-the-job" training. Corrective feedback and remediation sessions were conducted individually as needed. Microteaching sessions were continued; the course developers and MIAs practiced teaching units as they were developed in loopback mode using TNET.

Each course developer was also given a 13-page in-house job aid called *The Quick Reference Guide to Course Conversion* to assist them in (a) developing the units of instruction and (b) producing the entire course package. The Quick Reference Guide was an abbreviated handout of key points and instructional ideas that should be considered when designing military courseware for TNET.

The Guide was used as a job aid or ready reference for the course development process.

Topics included in *The Quick Reference Guide* were:

- the components to be included in a lesson plan
- ideas for designing the lesson plans
- guidelines for selecting and using media and instructional strategies
- key conditions of learning for different types of objectives
- the events of instruction
- an outline for converting a unit of instruction
- two checklists that specified the components that had to be included in the IG, ICG, and ISG.

Pilot Testing

A separate function was included in the adapted SAT model that addresses revising instruction. These functions will be discussed in more depth in the Revise Instruction Phase of this section of the report.

During the Development Phase, two types of pilot testing and revision were conducted:

- Instructional Materials were tested to:
 - a) assess the viability of conducting some activities over TNET, for example instructional games that would require extensive use of the microphones
 - b) try out the word picture concept, specifically to determine how many words should be omitted from a frame, and
 - c) determine the adequacy of the graphics in terms of color used, size of print, etc.
- A prototype unit was sent to each proponent school (MOS courses) or U.S. Navy organization (special topics courses) for review and approval.

Personnel Needed During the Development Phase

The following personnel were required to perform the functions and tasks during the Development phase:

- an instructional designer, IST
- a military training expert, IST
- an instructional designer, FCCJ*
- a logistics manager, FCCJ
- an instructional manager, FCCJ
- five course developers, one for each course, FCCJ
- five military SMEs* (called Military Instructional Assistants-MIAs)
- experts in the technology, IST and FCCJ
- graphic artists*
- word processors*
- an editor and proofreader*
- TV studio personnel who ran the equipment during microteaching sessions*
- video technicians for shooting and editing the video vignettes and making the countdown tapes*

The personnel above, who are marked with an asterisk, joined the project during this phase. An instructional designer was added to the FCCJ team to review and revise course materials and to coordinate some efforts among the course developers, graphic artists, and word processors. The graphic artists, word processors, and an editor/proofreader were added to develop all the print materials and to produce the graphics. During the peak development phase (a two-month period), approximately eight full-time word processors and four graphic artists were working on the project. Personnel were also added to produce the videotapes and to operate the equipment for practice sessions.

Summary of the Development Phase

During this phase of the reconfiguration effort, the course materials were developed. Print materials, including the IG, ICG, and ISG, were developed and produced. All media and support materials, including graphics, videotapes, and learning activities were also produced. At the end of this phase of the project all the development and production work was completed. Table 14 summarizes the activities completed during the Development Phase. During the next stage, Implementation, the activities related to actually conducting the course were undertaken.

Implementation Phase

According to the SAT, implementation involves the separate and related functions of preparing for and conducting training. Since conducting training is beyond the scope of this report, the tasks associated with preparing for implementation are the focus of this section. The tasks were:

- acquiring military materials and equipment
- acquiring instructional equipment
- scheduling labs and facilities at the remote sites for instructional activities
- organizing for instruction, e.g., planning for contingencies, the After Action Review (AAR), and flexibility in presentations
- preparing paperwork and record keeping to be used during instruction, e.g., visitor's logs and TNET logs
- producing sufficient quantities of course materials
- delivering the courseware to the remote sites
- staff training to prepare for implementation

Acquiring Military Materials and Equipment

During the Design Phase of the reconfiguration process, the military POIs and syllabi were examined to determine what military materials and equipment were required to implement each course. The military materials were either standard Army forms or publications, e.g., regulations and pamphlets. All the MOS-awarding courses required military materials. Only one course, 95B10, required military equipment. One special topics course, TQL, needed additional copies of an instructional strategy, the Red Bead Factory.

TABLE 14

TASKS PERFORMED DURING THE DEVELOPMENT PHASE

- Develop all learning activities and strategies
- Produce all media including graphics, word pictures, and video tapes
- Develop all lesson plans for the Instructor Guide (IG) and Instructional Coordinator Guide (ICG)
- Develop the Interactive Study Guide (ISG)
- Develop a prototype unit for each course
- Obtain validation and approval of the prototype unit from the appropriate military unit
- Develop all units based upon military input
- Write surrounding materials that were included in the IC, ICG, and ISG
- Prepare/Obtain all practical exercises (PEs) and performance tests (PTs)
- Develop the complete course package of materials for each course
- Continue staff training by providing on-the-job training sessions and providing corrective feedback during the course development process

During the Implementation phase, the materials and equipment were ordered. The initial list of materials and equipment was reexamined to determine if any modifications to the list were needed due to the adaption of the courseware for teletraining, e.g., deletions or additions. Once a final list was compiled, the per student requirements of the military materials were multiplied by the maximum number of students that could be accommodated per course to determine the total number of blank forms and publications required.

The standard Army forms and publications used for instruction were ordered directly from the U.S. Army Publications Distribution Center (USAPDC) in Baltimore, Maryland. The forms and publications were ordered using the standard Army procedure outlined in Chapter 12, section IV of AR 25-30, The Army Integrated Publishing and Printing Program. There were 25 different forms and publications ordered for the three MOS courses.

The publications and blank Army forms were ordered through DITRA. Following the third request for publications, the USAPDC made provisions to set up a special account for the project for future publications requests.

Obtaining the ancillary course support materials proved to be a problem given the time constraints caused by the project's delivery schedule. However, provisions were made for the FTP to get special priority. Without this priority, and on a routine basis for other such course development projects for the military, obtaining the materials and forms would have been a significant problem.

Publications that were out of stock or were not stocked by the USAPDC were locally reproduced if it was possible. When the length of the documents prohibited full document reproduction, the FCCJ course developers and SMEs/MIAs reviewed the documents they had been using for course reconfiguration and extracted and reproduced necessary sections.

In addition to military materials, the 95B10 course required the use of military equipment such as MP clubs and hand irons. A list of these items, by National Stock Number (NSN) and Nomenclature, was compiled. The total amount of equipment needed and the amount needed at each remote site was included on the list. This list was given to the 81st Army Reserve Command (ARCOM), which was tasked by Second Army to provide logistical support. The 81st ARCOM then tasked the 3391st USARF Schools to obtain the equipment on hand receipt for the classrooms in their respective areas of responsibility.

The Practical Exercises and Performance Tests for the MOS courses were not developed by the project. They were obtained directly from the respective proponent schools. The PEs and PTs for 71L10 were sent directly to FCCJ by the Soldier Support Center (SSC). These materials had been updated especially for the project to reflect proponent directed changes to the existing courseware. Sufficient copies were sent for all students.

The PEs and PTs for the 76Y10 course were photocopies of the originals that were provided to FCCJ for course development. Because the proponent schools did not have sufficient

shelf copies nor access to reproduction facilities, FCCJ reproduced sufficient copies of the materials for student use.

The 95B10 Proponent furnished FCCJ with sufficient copies of the written PEs and PTs for each student. Procedures for grading the PTs were altered to accommodate the evaluation component of the project, e.g., hard copies of all student tests and scores were needed, so additional scoring sheets were reproduced.

All PTs for the MOS-awarding courses were locked in a metal cabinet provided at each site to insure test security. The Military Site Coordinator (MSC) at each site was responsible for removing and administering each test and insuring that test security was maintained.

The only additional resource needed for implementation was for the TQL course. The U.S. Navy did not have enough copies of the Red Bead Factory exercise to lend them to the project. A private vendor was located; five copies of the exercise were ordered from Michael A. Johnson, Cupertino, CA.

Acquiring Instructional Equipment

Each remote site was assigned the responsibility to acquire the ancillary instructional equipment needed for course implementation. The following equipment was needed for the duration of the project:

- a bookshelf to house the instructional materials
- access to a video tape player and monitor to show any tapes not presented over TNET (particularly for the purposes of student remediation and make-up).

Additionally, course specific equipment was needed. An equipment list was sent to each remote site and they were tasked with providing the equipment for the project. An example of the kinds of equipment needed follows:

- 71L10, Administrative Specialist
 - 15 Electric Typewriters
 - 1 - 2 Microfiche Readers (these were not included in the POI, but an activity developed by the course developer required students to use the readers)
- 76Y10, Unit Supply Specialist
 - 5 Microfiche Readers

- 95B10, Military Police
 - Lockable Cabinet
 - 6 Gym Mats
 - Fire Arms Training System (FATS) (One site, Valencia Community College did not have access to FATS; the video, "Deadly Force," from the FCCJ audio-visual collection, was shown over TNET to VCC).

Scheduling Labs and Facilities at the Remote Sites for Instructional Activities

Additional space requirements were needed for the 95B10 course. For example, during the self-defense unit, students had to demonstrate MP search procedures (such as the prone search) that required more space than was available in the classrooms. In addition, an automobile was needed at each site for the vehicle search lesson. Each remote site designated space and resources for the practical exercises and for the performance tests for any unit that required it. Necessary scheduling arrangements were made by each site.

Because typing instruction is included in the 71L10 course, a decision was made to use a typing lab for this instruction. This was not feasible because some sites did not have ready access to a typing lab. Each site, therefore, brought typewriters into the classroom; all practical exercises and performance tests were conducted there. The 71L10 POI specifies that typewriters rather than word processors are to be used when conducting the course.

Organizing for Instruction

During this phase of the process, several plans were developed to insure that the instruction was continuous and effective in the event that forces outside of project control, such as equipment failures, transmission outages due to inclement weather, or student absences, occurred. While these plans were made primarily for the two-week MOS courses, they were modified and used for the one-day special topics courses.

First, a series of contingency plans was established (see Willis, 1989). Nine specific contingencies were planned to accommodate events as varied as loss of audio at only one site to a long-term, system-wide failure. These contingencies were published in the IG and ICG. In the event of a failure of any kind, the instructional coordinator at each site knew precisely what to do to continue with the instruction. An example of the contingency plans used with the 95B10 course is included in Table 15. The TNET system had an overall reliability of 99+ % for all five courses so the contingency plans were rarely used.

Second, an After Action Review (AAR) was planned. It was scheduled at the end of each instructional day. The purpose of the AAR was to discuss what happened each day, specifically what went right, what went wrong, and what, if any, changes needed to be made in the instructional process or in the procedures. Also, preparations for the next day's instruction were discussed. The personnel at the remote sites were asked for input and feedback to help improve

TABLE 15

CONTINGENCY PLANS

Although every reasonable (and affordable) attempt is being made to ensure continuous course delivery during instructional periods, contingency plans have been developed in case of loss of power, network or equipment failures, and other unforeseeable events.

IFTHEN

- | | |
|---|---|
| 1. Origination Site is down, | FCCJ2 will be used. (Instruction will occur with students in the classroom.) |
| 2. FCCJ2 is down, | Origination site will be used. (Students will be moved to the TV studio.) |
| 3. Origination site and FCCJ2 are down, | Designated on-site activities will be employed. |
| 4. SPJC and/or VCC is down, | <p>Make-up videotapes of the instruction missed will be sent via overnight mail to that site. Conference time (for questions and clarification of points) will be scheduled on an as-needed basis following instruction periods, or telephone instructions will be provided requesting on-site instructors to proceed with printed or practice activities.</p> <p>In case of an extended disruption of the network, the procedures in number 5 will be used and, if needed, those will be backed up by videotape.</p> |
| 5. A system-wide failure occurs, | <p>The Military Site Coordinator at each site will use the lesson materials in their guide to teach the lesson. The ELMO can be used as an overhead projector to display the graphics. The VTT Instructor will contact each coordinator by telephone to convey directions.</p> |
| 6. A long-term site failure occurs, | <p>A military instructor will be assigned or relocated at any given site, to that site for on-site instruction. Videotapes of the teletraining will be provided the next day following instruction.</p> |
| 7. Audio only (for any or all sites), | <p>Instruction continues with students following the sequential activities in their Interactive Study Guide.</p> <p>The site coordinators will use transparencies to continue instruction.</p> |
| 8. Graphics Computer failure, | Switch to back-up computer. |
| 9. VTT Instructor absence, | Use Military Instructor. |

the instruction. The scheduled participants in the AAR were the instructional coordinators (ICs), the MSCs, the MIA, the FCCJ instructional manager, and chairing the conference, the VTT instructor.

The procedures followed for the AAR were that the ICs were asked to follow the instructional text in their ICG as the instruction was being presented over the network. Since the instruction was presented live and the text was presented rather than read exactly as it was scripted, the ICs were asked to monitor the alterations made during instruction and were asked to discuss the effectiveness of any changes made during the AAR as well as to discuss the instructional events of the day.

Third, procedures were formalized for any make-up and remediation that students might need. A make-up session was provided for students who were absent due to illness or an emergency. A remediation session was provided if a student was having academic difficulties. For example, back-up video tapes were made of each day's lessons. These could be shipped overnight to the remote site(s) if a student needed to view them. Other methods of make-up and remediation included getting notes from classmates to fill in the word pictures, reading the lesson plan in the Instructional Coordinator Guide (ICG), and scheduling a study hall and/or a teleconference with the video teletraining instructor.

Finally, a detailed training schedule was developed and produced for inclusion in the ISG, IC, and ICG. It was developed by the military training specialist at IST based on input from the instructional manager at FCCJ. The final schedule was produced in four versions, one for each remote site that included site specific information, e.g., room numbers, and one for the overall network. Included in each schedule was the time allotted for:

- each instructional lesson, including PEs and PTs,
- military formations
- network start-up
- make-up and remediation
- the After Action Review (AAR)
- breaks and lunch

Prepare Record Keeping and Paperwork

During instruction, records were kept on students for the military so that students could be awarded the MOS or could attain a certificate of completion of a course. Records were also kept for the purposes of evaluating the project. All record keeping forms were prepared during this phase of reconfiguration. The forms prepared were:

- Attendance records and the in-class sign-in sheet
- Performance test achievement records
- Grading or scoring sheets not included in the courseware, e.g., to record pretest scores
- Military forms for tracking visitor's to the classrooms, i.e., The USARF Visitor's Log
- Logs to track the use and efficiency of the equipment, i.e., the TNET Log

Producing and Delivering Courseware to the Remote Sites

The maximum student load per site was established at 15 to insure a high level of interactivity at each site and among students at the sites. This number was multiplied by the number of sites (three for the MOS courses and three, four, or five for the special topics courses) to determine how many copies of the ISG were needed. Two ICGs were produced for each site. Several extra copies of the IG and ICG were also produced for each course. These were sent to the sites for visitor use. For any one course, with three sites, a minimum of 52 copies of the ISG, 11 copies of the ICG, and six copies of the IC were produced. Also produced were copies of any PEs and all the forms and paperwork for each site.

In addition to the course materials produced for the sites, copies of the courseware were produced for various government agencies, e.g., TNET, TRADOC, DITRA, the proponent schools, and for the project participants, e.g., IST and the community colleges.

During the initial stages of producing the materials, a non-profit agency, PRIDE, was contracted to perform the tasks of xeroxing, collating, and binding the course materials. This proved unworkable due to the very tight production schedule so an in-house production center was set up at FCCJ. Temporary personnel were hired to be in charge of the logistic of producing, boxing, and mailing or delivering the courseware to the sites.

All courseware was delivered to the remote sites one week before the course began. A checklist of course materials was included with each shipment. The Instructional Coordinator at each site checked the delivery to insure that all the materials were included. Any missing items were shipped from FCCJ to the site via one or two-day delivery.

Staff Training

Previous staff training was conducted primarily for the course developers, who were also the video teletraining (VTT) instructors, the SMEs (who became the military on-camera instructors called the Military Instructional Assistant (MIAs)) and other project personnel who

were involved in the design and development of the courses, the use of the TNET system, and the on-camera presentation of the instruction.

During the Implementation Phase of the project, staff training was conducted for all project personnel at the origination and remote sites (see the list in the next section, Personnel Needed During Implementation). There were two types of training.

The first was large group training held at FCCJ. The primary purpose of this training was to (a) explain the roles and responsibilities of all project participants and to (b) have project personnel at each site work together to form a team for implementing the instruction. The large group sessions for all project participants were conducted on 3-4 August 1992 and on 29-30 August 1992. Two sessions were needed to allow for all project participants to receive the training. The agenda for this training was:

- Welcome and Introductions
- Project Overview
- Course Overviews
- TNET Orientation/Overview
- TNET Demonstration
- Classroom Protocol and Practice
- Roles and Responsibilities Overview
- Policies and Procedures (e.g., for operating the network, for visitation and observation)
- Small group work by functional roles, e.g., technicians, site coordinators, etc.
- Overview and Demonstration of Instructional Strategies
- Overview of Contingency Plans
- Procedures for Make-up and Remediation
- Evaluation and Data Collection Responsibilities
- Putting It All Together
 - The After Action Review
 - Use of the Training Schedule

The second type of training was Over-the-Network Training. The purpose of this training was to have all project participants in place, that is at the origination and the remote sites, to (a) plan for course and instructional delivery and (b) to practice technical and instructional uses of the system.

A schedule was made for each Over-the-Network training session and was distributed to all project personnel. The instructional and military coordinators and the technicians at each site, the VTT instructor, the MIA, the instructional manager and the technical team from FCCJ, and the instructional design expert from IST were present at these sessions. There were approximately ten sessions per course for the MOS courses; five for each special topics courses.

During these sessions, project personnel were informed of any instructional changes, practiced using the equipment, practiced the classroom protocols set up during the group training, clarified roles and responsibilities, and in general prepared for course delivery.

Training Technical Personnel. The engineers and technicians received both formal and informal training in the operation of TNET. First, a representative from AETD/TNET presented instruction at FCCJ after the origination site was installed. A two-day workshop on the configuration of the equipment, its capabilities, and troubleshooting techniques was provided. Practice sessions using the equipment were provided and a TNET handbook with flowcharts of the troubleshooting procedures was given to each member of the technical team at each remote site.

Second, when the equipment at each site was installed, the installer worked individually with the technicians at each site to insure their ability to use the equipment. Personalized and individualized practice with the equipment was provided.

The technical personnel also attended the group training session on 3 - 4 August 1993.

Personnel Needed During Implementation

During this phase of the project all personnel needed to conduct the instruction and all personnel involved with the logistics of producing and delivering the courseware were in place. The personnel requirements for this phase were extensive.

The primary task of planning for implementation was to specify the roles and responsibilities of various personnel for the delivery of instruction and to prepare them to perform their roles (See Table 16). The key roles of personnel included, at a minimum, the following:

Instruction

At the origination site, the primary person responsible for content presentation was the VTT Instructor. The content of the courses, however, required that a military instructor/SME,

TABLE 16

| ROLES AND RESPONSIBILITIES | | | |
|--|---|--|--|
| Origination Site | | Remote Sites | |
| VTT Instructor | Military VTT Instructor | Instructional Coordinator | Military Site Coordinator |
| <ul style="list-style-type: none"> Reconfigures military courseware for VTT Serves as primary instructor Presents content and graphics Directs VTT activities Explains PEs and provides feedback Paces instruction Conducts daily AAR | <ul style="list-style-type: none"> Assists VTT instructor Answers military questions Presents instruction as requested by VTT instructor Grades tests and PEs as needed Acts as content expert Acts as NCOIC Directs remediation | <ul style="list-style-type: none"> Directs all on-site activities Distributes handouts and materials Directs/controls audio at remote site Coordinates questions to origination site Leads discussion groups Participates in daily AAR Becomes the VTT instructor when baton is passed Directs remediation, makeups, and contingency plans | <ul style="list-style-type: none"> Takes attendance Controls student behavior Maintain visitor logs Updates remote site training schedule Participates daily AAR Identifies students needing remedial help Monitors student progress Assists instructional coordinator in remediation, makeups, and contingency plans <p><u>95B ONLY</u></p> <ul style="list-style-type: none"> Directs/evaluates PEs Secures government instructional equipment |

the MIA deliver some of the content. At each remote site, a community college site coordinator, the Instructional Coordinator (IC) was needed as the instructor of record for each course. The IC also performed some of the off-line instructional roles. For the MOS courses, a MSC was also required.

The MSC was responsible for record keeping, adhering to the off-camera course schedule, distributing and maintaining instructional materials (e.g., regulations, pamphlets), evaluating off-line exercises, sending course materials back to the VTT instructor, and conferring with the on-camera instructor, etc. For the 95B10 course, the MSC also performed some instructional roles and graded some off-line activities. The IC performed these roles during the one-day special topics courses. In these courses, students were not being formally certified so the military role could be performed by community college personnel.

Technical

Technical personnel were required at both the origination site and at each remote site. At the origination site a team of engineers and technicians was needed who had direct phone access to TNET Network Control Center (NCC) and who were experts in the system as a whole and with TNET. They were responsible for insuring that the system was functioning properly. At the remote sites, a technician and an assistant (as a backup) were required. Their purpose was to insure system viability at their site and to maintain contact with the origination site and the other remote sites.

Management

Both civilian and military personnel were required to manage different aspects of the instruction. For the MOS courses, the MSC was responsible for taking attendance, and insuring that appropriate forms were completed. The MIA graded the PTs for 71L10 and 76Y10; the MSC graded the PTs for 95B10. An instructor of record from each community college, the Instructional Coordinator (IC), was needed at each remote site. For the special topics courses, the IC performed the roles previously performed by the MSC.

The IC was responsible for insuring that the community college standards were met. This was specifically in regard to providing credit, but this person also provided non-instructional support, e.g., opening the door and coordinating with the technical personnel.

The community college Administrative Point of Contact (POC) was responsible for overseeing and coordinating the project activities at the remote sites with the lead institution, FCCJ.

A facilities coordinator was directly responsible for the remote site, e.g., scheduling and providing access to the designated classroom as needed during the project. The facilities coordinator also performed management and logistics functions at the remote sites such as

arranging for xeroxing to be done if it was needed, receiving and sending mail, insuring that a technician was at the sites, etc.

The list below is a summary of the personnel needed during this phase of reconfiguration:

- Origination Site (FCCJ)
 - VTT Instructor
 - Military Instructional Assistant (MIA)
 - Network/Technical Personnel
- Each Remote Site
 - Instructional Coordinator (IC)
 - Military Site Coordinator (MSC) (MOS courses only)
 - Site Technician/Back-up
 - Facilities Coordinator
 - Administrative POC
- Personnel Conducting Staff and Technical Training
 - Instructional Designer, IST
 - Military Training Expert, IST
 - Instructional Manager, FCCJ
 - Network Manager, FCCJ
 - Chief Engineer and Network Technicians, FCCJ
- Logistics
 - Logistics Manager, FCCJ
 - Assistant, FCCJ

Summary of the Implementation Phase

During this phase of the reconfiguration process, the tasks associated with preparing for the delivery of the courses were performed. These tasks included ordering and acquiring military forms, materials, and equipment, acquiring instructional equipment, scheduling labs and facilities, organizing for instruction, including making contingency plans and preparing detailed training schedules, preparing all the paperwork and record keeping forms that were needed, producing and delivering of all courseware to the remote sites, and conducting staff training to prepare all project personnel for the delivery of the courses. Table 17 summarizes these tasks.

Revise Instruction Phase

The SAT includes a revise instruction function in the Development phase of the model. In the adapted model, Revise Instruction, was made a separate phase of the reconfiguration process to highlight its importance. Several revision and validation cycles were performed during the reconfiguration process.

The functions of the Revise Instruction phase are not discreet, but continuous. The major activities of Revise Instruction are presented within the context of other phases of the adapted SAT model.

Analysis Phase

During this phase, there was no revision of the instruction by project personnel because the five courses were assigned to the project. While instructional components of the courses were analyzed, no changes were made at this point in the process.

Design Phase

During this and the previous phase, the POI and syllabi were evaluated to determine if there was a match between objectives, test items, and instructional strategies and media. For the MOS courses, minor modifications to the wording of the objectives, performance test items, and practical exercises were made, but no other revisions were allowed by the proponent schools and TRADOC because of certification issues. The 71L10 proponent did revise their performance tests and practical exercises in part because of the analysis of the courseware performed by project personnel.

For the special topics courses, the learning objectives, performance items, and global media and instructional strategy selections were written, modified, and aligned as necessary to produce a sound instructional course.

TABLE 17

TASKS PERFORMED DURING THE IMPLEMENTATION PHASE

- Acquire military materials and equipment
- Acquire instructional equipment
- Schedule labs and facilities at the remote sites
- Organize for instruction, e.g., establish contingency plans, plan the AAR, establish procedures for make-up and remediation
- Prepare all record keeping and paperwork
- Produce and deliver all courseware to the remote sites
- Conduct training for all project personnel involved with delivering the courses

Development Phase

Most of the course revisions occurred during this phase and during the Implementation phase. A key strategy used when developing the instruction was to keep the instruction "lean." That is, the instruction was developed in an abbreviated fashion so that it could be easily modified. For example, all graphics in the review materials were first developed in black and white. This allowed revisions to be made before the expensive final color versions were produced.

Major revisions to the courseware were made after several rounds of feedback were obtained. This was also a cost effective measure. There were two revision cycles. The first revision was made after the review by the expert review team (IST and FCCJ) and after selected interactive tasks and activities were field tested. The second revision was made after the proponent school review.

Two types of feedback were gathered: process and product. Process feedback included information about the readability and vocabulary level of the print materials, the adequacy of the graphics and their appropriateness in relationship to the text, the appropriateness of the instructional strategies and media for the audience, content, and delivery system, the motivational level of the materials, etc. Product feedback included student performance measures or, stated another way, the ability of the courseware to produce the desired outcomes.

The data collected during the Development Phase were process data; data were not collected from students because there were none available. Rather, expert reviewers evaluated the courseware and made suggested revisions. The reviewers were instructional design experts, military training experts, experts in the technology, and military SMEs. Since the complete courseware package was not pilot tested with students prior to the first course delivery (Brenneman, 1989), product (performance) data was not directly obtained; content experts did a "paper" evaluation of this aspect of the courseware during course reviews.

The following cycles of feedback and revision were conducted during the Development Phase:

- All course materials were reviewed by two instructional designers (IST and FCCJ), the course developer, the MIA, a military training expert, and a graphic artist. A large part of this review assessed the adequacy of word pictures. These were evaluated to determine if too many were being used, if there were too many blanks to fill in, if students would miss part of the content while filling in the blanks, and if the word pictures adequately supported the content presentation. No modifications were made at this time, but the results guided the development of future word pictures. Needed changes were made after later review cycles.
- As soon as the equipment was installed, selected instructional strategies such as a role play, an instructional game, and selected media such as a videotape were

tried out to assess the viability of the strategies and media for use over the TNET system. These representative tasks were tried out with reviewers acting as students.

- Using first draft materials, the capabilities of TNET were also assessed. Questions such as how fast the graphics were transmitted, how difficult it was to focus the camera on different size graphics, and how long it took the instructor to "pass the baton" and to go from one remote site to another were among the information needed to adapt good instructional materials to TNET.
- After the initial review and first revision cycle, the prototype unit and then all subsequent units were sent to the respective proponent schools or Navy review team for feedback. All comments were reviewed by the course developer and each instructional unit was revised.
- Concurrently with the print review cycle, the graphics were reviewed using TNET. Since the color palettes for the graphics computer system and the TNET system did not correspond, each graphic was evaluated for color correctness. During this review, each graphic was also evaluated to make sure it was the right size for the TNET monitor. The graphics were corrected at this point.
- After both review cycles, the complete revised course package was sent to each of the proponent schools or the appropriate Navy unit for approval. The complete package was also sent to DITRA and IST for review. The complete course package included the ISG, IC, ICG, all print black and white copies of graphics and visual materials, and any support media, e.g., videotapes.

Final modifications of the courseware prior to course delivery were made at this point.

Implementation Phase

Plans were made for collecting data to revise or modify the courseware during course delivery. A pilot test site, called an Intensive Site, was set up at the FCCJ remote site. This site, called FCCJ2, was located upstairs in the same building as the origination site, called FCCJ1. Evaluators could move between the two sites in less than a minute. FCCJ2 had a one-way mirror that allowed evaluators to observe, evaluate, and critique the instruction. The benefit of the Intensive Site being at FCCJ was that the course instructor could be immediately advised of any course revisions that were needed.

Students at FCCJ2 were not shown the origination site. This was done to insure that the Intensive Site was exactly like the other two remote sites.

The purpose of the Intensive Site was two-fold:

- To make immediate changes to the instruction and the delivery process as necessary
- To gather data that could be used to develop or modify the courses still being developed.

During this Phase, data were collected from both the students and the site coordinators during the MOS courses. Evaluators from IST also observed the instruction and collected data.

Three types of student data were collected. Product or achievement data were collected after the students took individual performance tests (PTs) and after they performed on practical exercises (PEs). Process data were collected from all students. Each student filled out a questionnaire and a random group of students was interviewed.

Each student completed the same questionnaire twice: once after the first lesson, and then again after the first lesson that included a PT or PE. Students were asked a series of questions about the written materials, e.g., if the purpose of the instruction was clear, if the materials were at an appropriate reading level, if the directions were clear, if the word pictures helped them learn the content, etc. Students were also asked questions about the instruction as it was presented over TNET. For example, students were asked if they had a chance to interact with the instructor and other students, if the interactive study guide (ISG) and the content presentation were compatible, if the lesson presentation was at an acceptable quality level, if they were able to use the components, e.g., the microphones, and if and how well they liked or disliked the instruction.

During the second administration of the questionnaire, the same set of questions was asked with the addition of questions specifically about the adequacy of the PEs and the clarity of the directions given for the PT. The intent of these questions was to compare them to the product (achievement) data gathered at the end of the unit or lesson.

Several students were also randomly chosen to be interviewed. Each interview was based on the student's responses to answers given on their questionnaire. Students were asked to elaborate and/or clarify their responses.

The instructional coordinators, both civilian and military, were also interviewed. The coordinators were asked if their roles and responsibilities were clear to them, if all the materials they needed were on hand, if they noticed any students having problems and what they did about that, if they had any suggestions for improving or revising the instruction, and what their assessment was of the components of the lesson, e.g., the written materials, the off-line activities, interaction patterns, etc.

In addition, an IST evaluator observed the instruction as it was being presented. Twenty-two behaviors were listed on an observation checksheet. The categories of the behaviors included:

- the number of on-line vs. off-line activities
- instructor use of sound instructional principles, e.g., content examples, summaries, lesson overviews
- whether or not the instructor was able to operate the TNET equipment
- the number of questions that were asked and to whom, e.g., student to instructor, student to site coordinator, instructor to student
- student behaviors, e.g., enjoyment, excitement, confusion, puzzlement

A frequency count with narrative summary of the instructional events was recorded. This was used to discuss and modify, if needed, the instructional events of the lesson.

Finally, an After Action Review (AAR) was held each day after the instruction was completed. The IC and MSC at each of the three remote sites, plus the VTT instructor, the MIA and the Instructional Manager at FCCJ met daily over the network to discuss the day's activities and plan for the following day. A simple one-page form asked the site coordinators to (a) rate the quality of the lesson each day, e.g., lesson presentation, student motivation, student interaction with the VTT instructor, the instructor's use of graphics/charts, wise use of available time, and classroom exercises and (b) to summarize any comments they might have about the instruction. These were used to provide daily feedback to the VTT instructor and the MIA and to adjust the instruction as needed.

Personnel Needed During the Revise Instruction Phase

Personnel Needed to Deliver Instruction During the Revise Instruction Phase

- Origination Site (FCCJ)
 - VTT Instructor
 - Military Instructional Assistant (MIA)
 - Network/Technical Personnel
- Remote Sites
 - Instructional Coordinator
 - Military Site Coordinator (MOS courses only)
 - Site Technician/Back-up

Additional Personnel Needed for Validating and Revising Materials

- Evaluation expert, IST
- Instructional designer, IST
- Military training expert, IST
- Instructional Manager, FCCJ
- Network Manager, FCCJ
- Respective proponent school and Navy training representatives
- Graphic artist, FCCJ
- Word processors, FCCJ

Summary of the Revise Instruction Phase

The Revise Instruction Phase of the reconfiguration effort was an on-going and continuing process. It was during the Development and Implementation Phases that the majority of course tryout and revision was accomplished. Table 18 summarizes this Phase.

During Development, the course developers/VTT instructors adopted a lean development strategy. Several cycles of process and product feedback data were gathered before the prototype and subsequent units were sent to the military for approval. A final round of revision was made after the appropriate military agency approved the courseware.

During Implementation, a pilot testing site, the Intensive Site, was set up so that the instruction could be monitored and revised as it was being delivered. The feedback received from the Intensive Site was used to immediately revise the instruction that was currently being delivered and it was used to improve the development of units for later courses that were offered. Daily AARs were also held to monitor and modify the instruction as it was being implemented.

Management Phase

A Management component was added to the adapted SAT model because of the complexity of the reconfiguration process. This phase is presented in two parts: (a) personnel and functional groups and (b) tasks completed at different stages of the project.

TABLE 18

TASKS CONDUCTED DURING THE REVISE INSTRUCTION PHASE

Analysis Phase

- no revisions made during this phase

Design Phase

- word changes and typing corrections were made
- instructional components were aligned according to instructional design principles

Development Phase

- instructional materials were developed "lean"
- process and product data was gathered from the expert review team; no student data was gathered
- two revisions cycles:
 - after the development and tryout of word pictures, graphics, selected instructional strategies, and the capabilities of TNET
 - after the military review
- final modifications to the courseware were made at this point

Implementation Phase

- an intensive site was set up to collect data during delivery (MOS courses only)
- process and product data was gathered from students and from the instructional coordinators
- data was gathered using two administrations of a questionnaire; a random group of students was interviewed
- data was used to modify courses as necessary and to provide input for the development of the courses still in designed
- IST evaluators collected data for the evaluation of the project, but data was also used to modify the instruction
- the AAR was established to discuss each day's instruction

Personnel and Functional Groups

During reconfiguration, the two most important tasks to be completed were (a) the design, development, and production of the courseware and (b) training project personnel. The personnel needed and tasks performed in each phase of the project were listed previously and are not repeated here. As a review and to provide an overall perspective of the management component of this aspect of the project, a list of the teams needed for the design, delivery, production and staff training during the reconfiguration effort is included. These will be discussed in more depth in a later part of this section. The teams were:

- instructional design team
- delivery/implementation team
- production team
- technical team
- review and validation team
- staff training team(s)

In addition to the teams listed above, two other primary groups had to be coordinated and their efforts managed in order to implement the courses.

Military Organizations

A military training specialist was hired to insure that all appropriate military groups were involved in the project (See Table 1) and that the training met military standards. For the MOS courses, some key military groups included TRADOC, the proponent schools, USARF schools, Forces Command (FORSCOM), Second Army, 81st ARCOM (Army Reserve Command), Florida Army National Guard (FLARNG), and United States Army Reserve Command (USARC). For the special topics courses, the U.S. Navy identified key military command groups to work with project personnel. These included: Chief, Naval Education and Training; Naval Training Systems Center; Commander, Naval Aviation Activities, Jacksonville; Orlando Naval Training Center; and Naval Air Station, Cecil Field, Jacksonville.

These groups had primary responsibility for insuring that the courses met military standards, that instructors were approved, and that students would be certified, if necessary, as per military requirements. The military groups also assisted with the selection and identification of students, and they provided the SME/MIA who assisted with course development and delivery.

Community College Organizations

Three community colleges were involved in the project. While FCCJ was responsible for the design, development, and implementation of the courseware, and providing one remote site, two other community colleges were involved in the project, Valencia Community College (VCC) and St. Petersburg Junior College (SPJC). FCCJ provided the lead in making sure that organizational decisions regarding the community colleges were made. These included decisions regarding (a) selecting the site for the satellite dish and TNET equipment (b) selecting the classroom to be used for instruction, (c) identifying instructional and technical personnel, and (d) organizing the resources for instruction. Subcontracts between FCCJ and the two other community colleges were signed specifying the terms of their agreements.

A project manager at FCCJ and the logistics manager were primarily responsible for insuring that the subcontracts for the project were in place. At each community college an administrative POC was the prime contract for all negotiations made between the lead institution (FCCJ) and each community college.

Management of Project Tasks

One of the most complex and important components of the reconfiguration process was the management of the various teams and their tasks. Teams of people had to be organized as did a communication flow that allowed all the various tasks to be accomplished. In the section below, key groups and tasks that were coordinated during the three major phases of the reconfiguration effort are described.

Pre-course Development

For the military and directly related to course development, DITRA and TRADOC were chiefly responsible for insuring that the proponent schools cooperated with the project and that they provided the necessary course materials. The materials needed were POIs (MOS courses) and lesson outlines or syllabi (special topics courses), military regulations and other reference materials, and military equipment, e.g., hand irons. Procurement procedures for these materials were previously described.

In addition, a Memorandum of Understanding (MOU) with AETD regarding TNET was negotiated. These agreements had direct impact on the reconfiguration effort. Decisions related to exactly what equipment was included with the system, how many systems would be provided, when they would be installed, etc. were made. DITRA took the lead in working with AETD.

Another military group that played a significant role in the process was the USARF schools. These schools, 3388th USARF (Tampa) and 3391st USARF (Jacksonville), were ultimately responsible for providing students to take the courses and for providing SMEs for the course conversion process.

Other groups, such as 81st ARCOM, FORSCOM, and the U.S. 2nd Army, etc. also had a direct interest in the project, specifically the purpose of the project and how it was being implemented. DITRA took the lead role in establishing relationships with these groups and keeping them informed.

The major civilian groups involved in pre-course development were IST and FCCJ. The IST team had the major responsibility for designing the conversion model, establishing the procedures for reconfiguration, and designing the evaluation plan. FCCJ had major responsibility for selecting course developers, establishing agreements with the VCC and SPJC, and setting up development and production procedures for the courses.

Course Design and Development

During this phase of the project, units of instruction were designed and developed, and approved by the appropriate agency. Some of the tasks identified in the pre-conversion phase continued, e.g., selecting students, getting materials, and establishing agreements with participating community colleges. However, the primary task of this phase was to produce and gain approval for the instructional packages.

Three major groups participated in this task: IST, FCCJ, and the proponent school or U.S. Navy organization responsible for the special topics courses. IST provided technical support and expert ISD and military review for each unit of instruction.

FCCJ was charged with detailed development of the courses, including the design of the graphics and support media. In addition to the course developers who produced the materials, other personnel required for this phase were word processors, graphics designers, and proofreaders. A development and production tracking worksheet for the 71L10 course is included in Table 19. This shows the production tasks required to get the course ready for implementation.

Different courses were organized differently and that influenced timelines for completing course materials. For example, the MP course was organized by tasks, whereas 76Y10 and 71L10 were organized by units. The timelines established to complete the course development process had to take these differences into account. In general, a first draft of a unit took about two weeks to develop, another week for internal review, and another week for corrections before it was sent to the proponent school.

The third group with a primary task to perform in this phase of the project was the military review. Each proponent (MOS courses) and U.S. Navy group (special topics courses) agreed to review and provide comments about each unit with a one to two week turnaround. Since these courses were being developed during the summer months, the schedules of all concerned required a flexible review timeframe.

TABLE 19

| COURSE: 121-71L10-RC ADMINISTRATIVE SPECIALIST DEVELOPMENT AND PRODUCTION TRACKING | | Received From Developer | Review Copies Produced & Distributed to IST(2), TV/Graphics, Managers, Developer & SME (I,T,M,D,S) | Review Copies Returned From I, T, M, D, and S | Review Copies Delivered to Developer | Review Copy Received From Developer | Instructor Guide, Student Guide PEs, PTs, Objectives, ELMO Graphics and Lesson Outline Produced | All Documents Sent To Graphic Artist and Proofreader | Documents Returned From Proofreader | Documents Returned From Graphic Artist | Documents Revised and Sent to IST | Documents Revised and Sent to Proponent School | Documents Received From Proponent School | Documents Final Review By Manager and IST | Camera-Ready Copies Produced | Computer Slide Show Produced | Documents Printed | All Materials Delivered to Receive Sites |
|---|-----------------------------------|-------------------------|--|--|---|--|---|---|--|---|--------------------------------------|---|---|--|------------------------------|------------------------------|-------------------|---|
| TASK NUMBER | TITLE | | | | | | | | | | | | | | | | | |
| 121-PA | The Privacy Act | | | | | | | | | | | | | | | | | |
| 121-CORRES | Introduction to Correspondence | | | | | | | | | | | | | | | | | |
| 121-004-1202 | Type A Memorandum | | | | | | | | | | | | | | | | | |
| 121-004-1203 | Type A Letter | | | | | | | | | | | | | | | | | |
| 121-004-1204 | Type an Endorsement to a Memo | | | | | | | | | | | | | | | | | |
| 121-004-1205 | Type A Joint Messageform | | | | | | | | | | | | | | | | | |
| 121-004-1207 | Resupply Publications ... | | | | | | | | | | | | | | | | | |
| 121-004-1216 | Type A Special Purpose Memo | | | | | | | | | | | | | | | | | |
| 121-004-1223 | Route Incoming Distribution | | | | | | | | | | | | | | | | | |
| 121-004-1224 | Dispatch Outgoing Distribution | | | | | | | | | | | | | | | | | |
| 121-004-1227 | Establsh Files | | | | | | | | | | | | | | | | | |
| 121-004-1228 | Maintaln Files | | | | | | | | | | | | | | | | | |
| 121-004-1232 | Type Straight Copy Material | | | | | | | | | | | | | | | | | |
| 121-004-1233 | Assemble Correspondence | | | | | | | | | | | | | | | | | |
| 121-030-1518 | Classified Material | | | | | | | | | | | | | | | | | |
| 121-030-1504 | Maintaln ... Check Sheet (SF 702) | | | | | | | | | | | | | | | | | |
| 121-030-1505 | Prepare SF 700 ... | | | | | | | | | | | | | | | | | |
| 121-030-1507 | Safeguard ... (FOUO) Material | | | | | | | | | | | | | | | | | |

AETD was essential to the success of this phase. As the course materials were developed, they were pilot tested. The equipment had to be installed and operational before the actual pilot tests were conducted. While the technicians at FCCJ were able to simulate a TNET system for this purpose prior to TNET being installed, the actual equipment provided the best avenue for review and revision of the courseware. Also, AETD was responsible for providing both equipment and instructor training over the system. This required the coordination and scheduling of several different meetings with a number of different groups, e.g., AETD technical personnel, FCCJ technicians and instructors, USARF instructors, etc.

Implementation

While many of the tasks were previously addressed in the Implementation Phase of this report, some of the key management tasks are presented again. During delivery of the instruction it was necessary to coordinate:

- the students, e.g., billeting
- instructional time (the Alabama site was in a different time zone),
- facilities at both the origination and remote sites, e.g., classroom space, labs, dining and sleeping facilities
- the data collection effort, e.g., interviewing students
- the record keeping function
- the network to insure proper functioning and maintenance

Summary of the Management Phase

A Management function was added to the adapted SAT model because of the complexity of this project. In addition to the instructional design, delivery, and production teams, two other primary groups, community colleges and the numerous military organizations played key roles in the reconfiguration process. Their efforts were organized by the IST project director and the DITRA project manager.

During the three primary phases of the reconfiguration process, a number of tasks and personnel had to be organized and coordinated. The IST project director, in conjunction with the DITRA project manager, had primary responsibility for insuring all tasks were completed in an expedient and timely manner.

Summary of the Course Reconfiguration Process

The Florida Teletraining Project used a modified SAT model to reconfigure five military courses. The adapted model made explicit two components of the model that were of vital importance to insuring that the courseware was designed and developed according to military requirements. The added components were Revise Instruction and Management. With the exception of the Evaluation component of the SAT that will be addressed in a separate document, the other components of the adapted model and the functions performed during each phase of the model were consistent with the components of the SAT.

The key tasks performed during each phase of the reconfiguration process were:

Analysis Phase

Five courses were assigned to the project; traditional analyses to determine what courses should be selected for delivery were conducted by the government. The courses assigned to the project were analyzed to determine how appropriate each was for TNET delivery based on six factors: length, a cognitive rather than psychomotor course, throughput, appropriate for video teletraining presentation, appropriate for the expertise of community college faculty, and the inclusion of well stated instructional components. In general, the first three criteria were met, but design decisions were made based upon the other three. These decisions included the need to design off-line activities for video teletraining, secure the services of subject matter experts to assist in the design, development, and implementation of the courses, and provide instructional design training to the course developers.

Design Phase

During this phase of the project two primary types of tasks were performed: tasks related to reconfiguring the courseware and tasks related to staff training (see Table 11). In order to begin reconfiguring the courseware, course developers wrote or modified objectives and criterion-referenced tests, identified the conditions of learning and events of instruction, specified the media and instructional strategies to be used, selected media mixes for objectives or groups of objectives, identified all the military materials and equipment needed to conduct the instruction, and determined student entry behaviors.

The staff training conducted during this phase prepared the course developers to develop the reconfigured courseware. Course developers were instructed in principles of instructional design and development, were presented an overview of TNET and its instructional capabilities, and given an opportunity to practice teaching using the TNET system.

Development Phase

The major activities of the Development Phase were to develop and produce the instruction. Additional staff training was also conducted (see Table 14).

The following instructional materials were developed: the Instructor's Guide (IG), the Instructional Coordinator's Guide (ICG), the Interactive Study Guide (ISG) (the student manual), screen graphics and word pictures, support media, e.g., videotapes, charts. In order to produce these guides, lesson plans had to be developed and surrounding materials, e.g., introductions to the guides and classroom protocols, had to be written and produced.

Also during this phase, initial pilot testing of the courseware was conducted and validation and approval of the courseware from the military unit with responsibility for providing approval was obtained. Staff Training was also continued; it was primarily on-the-job training. Course developers were provided with a reference for the development effort, *The Quick Reference Guide*, and were given individual guidance and feedback as necessary for course development.

Implementation Phase

During this phase, preparations for implementing the courses were made (see Table 17). The tasks performed were: acquiring military materials and equipment, acquiring instructional equipment, scheduling labs and facilities at the remote sites for instructional activities, organizing for instruction, e.g., planning for contingencies, the After Action Review (AAR), and for flexibility in presentations, preparing paperwork and record keeping to be used during instruction, e.g., visitor's logs and TNET logs, producing sufficient quantities of course materials, delivering the courseware to the remote sites, and training the staff to prepare for implementation, e.g., explaining the roles and responsibilities of the implementation staff and providing opportunities prior to implementation for personnel at each remote site to work together as a team.

Revise Instruction Phase

Revise Instruction was a function of the reconfiguration process that was added as a separate component to the adapted SAT model. The tasks in this component were conducted throughout the entire process (see Table 18). The two most complex tasks were performed during the Development and Implementation phases of reconfiguration. During Development, the courses were validated and revised to prepare for implementation. During Implementation, a test bed site, called the Intensive Site, was set up at FCCJ2 for the purpose of revising the instruction as it was conducted and to provide feedback to other course developers who were still developing courseware.

Management Phase

This component was also added to the adapted SAT model because of the complexity of the project. Three primary groups of people with a web of complex relationships among them had to be coordinated for the success of the project. These groups included: (a) the design, development, production, and implementation teams, (b) the military organizations and groups involved in the project, and (c) the three community colleges. The project director at the

Institute for Simulation and Training (IST) and the project manager at Defense Institute for Training Resources Analysis (DITRA) were responsible for these tasks.

Evaluation Phase

This component of the SAT and the adapted SAT refer to broad issues of evaluation related to establishing a general project evaluation policy and are not directly related to reconfiguration. However, a considerable amount of data was collected during delivery of the courses. One of the roles of project personnel, specifically the ICs and MSCs, was to collect data from students. Data were collected from all project personnel, e.g., the VTT instructors, MIAs, the administrative POCs, at each remote site, the ICs and MSCs, and from many of the key military organizations involved in the project. These activities will be discussed in depth in the final project report. The Evaluation component, however, is included in the adapted model to reinforce its importance in the overall project implementation and plan.

SUMMARY OF THE REPORT

Overview of the Scope and Purpose of the Project

The DoD was directed by Congress in the FY 1991 Defense Appropriations Bill to conduct a pilot test project to determine the feasibility of using civilian personnel to deliver military programs of instruction to the armed services. TNET, the Army's teletraining network, was selected as the delivery system. TNET is an interactive two-way audio and video distance learning system. The video is compressed and digitized. The system was designed to simulate face-to-face live instruction.

The purpose of the Florida Teletraining Project was to assess the feasibility of using professors and staff at three community colleges in Florida to offer a total of five military courses via TNET. Three MOS-awarding courses and two special topics courses were reconfigured and delivered to military personnel.

The three MOS-awarding courses were reconfigured using U.S. Army Reserve Component Configured Courseware (RC³). These courses were delivered to Army National Guard and Army Reserve soldiers who were seeking to be reclassified in the MOSs. The three courses were:

- 71L10, Administrative Specialist, a 73-hour course presented in the ADT mode from 17 October to 31 October 1992
- 76Y10, Unit Supply Specialist (IDT Phase), a 96-hour course presented from 7 November to 22 November 1992
- 95B10, Military Police (IDT Phase), a 66-hour course presented from 5 December to 18 December 1992

The two special topics courses were reconfigured using U.S. Navy courseware. These courses were made available to the personnel in the Army National Guard, Air National Guard, U.S. Marine Corps, U.S. Marine Corps Reserve, and U.S. Navy and Navy civilians. The two courses were:

- Total Quality Leadership, a one-day course presented on 30 January 1993 and 22 February 1993
- Handling Hazardous Waste--Activity Level, a one-day course presented on 27 January 1993, 5 February 1993, and 25 February 1993

Overall project management was performed by the Defense Institute for Training Resources Analysis (DITRA). The Institute for Simulation and Training (IST) at the University of Central Florida served as the project's prime contractor. IST also performed managerial,

technical, design, and evaluation tasks for the project. IST subcontracted with the Florida Community College at Jacksonville (FCCJ) to serve as the lead community college for developing and offering instruction over TNET. FCCJ subcontracted with two other community colleges to provide the instruction. The three community colleges involved in the project were:

- Florida Community College at Jacksonville, the lead institution
- St. Petersburg Junior College, St. Petersburg
- Valencia Community College, Orlando

Summary of the Course Reconfiguration Model and Plan

The course reconfiguration model and plan was based on an analysis of (a) reviews of literature and results of research conducted in the areas of distance learning, instructional systems design, media selection, interactive television, and the use of video teletraining in the military, and (b) the context of the project. As a result of this analysis, the following guidelines were used to reconfigure the five courses:

Design Considerations

- Distance education courses and programs must be carefully planned.
- Instructional systems design (ISD) is a viable method for planning and designing instruction and should be used for course reconfiguration.
- Design of successful video teletraining courses and programs should be grounded in learning theory.
- Good instruction is the same whether presented face-to-face or at a distance. Distance courses, like face-to-face instruction, should include the following instructional techniques: involvement and motivational activities, interaction with the instructor, site facilitator, and other students, feedback, opportunities for students to ask questions, advance organizers and summaries, and group and individual activities.
- VTT courses should be presented in short segments, use a variety of media and instructional strategies, and use graphics and other visuals.
- A interactive student study guide should be developed.

Delivery and Management Considerations

- Contingency plans should be developed.
- All personnel, e.g., instructors, site facilitators, and technicians, must communicate with each other to present instruction.
- Teams of personnel are required to design, deliver, and manage good VTT instruction. These include a management team, an instructional design team (including course developers, military training experts, subject matter specialists), a production team (including graphic artists, word processors), and an evaluation team.
- The VTT instructor is a key element in the success of a VTT course. He or she must have good on-camera skills and must be prepared to expend extra time and energy in the design and delivery of the distance course.
- All personnel involved in the design and delivery of the VTT courses must have adequate training in the technology and in VTT instruction.
- Management issues for the classroom, e.g., record keeping and scheduling, and for the larger project, e.g., roles and responsibilities of all project personnel, need to be carefully planned.

Context Considerations

- An ISD model should be adapted rather than developed for a project. The Army's Systems Approach to Training (SAT) model was adapted for use in the FTP.
- A large number of military and civilian groups had to be coordinated. The management team was instrumental in insuring that all the necessary groups were organized and cooperated.
- The technology used for the project, TNET, is a comprehensive audio-visual system. Media had to be designed to use the capabilities of the system as a whole, that is, as an audio-visual package. The individual components of TNET had to function effectively as stand-alone media.
- Military instruction typically occurs in a highly structured environment. The courses designed for this project had to take into account the context of (a) military instruction, such as, mandatory break periods, roll calls, uniforms, Army physical readiness training, and (b) the requirements of the community college distance learning sites, for example smoking policy, classroom behavior, etc.

The adapted SAT model used for reconfiguring the five courses is iterative and has six functions: Analysis, Design, Develop, Implement, Revise Instruction, and Management. An Evaluation function was included with the model to show its importance as a component of the larger project, but Evaluation was not directly related to the reconfiguration process. The adapted model is generic in the sense that it can be applied to any large scale project using any variety of media.

The key tasks performed during each phase of the model were:

Analysis

The five courses assigned to the project were analyzed to determine their appropriateness for VTT. Course design decisions were made as a result of this analysis based on the appropriateness of the courses for VTT delivery, the expertise of the community college faculty members, and the completeness of the course materials received from the Army proponent schools and Navy agencies.

Design

Initial reconfiguring was begun by applying ISD and learning theory to each course, e.g., modifying objectives and criterion-referenced test items, identifying and specifying conditions of learning, and selecting media and media mixes for each objective or set of objectives.

Staff training was conducted to prepare the course developers for the reconfiguration tasks, e.g., principles of ISD and learning theory were presented, an overview of TNET was presented, and microteaching practice sessions were held for the course developers.

Development

All instructional materials were developed, including the IG, ICG, ISG, word pictures, screen graphics, lesson plans, and surrounding materials. Initial pilot testing of the courseware was conducted. On-the-job staff training was used during this phase.

Implementation

Preparation for conducting the instruction was completed. All materials and equipment were ordered, produced and/or acquired, all scheduling was completed, and all tasks related to organizing for instruction were completed, e. g., planning for contingencies, the AAR, and record-keeping.

Staff training for all personnel related to course delivery (e.g., the instructional coordinators, technicians) was completed.

Revise Instruction

This component was added to the adapted model because of its importance and because of the complexity of this phase of the project. The tasks in this phase were performed throughout the reconfiguration process, however, the most complex revision tasks occurred during the Development and Implementation phases of reconfiguration. During Development, tryout and revision of the courseware was conducted prior to implementation. During Implementation, a pilot test site was established for the purpose of revising the instruction during delivery.

Management

This component was also added to the adapted model. The complexity of the design and development effort plus the coordination of personnel, resources, and tasks required a management team to insure that all tasks related to the reconfiguration were completed. The IST project director and the DITRA project manager performed the management functions.

GENERAL LESSONS LEARNED FOR FUTURE CONFIGURATION PROJECTS

Course Selection

- The quality of a POI (U.S. Army) or military syllabus (U.S. Navy) has an important effect on the amount of time and effort it takes to reconfigure courseware. POIs and syllabi that have clearly defined objectives, criterion-referenced performance tests, and a variety of learning activities and strategies (PEs) are more easily reconfigured than those that are less complete, require significant modification, or a rewrite prior to reconfiguration.
- Courses that have already developed materials, such as practical exercises, performance tests, and military forms, cost less to reconfigure than courses where these components must be developed. In addition, courses that have stable content and can be presented for several iterations without significant changes in the materials are more cost effective to reconfigure than are courses that must be continually updated.
- The extent of military content knowledge of the course developers is a factor that directly relates to the time needed and the cost of course reconfiguration. When course developers are not content experts, subject matter experts (SME) need to be included in the conversion process, or the course developers will have to learn the subject matter prior to or during reconfiguration. Either option adds to both the cost and time needed for VTT conversion.
- Proponent school SMEs, rather than USARF SMEs, should work closely with course developers to reconfigure courses for VTT because the proponent school personnel have extensive content expertise and they develop the courseware.

Course Design

- The SAT model, an instructional systems design (ISD) model, is required in the design of all military instruction. It is an effective approach for designing VTT courses and programs and it should be used to reconfigure military VTT courseware.
- ISD is both a process and a set of procedures that can be applied in a variety of ways and in differing degrees of depth and completeness. It is not known how much ISD is needed to make a quality VTT product, that is, how much ISD is enough? For example, to what extent is the application of instructional theory (e.g., the conditions of learning) or the revision of courses at the development phase of the SAT model essential to producing successful VTT courses and programs.

- Coupled with the above, shortcuts and time-savers using ISD for VTT course development are needed. For example, parallel development of some components of courseware, e.g., objectives and criterion-referenced evaluation measures, can be accomplished. These can increase the cost effectiveness of any VTT project.
- ISD expertise is needed on VTT projects. If course developers are not familiar with ISD procedures they will have to be trained, or an outside expert will be needed. Presumably an ISD expert with both breadth and depth of the processes and procedures is needed; the question is whether each course developer has to be an ISD expert or if the necessary ISD skills and tasks can be taught so they can be applied during the design and development phases of the project.
- A course will be designed differently if it is presented in an intensive period of instruction (for example, during a two-week block as was done in the Florida Teletraining Project) versus a course presented in a different timeframe, e.g., two hours once a week or weekend training. Different course schedules require courses that are designed differently, for example, the inclusion of more or less off-line activities and/or the inclusion of more or less interaction with the teleteacher or other students at remote sites.

Course Development/Revise Instruction

- Initial development of the courseware should be produced in a "lean" mode so that it can be tested out and modified with minimal initial production costs.
- An interactive study guide is needed for all VTT courses. However, methods other than the word picture approach should be investigated. These methods will probably vary with certain student characteristics. That is, students who typically perform in more professional roles may find that the word picture concept is less effective and engaging than students who perform technical roles.

Implementation

- The need for both a military and a civilian instructional coordinator (MSC and IC) was unnecessary for some courses. Often the MSC and IC performed similar roles. The MSC was required for the MOS-courses to satisfy the testing requirements for military certification; the IC was required because community college course credit was offered. The need for both coordinators is expensive. A way to streamline personnel requirements is needed; for example, the community college instructors could be certified to delivery military courses.

REFERENCE LIST

- Andrews, D. & Goodson, L. A. (1980). A comparative analysis of models of instructional design. *Journal of Instructional Development*, 3(4), 2-16.
- Atman, K. S. (1987). The role of conation (striving) in the distance learning enterprise. *The American Journal of Distance Education*, 1(1), 14-24.
- Bailey, S. S., Sheppe, M. L., Hodak, G. W., Kruger, R. L., & Smith, R. F. (1989). *Video Teletraining and Video Teleconferencing: A Review of the Literature*. (Technical Report 89-036). Orlando, FL: Naval Training Systems Center.
- Barker, B. O., & Platten, M. R. (1988). Student perceptions on the effectiveness of college credit courses taught via satellite. *The American Journal of Distance Education*, 2(2), 44-50.
- Batey, A., & Cowell, R. N. (1986). *Distance education: An overview*. Portland, OR: Northwest Regional Educational Laboratory. (ERIC Document Reproduction Service No. ED 278 519)
- Bishop, L. J. (1976). *Staff development and instructional improvement: Plans and procedures*. Boston: Allyn and Bacon.
- Bloom, B.S. (Ed). (1956). *Taxonomy of educational objectives, Handbook 1: Cognitive Domain*. New York: David McKay.
- Brenneman, J. D. (March, 1989). When you can't use a crowd: Single-subject testing. *Performance and Instruction Journal*, 20-25.
- Bramble, W. J. (1990). *Distance Education and its Relevance to Nonresident Foreign Language Training: Review and Synthesis of the Literature*. ETNA Project Report. Orlando, FL: Institute for Simulation and Training, University of Central Florida.
- Bramble, W.J. & Bauer, C. L. (1991). *Evaluation Report: German Video Teletraining (VTT) Pilot Project*. ETNA Project Report. Orlando, FL: Institute for Simulation and Training, University of Central Florida.
- Bramble, W.J. & Bauer, C. L. (1992). DFIFLC computer assisted study (CAS) and video teletraining (VTT) pilot tests. Defense Language Institute, Foreign Language Center. Orlando, FL: Institute for Simulation and Training, University of Central Florida.
- Bradshaw, D. (1989). *The promise of distance learning*. San Francisco, CA: Far West Regional Laboratory for Educational Research and Development.

- Briggs, L. J. (1975). *An overview of instructional systems design*. Tallahassee, Florida: Florida State University.
- Briggs, L. J. (Eds.). (1977). *Instructional design: Principles and applications*. Englewood Cliffs, N. J.: Educational Technology Publications.
- Briggs, L. J. & Wager, W. (1979). *Handbook of procedures for the design of instruction*. Englewood Cliffs, N. J.: Educational Technology Publications.
- Chu, C. G., & Schramm, W. (1967). *Learning from television: What the research says*. Stanford University: Stanford University Institute for Communication Research.
- Chute, A.G., Bathazar, L.B., & Poston, C.O. (1988). Learning from teletraining. *The American Journal of Distance Education*, 2(3), 55-63.
- Clark, R. E. (1983). Reconsidering the research on learning from media. *Review of Educational Research*, 53(4), 445-59.
- Clark, R. E. (1989). Current progress and future directions for research in instructional technology. *Educational Technology Research and Development*, 37, 57-66.
- CNET Electronic Schoolhouse Network (CESN). U.S. Navy (1992). *Handout*. Dam Neck, VA: CESN.
- Cyrs, T. E., & Smith, F. A. (1990). *Teleclass teaching: A resource guide* (2nd ed.). Las Cruces, NM: New Mexico State University
- Department of the Army. (July, 1989). *Army Long Range Training Plan: 1989-2018*. Washington, D. C.: Office of the Deputy Chief of Staff for Operations and Plans.
- Defense Language Institute. (1992). *Video Teletraining Strategies*. Monterey, CA: Defense Language Institute, Foreign Language Center, Distance Education Division.
- DeLoughry, T. J. (1988). Remote instruction using computer found as effective as classroom sessions. *The Chronicle of Higher Education*, April 20.
- Dick, W., & Reiser, R. A. (1989). *Planning effective instruction*. Englewood Cliffs, N. J.: Prentice-Hall.
- Diehl, G. E. (1987). Hidden agenda in course construction and revision. *The American Journal of Distance Education*, 1(1), 25-30.

- Fahl, L. A. (1983). Teletraining in the corporate environment. *Teleconferencing and Electronic Communications: Applications, Technologies and Human Factors, Vol. III*. Madison, WI: University of Wisconsin, Extension Center for Interactive Programs.
- Gagne, R. M. (1970). *The conditions of learning* (2nd ed.). New York: Holt, Rinehart & Winston.
- Gagne, R. M. (1985). *The conditions of learning* (4th ed.). New York: Holt, Rinehart & Winston.
- Gagne, R. M., & Briggs, L. J. (1974). *Principles of instructional design*. New York: Holt, Rinehart & Winston.
- Gagne, R. M., Briggs, L. J., & Wager, W. (1989). *Principles of instructional design* (4th ed.). New York: Holt, Rinehart & Winston.
- Gibson, T. L. (1985). *Heuristics of instructional design for distance education*. Department of Continuing and Vocational Education, University of Wisconsin-Madison, University of Wisconsin-Extension. (ERIC Document Reproduction Service No. ED 307 847)
- Grimes, P. W., Nielson, J. E., & Niss, J. F. (1988). The performance of nonresident students in the Economics USA Telecourse. *The American Journal of Distance Education*, 2(2), 36-43.
- Haarland, B. A., & Newby, W. G. (1984). Student perception of effective teaching behaviors: An examination of conventional and teleconference-based instruction. *Teleconferencing and Electronic Communications: Applications, Technologies and Human Factors, Vol. III*. Madison, WI: University of Wisconsin, Extension Center for Interactive Programs.
- Harbour, J., Daveline, K., Wells, R., Schurman, D., & Hahn, H. (1990). *Distributed training for the reserve component: Instructor Handbook for computer conferencing*. U. S. Army Research Institute. Boise, ID: Idaho National Engineering Lab & Boise State University.
- Hayman, J. L., Jr. (1974, May). The systems approach and education. *The Educational Forum*. 491-501.
- Heinich, R., Molenda, M., & Russell, J. D. (1990). *Instructional media and the new technologies of instruction* (4th ed.). New York: McMillan.
- Holmberg, B. (1983). Guided didactic conversation. *Distance Education: International Perspectives*. London: 114-122.

- Howard, D. C. (1987). Designing learner feedback in distance education. *The American Journal of Distance Education*, 1(3), 24-40.
- Jorgensen, E. S. (1986). *Doing right by design*. Keynote Address, Distance 11 Conference: Improving teaching at a distance, Madison, WI. (ERIC Document Reproduction Service No. ED 307 848)
- Keegan, D. (1986). Problems in defining the field of distance education. *The American Journal of Distance Education*, 2(2), 4-11.
- Keene, S. D., & Cary, J. S. (1990). Effectiveness of distance education approach to U. S. Army reserve component training. *The American Journal of Distance Education*, 4(2), 14-20.
- Knirk, F. G., & Gustafson, K. L. (1986). *Instructional Technology: A systematic approach to education*. New York: Holt, Rinehart, and Winston.
- Kruh, J. (1983). Student evaluation of instructional teleconferencing. *Teleconferencing and Electronic Communications: Applications, Technologies and Human Factors*, Vol. III. Madison, WI: University of Wisconsin, Extension Center for Interactive Programs.
- Levie, W. H., & Lentz, R. (1982). Effects of text illustrations: A review of research. *Educational Communications and Technology Journal*, 30 (4).
- Maloy, W. L. & Perry, N. N. (1991). A Navy video teletraining project: Lessons learned. *The American Journal of Distance Education*, 5(3), 40-50.
- Marland, P. W., & Store, R. E. (1982). Some instructional strategies for improved learning from distance teaching methods. *Distance Education*, 3(1), 72-106.
- McCleary, I. D., & Egan, M. W. (1989). Program design and evaluation: Two-way interactive television. *The American Journal of Distance Education*, 3(1), 50-60.
- McDonald, R. G., Weisenford, J. M., Fleeton, S. A, Kreiner, L.W., & Hodak, G. W. (1990). *Course Selection Model for Navy Video Teletraining (VTT)*. (Technical Report 90-005). Orlando, FL: Naval Training Systems Center.
- Moore, M. (1989). Three types of interaction. *The American Journal of Distance Education*, 3(2), 1-6.
- Moore, M. (1990). The effects of distance learning: A summary of the literature. *ACSDE Research Monograph*, No. 2. University Park, PA: The Pennsylvania State University.

- Moore, M. (1993). Is teaching like flying: A total systems view of distance education. *The American Journal of Distance Education*, 7(1), 1-10.
- Ostendorf, V. A. (1991). *The two-way video classroom*. Littleton, Colorado: Virginia A. Ostendorf, Inc.
- Office of Technology Assessment (OTA). (1989). *Linking for learning: A new course for education*. Washington, D.C.: Congress of the United States.
- Partin, G. R., & Atkins, E. L. (1984). *Interactive Teaching Through Electronic Media*. Ft. Monroe, VA: U. S. Army Logistics Management Center.
- Reiser, R. A., & Gagne, R. M. (1983). *Selecting media for instruction*. Englewood Cliff, N. J.: Educational Technology Publications.
- Richey, R. (1986). *The theoretical and conceptual bases of instructional design*. New York: Nichols.
- Ritchie, H., & Newby, T. J. (1989). Classroom lecture/discussion vs. live televised instruction: A comparison of effects on student performance, attitude, and interaction. *The American Journal of Distance Education*, 3(3), 36-45.
- Roberts, R. C. (1978). *The construction and field-testing of a program planning model for non-formal adult education in human service agencies*. Unpublished doctoral dissertation, Florida State University.
- Romiszowski, A. J. (1981). *Designing instructional systems*. New York: Nichols.
- Romiszowski, A. J. (1988). *The selection and use of instructional media for improved classroom teaching and for interactive, individualized instruction*. New York, NY: Nichols Publishing.
- Scanland, W. (1974). *The instructional systems development function -- How to get it done*. Paper presented at the National Society for Performance and Instruction Annual Conference, Miami, Florida. (ERIC Document Reproduction Service No. ED 095 839)
- Schall, K. (Summer, 1991). TNET: The answer. *Army Trainer: The professional trainer's magazine*.
- Schramm, W. (1977). *Big media, little media*. Beverly Hills, CA: Sage Publications.
- Shale, D. (1988). Toward a reconceptualization of distance education. *American Journal of Distance Education*, 2(3), 25-35.

- Sheppard, D. J., Gonos, G. H., Weisenford, J. M., & Hodak, G. W. (1990). *Analysis of Training Requirements for Video Teletraining at Strategic Homeports*. (Technical Report 90-001). Orlando, FL: Naval Training Systems Center.
- Stoffel, J. A. (1987). Meeting the needs of distance education students: Feedback, support, and promptness. *Lifelong Learning*, 11(3), 25-28.
- Teague, W., & Faulkner, T. L. (1978). *Developing performance objectives and criterion-referenced measures for performance-based instruction in vocational education*. Montgomery, AL: Division of Vocational Education, Alabama State Department of Education. (ERIC Document Reproduction Service No. ED 154 799)
- TRADOC. (September, 1987). *Interactive video teletraining (IVT) management plan*. (TRADOC Circular 351-87-2). Fort Monroe, VA: Department of the Army, Headquarters United States Army Training and Doctrine Command.
- TRADOC. (1988). *Systems approach to training*. (TRADOC Regulation No. 350-7). Ft. Monroe, VA: Headquarters, United States Army Training and Doctrine Command.
- TRADOC. (March, 1989). *TRADOC long-range plan, Vol. 1* (2nd ed.). FY 1191-2020. Fort Monroe, VA: Department of the Army, Headquarters United States Army Training and Doctrine Command.
- TRADOC. (1990a). *Army training 2007 (Coordinating Draft)*. (TRADOC Pamphlet No. 350-4). Fort Monroe, VA: Department of the Army, Headquarters United States Army Training and Doctrine Command.
- TRADOC. (1990b). *Media Elimination & Design Intelligent Aid (MEDIA Version 2.1)*. (User's Manual and computer program). Fort Monroe, VA: U.S. Army Training and Doctrine Command (TRADOC).
- TRADOC. (1991). *Training strategies for the 90's*. Headquarters TRADOC.
- TRADOC. (1992, May). *Emerging results: Kentucky National Guard BNOCC Common Leader Training, Video Teletraining (VTT)*. Personal communication and briefing slides, Lt. Col. John Castle, May 6, 1992.
- U.S. Army Military Police School. (1991, August). *Basic military police course (reserve components) MOS 95B10*. Fort McClellan, AL: U.S. Army Military Police School.
- U.S. Army Quartermaster Center and School. (1989, April). *Unit supply specialist reserve component course (RC)*. Fort Lee, VA: U.S. Army Quartermaster Center and School (PROV).

U.S. Army Soldier Support Center. (1991, August). *MOS 71L10: Administrative specialist, skill level 1*. Fort Benjamin Harrison, IN: U.S. Army Soldier Support Center.

Wells, R. A. (1990). *Computer-mediated communications for distance education and training: Literature review and international resources*. U.S. Army Research Institute. Boise, ID: Boise State University.

Wilkinson, G. L. (1980). *Media in instruction: 60 years of research*. Washington, D. C.: Association for Educational Communications and Technology.

Willis, B. (1989). Distance-delivered instruction: Making it work. *Educational Technology*, 46-47.

ACRONYMS

| | |
|-----------|--|
| AAR | After Action Review |
| ADT | Active Duty Training |
| AETD | U.S. Army Extension Training Directorate |
| ALMC | U.S. Army Logistics Management College |
| ARCOM | Army Reserve Command |
| ARI | U.S. Army Research Institute For the Behavioral and Social Sciences |
| ARMS | U.S. Army Master Data File Retrieval Microfilm System |
| ASVAB | Armed Services Vocational Aptitude Battery |
| BMP | Bitmap |
| BNCOC | Basic Noncommissioned Officer Course |
| CAS | Computer Assisted Study |
| CD | Compact Disk |
| CESN | CNET Electronic Schoolhouse Network |
| CLI | Compression Labs, Inc. |
| CMC | Computer-mediated Communications |
| CNET | Chief of Naval Education and Training |
| CODEC | Coder/Decoder |
| DITRA | Defense Institute for Training Resources Analysis |
| DLIFLC | Defense Language Institute Foreign Language Center |
| DOD | Department of Defense |
| DVE | Digital Video Effects |
| EO | Enabling Objective |
| FATS | Fire Arms Training System |
| FCCJ | Florida Community College at Jacksonville |
| FCCJ1 | Florida Community College at Jacksonville Television Production Studio |
| FCCJ2 | Florida Community College at Jacksonville Remote Site |
| FCTC,LANT | Fleet Combat Training Center, Atlantic |
| FLARNG | Florida Army National Guard |
| FM&P | Force Management and Personnel |
| FORSCOM | U.S. Army Forces Command |
| FOUO | For Office Use Only |
| FTP | Florida Teletraining Project |
| HNS | Hughes Network Services |
| IC | Instructional Coordinator |
| ICG | Instructional Coordinator's Guide |
| IDT | Inactive Duty Training |
| IDU | Indoor Unit |
| IG | Instructor's Guide |
| ISD | Instructional Systems Design |
| ISG | Interactive Study Guide |
| IST | Institute for Simulation and Training |
| MEDIA | Media Elimination & Design Intelligent Aid |

| | |
|-----------------|---|
| MI | Military Intelligence |
| MIA | Military Instructional Assistant |
| MOS | Military Occupational Specialty |
| MOU | Memorandum of Understanding |
| MP | Military Police |
| MSC | Military Site Coordinator |
| MSDS | Material Safety Data Sheet |
| NCC | Network Control Center, TNET |
| NSN | National Stock Number |
| NTSC | Naval Training Systems Center |
| OASD | Office of the Assistant Secretary of Defense |
| OCIE | Organizational Clothing and Individual Equipment |
| PE | Practical Exercises |
| POC | Point of Contact |
| POI | Program of Instruction |
| PT | Performance Test |
| RC | Reserve Component |
| RC ³ | U.S. Army Reserve Component Configured Courseware |
| SAT | Systems Approach to Training |
| SEP | Satellite Education Program |
| SMART | System for Managing Asynchronous Remote Training |
| SME | Subject Matter Expert |
| SPJC | St. Petersburg Junior College |
| SSC | Soldier Support Center |
| TNET | U.S. Army's Teletraining Network |
| TPDC | Training Performance and Data Center |
| TQL | Total Quality Leadership |
| TRADOC | United States Army Training and Doctrine Command |
| UCF | University of Central Florida |
| UCMJ | Uniform Code of Military Justice |
| UPS | Uninterrupted Power Supply |
| USAPDC | U.S. Army Publications Distribution Center |
| USARC | United States Army Reserve Command |
| USARF | United States Army Reserve Forces |
| VCC | Valencia Community College |
| VSAT | Very Small Aperture Terminal |
| VTT | Video Teletraining |

APPENDIX A
INFORMATION SHEET: LESSON PLAN

This page intentionally left blank.

DEPARTMENT OF THE ARMY
U.S. Army Soldier Support Center
Fort Benjamin Harrison, Indiana 46216-5590

LESSON PLAN

TASK/SUBJECT: Type a Memorandum

TASK NUMBER: 121-004-1202

PROGRAM OF INSTRUCTION (POI):

- 121-71L10 (RC), Administrative Specialist Course
- 121-75B10 (RC), Personnel Administration Specialist Course
- 121-75C10 (RC), Personnel Management Specialist Course
- 121-75E10 (RC), Personnel Actions Specialist Course

PROGRAM OF INSTRUCTION (POI) FILE NUMBER:

- 121-71L10 (RC)
- 121-75B10 (RC)
- 121-75C10 (RC)
- 121-75E10 (RC)

COURSE MANAGEMENT GUIDE(S) AND RELEVANT APPENDIX(ES):

- Program of Instruction (POI)
- Course Management Plan and Instructor Guide (CMP)
- Interactive Study Guide

SECURITY CLASSIFICATION: Unclassified

A. TERMINAL LEARNING OBJECTIVE (TLO):

CONDITIONS: Given handwritten or typed draft memorandums and access to ARs 25-50, 25-55, 310-50, a dictionary, a typewriter or word processor, and standard office supplies,

ACTION: the student will prepare typewritten memorandums

STANDARD: IAW AR 25-50.

B. ADMINISTRATIVE INFORMATION:

1. METHODS OF INSTRUCTION: 1.5 hours Video Teletraining, 1.5 hours Practical Exercise, and 1.0 Examination.
2. NUMBER OF CLASS PERIODS: 4
3. PERSONNEL TO BE TRAINED: Reserve Component students enrolled in the following courses:
 - 121-71L10 (RC), Administrative Specialist
 - 121-75B10 (RC), Personnel Administration Specialist
 - 121-75C10 (RC), Personnel Management Specialist
 - 121-75E10 (RC), Personnel Actions Specialist
4. TRAINING AIDS, EQUIPMENT AND STUDENT REFERENCES:
 - a. EQUIPMENT: TNET, eraser and typewriter or electronic text writer (word processor).
 - b. OTHER MEDIA: Elmo display and computer graphics.
 - c. HANDOUT: 54th Inf. Div. letterhead and 3 sheets of plain bond paper per student.
 - d. PRACTICAL EXERCISE: Trainer copy of Practical Exercise Booklet (PEB) located in Appendix A. Student copies (1 booklet per student) are furnished separately. Practical and Self-Evaluation Exercise Answer Keys, located in Appendix B, may be used as overlays or overhead transparencies.
 - e. STUDENT REFERENCES: ARs 310-50 (1 per 2 students) and 25-50 (1 per student), dictionary (1 per student).
5. STUDY ASSIGNMENTS: As assigned by instructor.
6. EXAMINATION INFORMATION: ACADEMIC SECURITY
 - a. TITLE/NUMBER: Type a Memorandum PT/121-004-1202/CMF 71(RC).

- b. LOCATION OF EXAMINATION MATERIALS: Trainer copy of Performance Test located in Appendix C. Instructional Coordinator's copy in Instructional Coordinator's Guide Supplement. Student copies furnished separately.
- c. ADMINISTRATOR: Military Site Coordinator.
- d. SCORER: Instructors and Military Instructional Assistant. Performance Test Administration and Scoring Guide located in Appendix D. Memorandums may be used as overlays to expedite grading. Use trainer discretion when evaluating student ability.

7. DEVELOPER/TRAINER REFERENCES:

- a. ARs 25-50, 25-55, 310-50, STPs 12-71L12-SM, 12-75B12-SM, 12-75C12-SM, and 12-75E12-SM.
- b. Course converted to video teletraining by Kerry J. Gambrill, Florida Community College at Jacksonville, Jacksonville, FL., as part of the Florida Teletraining Project.
- c. Course content reviewed by Mr. Robert Ripperger, COM 317-542-4292, and Mr. Donald Hesselton, DSN 699-4968, COM 317-542-4698.

8. NOTES TO INSTRUCTIONAL COORDINATOR:

- a. The Performance Test and its scoring guide are contained in the Instructional Coordinator's Guide. Remove both documents prior to public display (i.e., visitor books/folders) of this lesson plan. ACADEMIC SECURITY is applicable.
- b. Practical and Self-Evaluation Exercise Answer Keys may be used as overlays or they may be locally reproduced and distributed to students as additional study/self-check references.

9. SAFETY PRECAUTIONS: None.

10. THREAT: Discussed previously.

11. AIRLAND BATTLE: Discussed previously.

This page intentionally left blank.

APPENDIX B

SAMPLE LESSON PLAN PAGES FROM THE 71L INSTRUCTOR GUIDE (IG)

Lesson outline: (pre-class, housekeeping), objectives, questions, content presentation, learning activities

Time

Introduction

3 hours

This lesson provides you with all the information you need to type a memorandum. Typing a memorandum is not difficult, but you must pay attention to detail. Please feel free to ask questions. When you complete this lesson, you will type a memorandum in accordance with AR 25-50.

1

Motivation

It is extremely important that you master the skills in this lesson. Correspondence is the backbone of any organization – military or civilian. Remember, the product you produce reflects directly back to you and your superior; therefore, correspondence must not only be correct, but it must also look absolutely professional.

2

Study Guide

TNET TV Screens

Left (Motion)Right (Static Graphic)

Instructor

Main Objective

"... the soldier will
type a memorandum in
accordance with AR
25-50."

1

Main Objective

"... the soldier will
type a memo..."

1

71L-121-004-1202-VTT

Instructor



Absolutely _____

2



Absolutely professional.

2

71L-121-004-1202-VTT

Lesson outline: (pre-class, housekeeping), objectives, questions, content presentation, learning activities

Time

Content

The memorandum is the Army's version of the business letter. Use the memorandum when you want to write to other military organizations outside your own headquarters or within a headquarters.

3

The Army uses five types of memorandums. They are the:

1. Formal memorandum;
2. Informal memorandum;
3. Memorandum of Understanding — the MOU;
4. Memorandum of Agreement — the MOA;
5. Memorandum for Record — the MFR.

The last three are special purpose memorandums and are not covered in this lesson.

4

Study Guide

TNET TV Screens



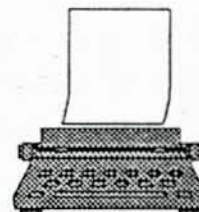
Memorandum

The Army's version of a _____.

3

Left (Motion)

Instructor

Right (Static Graphic)

Memorandum

The Army's version of a business letter.

3

71L-121-004-1202-VTT

5 Type of Memos

- Formal
- Informal
- Memo of Understanding (____)
- Memo of Agreement (____)
- Memo for Record (____)

4

Instructor

5 Type of Memos

- Formal
- Informal
- Memo of Understanding (MOU)
- Memo of Agreement (MOA)
- Memo for Record (MFR)

4

71L-121-004-1202-VTT

Lesson outline: (pre-class, housekeeping), objectives, questions, content presentation, learning activities

Time





This lesson focuses on preparing and using formal and informal memorandums.

Formal memorandums are written communications to anyone outside of your headquarters, command, or installation.

5

Informal memos, on the other hand, are used to communicate within the headquarters, the command, or similarly identifiable organizational element.

6

| Study Guide | TNET TV Screens | |
|--|---|---|
| <p data-bbox="295 457 454 489">Formal Memo</p>  <p data-bbox="252 636 481 661">_____ your headquarters</p> <p data-bbox="167 709 183 730">5</p> | <p data-bbox="705 294 901 325"><u>Left (Motion)</u></p> <p data-bbox="730 409 874 441">Instructor</p> | <p data-bbox="1109 289 1433 321"><u>Right (Static Graphic)</u></p> <p data-bbox="1200 462 1375 493">Formal Memo</p>  <p data-bbox="1109 636 1444 667">Outside your headquarters</p> <p data-bbox="1053 703 1069 724">5</p> <p data-bbox="1369 703 1484 724">71L-121-004-1202-VTT</p> |
| <p data-bbox="287 1308 462 1339">Informal Memo</p>  <p data-bbox="188 1560 555 1591">_____ your headquarters</p> <p data-bbox="167 1617 183 1638">6</p> | <p data-bbox="730 1276 874 1308">Instructor</p> | <p data-bbox="1173 1308 1364 1339">Informal Memo</p>  <p data-bbox="1109 1554 1433 1585">Within your headquarters</p> <p data-bbox="1053 1612 1069 1633">6</p> <p data-bbox="1369 1612 1484 1633">71L-121-004-1202-VTT</p> |

This page intentionally left blank.

APPENDIX C

SAMPLE PAGES FROM THE 71L INTERACTIVE STUDY GUIDE (ISG)

This page intentionally left blank.

Type a Memorandum
71L-121-004-1202-VTT
Interactive Study Guide

TERMINAL LEARNING OBJECTIVE

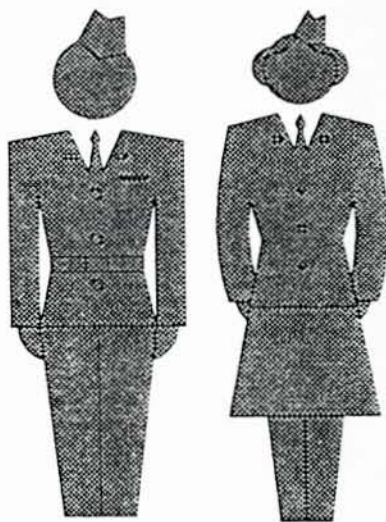
CONDITIONS: Given handwritten or typed draft memorandums and access to ARs 25-50, 25-55, 310-50, a dictionary, a typewriter or word processor, and standard office supplies,

ACTION: the student will prepare typewritten memorandums

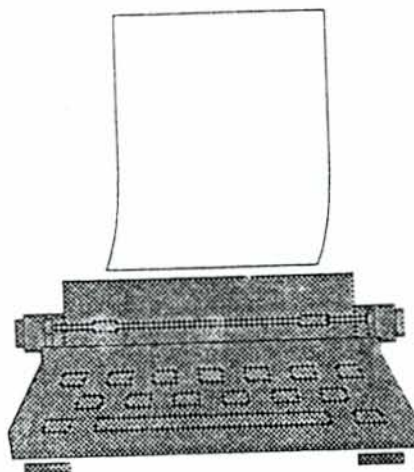
STANDARD: IAW AR 25-50.

| Display | Notes |
|--|-------|
|  <p data-bbox="290 564 703 634">Main Objective</p> <p data-bbox="295 640 730 840">"... the soldier will type a memorandum in accordance with AR 25-50."</p> | |
|  <p data-bbox="395 1690 655 1753">Absolutely _____</p> | |

1



2



Memorandum

The Army's version of a _____.

3

5 Type of Memos

- Formal
- Informal
- Memo of Understanding (_____)
- Memo of Agreement (_____)
- Memo for Record (_____)

4

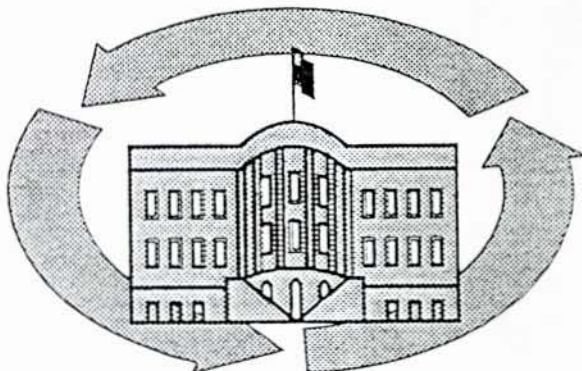
Formal Memo



_____ your headquarters

5

Informal Memo



_____ your headquarters

6

This page intentionally left blank.

APPENDIX D

CHECKLIST: LESSON ELEMENTS FOR REVIEW/APPROVAL

This page intentionally left blank.

FTP Checklist: Lesson Elements For Review/Approval

| Course: | Unit: | Yes | No |
|---|-------|-----|----|
| I. Instructor Guide (every unit) | | | |
| A. Lesson Plan Document (adapted from the course POI) | | | |
| B. Lesson Outline (see Quick Reference Guide for ideas) | | | |
| 1. Objectives included? | | | |
| 2. Introduction included? | | | |
| 3. Motivation included? | | | |
| 4. Content Presentation | | | |
| a. Graphics? | | | |
| b. Word pictures? | | | |
| c. Questions to be asked of students? | | | |
| d. Minimum of one involvement activity per hour? | | | |
| 5. Summary/Conclusion included? | | | |
| 6. Practical Exercises | | | |
| a. Included in lesson? | | | |
| 1. Individual activity? | | | |
| 2. Group activity? | | | |
| b. Not included? Specify | | | |
| 7. Test | | | |
| a. Included in this lesson? Specify | | | |
| b. Not included? Specify | | | |
| 8. Segue Included? | | | |
| a. Between frames? | | | |
| b. Between sections of the lesson outline? | | | |
| C. Pages for the Elmo | | | |
| II. Instructor Guide (where applicable) | | | |
| A. Content Presentation Strategies (to be included to increase interactivity) | | | |
| 1. Role plays | | | |
| 2. Instructional Games | | | |
| 3. Case Studies/Situations | | | |
| 4. Group work sessions/cooperative learning | | | |
| 5. Inquiry/discovery strategies | | | |
| 6. Individualized strategies (e.g., readings, worksheets) | | | |
| 7. Demonstrations | | | |
| 8. Interviewing strategies | | | |
| 9. Site surveys/instant questionnaires/quiet question | | | |
| B. Media Options | | | |
| 1. Video/Film clips | | | |
| 2. 3-D Objects | | | |
| 3. Print materials | | | |
| III. Interactive Study Guide (every unit) | | | |
| A. Graphics | | | |
| B. Word Pictures | | | |
| C. Practical Exercises | | | |
| D. Space For Notes | | | |

0000054

