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TRAINING REQUIREMENTS FOR MICROCOMPUTER USES

by

Cynthia S. Lassnoff

December 1986

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Training Requirements for Microcomputer Users

by

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requirements for the degree of

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ABSTRACT

The use of microcomputers to increase productivity and aid decision making is growing steadily. Today, many individuals have little or no experience with computers. Adequate training is required so that personnel may operate them effectively.

This thesis discusses training requirements, the advantages and disadvantages of different types of training, and evaluation criteria. A case study of Naval Station Treasure Island is presented to illustrate a command that has recently implemented microcomputer technology.

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I. INTRODUCTION

Manpower shortages have long been a problem for the Navy, and will most likely continue to be. A goal therefore must be to use personnel to their fullest capacity, to perform every activity as efficiently and effectively as possible.

The microcomputer has proven itself an invaluable tool for increasing productivity and aiding decision-making. Complex tasks may be carried out more quickly and easily. Many which were previously considered to be impossible are now routine. One study discusses the results of implementing a computer system:

> All the users we interviewed agree that the integration of competent workers and powerful tools has enhanced performance at all levels. . . . For example, some vital procedures . . . required nearly a day when done manually and now require one hour. Moreover, as one employee pointed out, no matter how carefully and slowly the manual work was done, it was more likely to contain errors than the computer-based equivalent. Still others cited operations they were unable to carry out before . . . or else did not do because they were too cumbersome to perform manually. . . . Another mentioned doing work that would require three people without computer support. [Ref. 1:p. 48]

The computer's place in the Navy is as firmly established as in industry. There are hundreds of applications in inventory control, operations, personnel management, and correspondence and reporting. Adding machines and

typewriters are fast being replaced by spreadsheets, databases, and word processing programs.

> Federal agencies nearly doubled their purchases of microcomputers in fiscal 1985, according to a recent General Services Administration report. The GSA study found that agencies acquired 67,502 microcomputers in fiscal 1985, compared with 37,277 in 1984 and only 7,908 in 1983 . . . the major reason that agencies are making substantial investments in microcomputer technology is to increase productivity. . . . The report says the use of micros has significantly increased not only productivity but the quality of work performed. Respondents also reported that, because microcomputers let them perform their duties more quickly, the use of the computers tended to improve the timeliness of their work . . . there are about 150,000 micros in the government today. That figure is expected to increase to 500,000 by 1990. [Ref. 2:pp. 1, 21]

It is widely accepted that microcomputers are easy to use. Many people believe that they can introduce microcomputer technology with little difficulty. State-of-the-art software and equipment are purchased but are often underutilized or, even worse, left to gather dust in a corner of the office and ". . . a new generation of would-be computer users is frustrated and resisting. . . ." [Ref. 3:] Why? Because training receives insufficient emphasis.

User training should be considered an important part of any computer system, even the "simple, little" microcomputer. It should be planned for at the same time as the system itself, and as thoroughly. Unfortunately, many commands purchase microcomputers with little or no thought as to how their personnel will learn to use them. Training may be considered nonessential (due to the supposed simplicity of the machine), or too expensive (in terms of

dollars and/or manpower). When funding or personnel is in short supply, training is often the first "luxury" to be cut. It is often viewed as an activity separate from department or command goals, rather than in support of them, and may therefore be given low priority.

Many sailors, civilian employees, and officers have no experience using computers. Few individuals, even in an environment conducive to study and experimentation, can teach themselves the correct, productive use of the machine or any one of a vast number of confusing application programs. Add the burden of incomprehensible, expert-oriented manuals, and along with the demands of the typical ship or shore routine, and an attempt at self-education is doomed to failure. Formal training is required so that both the microcomputer's and the individual's full capacity may be realized.

Computer training is necessary for the fulfillment of command goals and mission in general. The "hurry and show him what he needs to know right now" method is a quick fix and no more. It does not permit adequate understanding of any system or single application. Informal, ad hoc training of new users on a need-to-know basis often passes along incomplete, possibly incorrect, information. The user remains limited in what he can do, and rarely progresses. A strategic plan for training should be developed as an integral part of the computer implementation plan. To

ensure that it is successful, it is essential that it be supported at all levels of the chain of command. Conflicting objectives and priorities must be resolved and resources committed. Each command should appoint, at least as a collateral duty, a computer training officer; this individual would be responsible for developing an ongoing, formal training program and for coordinating resources.

This thesis will examine the current status of Navy computer training for routine departmental applications such as personnel management, correspondence, inventory, general record-keeping, and budgeting. Types of training will be discussed: advantages and disadvantages, criteria for evaluation, matching training to the students' skill level, costs. A case study of Naval Station Treasure Island will represent a command that has recently implemented microcomputers.

II. INTRODUCTION TO CASE

A. HISTORY

Treasure Island is located in the San Francisco Bay midway between San Francisco and Oakland. A man-made island, it was created for the 1939-1940 Golden Gate International Exposition. Originally planned for use as an airport for San Francisco after the fair, it was leased to the Navy early in 1941. During World War II, Treasure Island was built up to a major naval facility, processing up to 12,000 men a day to Pacific area assignments and thousands more in the days and months following the war as Navy personnel returned from the Pacific. After World War II, San Francisco traded the deed to the island for another parcel of government land. For many years it was the headquarters of the Twelfth Naval District. [Ref. 4:p. 600]

Today, Naval Station Treasure Island processes Pacific-bound and homecoming personnel and serves as host to a number of tenant commands. It provides a wide variety of services and support for locally berthed ships and shore commands in the region. Other services are provided for Northern California and the Pacific. For example, the Navy Band San Francisco is available for regional ceremonial and entertainment functions, while the Transient Personnel Unit serves all commands in the Pacific. The Supply Department

serves a wide customer area through its Islemart store and procurement facility. The Port Services Department coordinates ship services in the Bay Area and incidentally handles the distribution of movies for ships at sea and military theaters on West Coast bases. Approximately 3,000 military and 1,000 civilian personnel with a total annual payroll of $70 million comprise the island's population. The following is a partial list of the many commands which are located on Treasure Island:

- Commander, Naval Base San Francisco
- Naval Technical Training Center
- Twelfth Marine Corps District
- Commander, Naval Reserve Readiness Command, Region 20
- Naval and Marine Corps Reserve Training Center
- Naval Investigative Office
- Naval Legal Service Office
- Personnel Support Activity San Francisco
- Personnel Support Detachment
- Navy Office of Information San Francisco Branch
- Office of Naval Research San Francisco Branch
- Regional Financial Service Department
- Naval Regional Dental Center

Major construction is currently underway to build piers and auxiliary structures for the homeporting of ships at Treasure Island. Two frigates are slated to arrive during January 1987 and an additional two during the following

summer. Sometime in 1990, the battleship MISSOURI and an accompanying cruiser will be homeported at Treasure Island; at that time, the four small ships will be relocated to another local facility. Operations at the Naval Station will be impacted greatly by the planned homeporting and additional anticipated growth.

B. FEASIBILITY STUDY AND RECOMMENDATIONS

Navy Regional Data Automation Center (NARDAC) San Francisco performed a requirements and feasibility study during the first four months of 1984 [Ref. 5] in response to a request by the Commanding Officer, Naval Station Treasure Island. The request called for a feasibility study to ascertain information system needs and the recommendation of viable options for a possible station-wide Automated Information System (AIS). NARDAC used a variety of data collection and evaluation techniques; functional areas were surveyed, management and user representatives were interviewed, and manual procedures were reviewed to identify candidates for automation.

It must be noted that the scope of this study was limited to determining whether operations at Naval Station Treasure Island could be beneficially automated. It recommended one of three proposed systems and made recommendations pertinent to implementation. It did not, however, make further recommendations as to ongoing management and

use of the chosen system; it was not, nor was it intended to be, a management manual.

1. Constraints

The study noted the following under "Constraints":

> At present, in-house software/hardware maintenance is not available at NSTI. Any recommended systems should be well-supported by the vendor. Installation support and on-site preventive and corrective maintenance must be available locally. Manpower resources are limited, therefore, software packages should not require an extensive learning process. They should be easy to use and well-supported.
>
> NSTI departments and work areas are located in widely dispersed parts of the island. There is a need to interface between certain departments and divisions, and therefore a need for communications cabling or phone linkages. [Ref. 5:p. 1]

2. Proposed Alternatives

The study proposed three alternative configurations which represented the direction of the Naval Base/Naval Station Program's Information System (IS) Architecture.

- Alternative 1: Stand alone microcomputers with some dial-up communications hardware to support information interfaces . . . provides a low cost solution to the application and word processing requirements . . . [Ref. 5:p. 94]

- Alternative 2: Networking of single-user microcomputers to share common files and peripherals. . . . Local Area Network (LAN) . . . to share expensive resources . . . and . . . information/data on a central mass storage disk drive. [Ref. 5:p. 94]

- Alternative 3: This configuration would consist of a host minicomputer serving terminals/microcomputers throughout NSTI. [Ref. 5:p. 100]

Alternative 1 was the recommended alternative, based on costs, constraints, and ease of implementation/maintenance.

3. Proposed Implementation Strategy

The study proposed considering the automation of Naval Station Treasure Island as a pilot program, in accordance with the plans of the Naval Base/Naval Station Program and SECNAV's Information System Architecture. NARDAC made recommendations in several areas, including: acquisition, installation, and (initial) training. It also recommended the selection of

> . . . a system coordinator to ensure orderly progress and continuity of the proposed Treasure Island AIS. This individual will need to coordinate resources (people/dollars) and make the necessary decisions related to the implementation/installation of an AIS. [Ref. 5:p. 106]

III. CASE FINDINGS

A. INTRODUCTION

This chapter presents the results of telephone interviews with Naval Station Treasure Island (NAVSTA TI) department heads (or representatives), and the executive officers of two smaller tenant commands, concerning the implementation of microcomputers over the past 18 months. The initial and current skill level of department personnel, methods of training (initial, ongoing, and planned), and the current and planned use of the computers were discussed as well as problems encountered and desired system improvements. Reactions to NARDAC training are included where applicable.

The "one week NARDAC course" referred to in this chapter is a general introduction to microcomputer operation, the operating system, and commonly used application programs (Wordstar, Lotus 1-2-3, dBaseII/III). It is not a regularly scheduled NARDAC course, but one that was designed for NAVSTA TI as part of the contracted work. [Ref. 6]

B. ADMINISTRATION (ADMIN)

The Admin department is currently developing a word processing center for the command, besides performing its own tasks. Equipment consists of two Lanier word processing machines (one is kept by the Commanding Officer's secretary

at her desk) and two Zenith 120s. The Laniers have been on board since January 1986, and the Zeniths since May. The purpose of the center is to perform word processing for all departments, e.g., instructions, formal reports (which will leave the command), etc. It is now manned by a civilian employee and three non-designated seamen. At the time of the interview, the Admin Officer felt that it would be another six months, 14 months after initial equipment installation, before the center was fully operational.

The Admin Officer does not have any background working with computers. He was assisted by a petty officer (in the data processing rating) who was temporarily assigned to the command while in a medical hold status. The petty officer set up a database containing information on all command personnel and instructed department personnel in its maintenance and use. The civilian employee, hired for her word processing experience, was sent to NARDAC for the one-week program. At first, she was reluctant to use the micro-compute, but with some encouragement from the Admin Officer soon became proficient and is now instructing others in its use.

The Admin department has not been assigned the responsibility to train other departments on base, nor does the Admin Officer wish to do so. He would prefer that <u>his</u> department, rather than the various other departments, do the important word processing (outgoing command

correspondence, policy statements, and the like) so that he can ensure correctness.

Department personnel are still limited to word processing and the use of the established personnel database; they cannot yet develop other databases or program, and there has not yet been a need to use spreadsheets. The Admin Officer plans ad hoc on-the-job training as needed for new personnel; he cited the high cost of outside training as prohibitive. Though limited, the Admin Officer feels that the department is carrying out its functions smoothly, and experiencing only typical "new user" problems which are easily overcome. [Ref. 7]

C. BACHELOR QUARTERS

The Bachelor Officer Quarters (BOQ) received a micro-computer approximately one year ago. Even though several functions could be automated (e.g., word processing for all administrative tasks, spreadsheets for budget preparation and maintenance, and databases for personnel management and equipment inventory) to greatly improve division efficiency and productivity, the computer was never used "because no one knew how". No attempt was made to obtain or even to investigate sources of training.

The BOQ Manager offered no explanation for this lack of action regarding the micro. In almost 20 years experience running messes and barracks, he has never been exposed to computers. It is the author's opinion that due to his lack

of knowledge and a poor implementation plan, he did not realize how the computer could have improved division operations. He may have been intimidated by the machine as well.

The computer was transferred to the Bachelor Enlisted Quarters (BEQ) during August 1986. The BEQ Manager owns a Commodore personal computer and, though a beginner, has some knowledge of what tasks may be automated and how the computer can help the division.

One of the BEQ petty officers, chosen for his learning aptitude and interest in computers, will attend the NARDAC one-week course. He will be expected to train others in the division when he has gained some working knowledge of the system. The BEQ Manager is also tapping the resources of a personal friend who is an advanced user; this person will assist in setting up databases and perhaps writing programs. Some planned uses for the system are: word processing, data storage, and databases for personnel management (both division staff and an average of approximately 1200 BEQ residents), a reservation system, and inventory control. [Refs. 8, 9]

D. BRIG

This command received its computer over one year ago. It is currently being used for word processing only, for general administrative tasks and the preparation of prisoner evaluation and other specialized forms. No statistical

analyses, spreadsheet or database applications are currently performed; however, there is an expectation of accessing a centrally maintained (mainframe) database in the future.

The Executive Officer was displeased with the one-day Introduction to Microcomputers course given by NARDAC; he felt that it "didn't teach enough" and that it was little more than "a list of terms". His evaluation of the course may reflect the fact that it was too elementary for him; he owns an IBM PC. Training for other Brig personnel was conducted inhouse, by a few individuals who had some experience with microcomputers. Future training will continue as on-the-job instruction and will continue to use reference manuals as training aids.

The Executive Officer was dissatisfied with the Zenith computer; he would prefer an IBM. He was unhappy with the (small) amount of memory and the standard printer, and was awaiting the arrival of a letter-quality printer. [Ref. 10]

E. CHAPEL

One NAVSTA TI chaplain is responsible for implementing and directing the use of the chapel microcomputer. During December 1984, he had purchased an IBM personal computer for home use, "to be computer literate" and to "stay with the times". His daughter-in-law taught him basic computer operations, and the rest of his training consisted of hands-on experimentation and reading industry journals. He

continues to educate himself by staying abreast of current developments in the technology.

Another individual in the department has taken NARDAC courses in Advanced Wordstar and dBaseII. He has been passing his knowledge on to other department personnel and will continue to do so. The chaplain is confident that they will be able to teach their users what each needs to know through on-the-job training. They will also attempt to cross-train users to the greatest extent possible, depending on personnel and time constraints. If they desire more advanced training than they are able to provide for themselves, they will take NARDAC classes.

At the time of the interview, the computer had been in use approximately seven weeks. The chaplain felt that they had been successful in teaching their personnel word processing, a reasonable introductory application for new users. Word processing is of primary importance to the department due to its considerable amount of correspondence. Other applications in use are database programs (e.g., for maintaining congregation records) and spreadsheets (e.g., for budgeting). System implementation in this department has clearly been rapid and successful. [Ref. 11]

F. COMPTROLLER

During October 1984, this department received a Zenith microcomputer from Commander, Naval Logistics, Pacific (COMNAVLOGPAC). At that time, no one possessed any

knowledge of or experience with computers. A budget analyst was sent to NAVSTA TI for four days to instruct department personnel in the use of a budgeting application package designed by COMNAVLOGPAC.

The interviewee, a senior budget analyst, and one other department employee were sent to NARDAC for the Lotus 1-2-3 course; others were sent for word processing classes (WORDSTAR). The balance of training was self-instruction driven by personal motivation. The analyst purchased a book on the use of Lotus 1-2-3 and informally contacted other users (e.g. in the CCPO office) for assistance as needed.

Current use of the micro includes extensive work with spreadsheets, databases, graphics, and word processing. Users are getting along well, having learned their tasks with little difficulty. The computer is being used to its fullest with respect to time-sharing. Because of this, training for other employees is not planned in the near future. Additional microcomputers are desired; no other problems are noted. The analyst indicated that the department intends to perform on-the-job instruction, and that since they were well satisfied with the instruction received at NARDAC they would consider using that source again.

Increased efficiency is clearly proven in this department. The preparation of one particular budgeting worksheet used to take approximately two weeks to complete

manually. Now that the worksheet format and formulae are contained in a program, an analyst loads data (and tailors the output format if needed) and produces the finished worksheet in no more than 1-1/2 days. [Ref. 12]

G. CONSOLIDATED CIVILIAN PERSONNEL OFFICE (CCPO)

This department is experiencing no difficulty in automating tasks. CCPO is an "admin-intensive" department, performing a wide variety of personnel tasks in support of a number of local commands. They do a great deal of word processing and work extensively with databases and spreadsheets. The microcomputer was received during May 1986, but the printer did not arrive until July. Even so, the system was quickly up and running smoothly.

The CCP Officer is well educated in microcomputer use and technology; he owns one, and has used different systems in past jobs. He and two other department employees participated in the one week training program for new users given by NARDAC as part of the NAVSTA TI contract. There is no formal training plan. Based on the already established level of expertise, the CCP Officer feels confident that he and other experienced employees will be able to train others as needed. He will consider advanced level NARDAC classes if needed.

The CCP Officer discussed the following problems:

- The department has a dedicated word processing machine, but it is aging and somewhat limited in capability. He would like to use the micro for word processing, but

cannot because it is already scheduled to capacity for other applications.

- He was unhappy with the micro's small memory capacity (192K), and was in the process of expanding it.

- He was concerned that the department will soon exceed the micro's capacity, and felt that they could easily use "a few" more.

- The department does not have telecommunications capability for linking with a new central mainframe database program (the Naval Automated Civilian Manpower Information System) currently being implemented. [Ref. 13]

H. COUNSELING AND ASSISTANCE CENTER (CAAC)

CAAC had received its microcomputer only two weeks before the interview. This machine was not a contract Zenith, but an IBM model funded by their coordinator, Naval Military Personnel Command, code 62. A technician sent from Washington set up the computer on site, and installed the Navy Alcohol Drug Information System (NADIS). The CAAC Director is currently loading data (having taught himself by reading the accompanying program manual); he will mail the generated reports to Washington, where the actual analyses will be performed.

A department petty officer has been taking courses toward a bachelor's degree in computer science, and so he initially possessed a great deal of knowledge and practical experience working with both Zenith and IBM microcomputers. He has taught other personnel to use Wordstar. The CAAC Director is currently taking a basic "introduction to microcomputers" course at a branch college campus located

nearby. His plans for training are to take advantage of a weeklong on-site program presented by the vendor, and to continue to use outside training. Before the interview, he had not known about NARDAC's training programs; he was interested, and stated that he intended to look into their courses.

The CAAC Director plans to designate two individuals as primary users, and to fully train remaining personnel so that all individuals will be able to perform all tasks. Database and word processing programs will be used for record-keeping (e.g. personnel management, progress tracking, physical training program results), and general correspondence. He expressed a desire that telecommunication capability be made available, so that he could transmit data directly to Washington rather than having to send a hard copy report through the mail. [Refs. 14, 15]

I. FAMILY SERVICES

The department had received its microcomputer approximately two weeks before the interview. Only one individual possessed any knowledge of micros; this person was only temporarily assigned to the department and was expected to depart shortly. Some word processing was being performed for correspondence and the preparation of Welcome Aboard Packages. Future applications include the use of databases (e.g. for the spouse employment program).

The Family Services Officer intends to send the department secretary for training, and to designate that individual the primary user. She was previously unaware of NARDAC's training facilities and during the interview was very interested. Ongoing training will be on-the-job however, due to the expense of purchasing outside training. [Ref. 16]

J. FIRE DEPARTMENT

In addition to problems which were common to other departments interviewed, the Fire Chief discussed a few which were specific to his department, such as bad hardware and selection of personnel for training.

A dual drive microcomputer was received during March 1986, but without a printer. As such, the system was of no use to the department. Another computer, with a hard disk but still no printer, was substituted in May. An operating problem was noted immediately and, after some testing, was determined to be due to a bad circuit board. Some time passed before the board was replaced; the system was finally fully usable only two to three weeks before the interview in mid-August.

No one in the department possessed any knowledge of or experience with computers. Initial training, consisting of the one week NARDAC course, was scheduled for two employees during April. The previous Fire Chief, now retired, made what has turned out to be an unfortunate selection of

candidates for that training. One man, chosen for his aptitude to learn quickly, was a temporary employee with no guarantee of continued employment. He resigned one week after taking the course. The other man is reported to be "afraid of" the computer. It is not currently being used.

A Navy program, the Fire Management Information System, is expected to be implemented at Treasure Island soon. This package includes formatted reports for incident reporting, and procedures for filing building inspection results, hazardous material inventory, and manpower scheduling. NARDAC will load and test the system, and train personnel in its use.

Currently, "a friend" is helping with some very basic, informal training. The Chief plans to send some individuals to NARDAC for additional training, e.g. word processing. This department's major obstacle to acquiring training is not funding, but manpower. Due to the nature of their work, it is difficult to send employees away from the base for even a short time; on-site training would be preferable. The Chief expressed a desire for telecommunications capability in the future, so that reports could be transmitted directly rather than through the mail, and so that he could access data in centrally maintained databases. [Ref. 17]

K. PORT SERVICES

The microcomputer was received approximately eight months before the interview. At the time, the Port Services

Officer was the only person in the department who had any experience, limited though it was. He is continuing to educate himself on his personal computer at home; his school age son is his teacher.

Two individuals, the department secretary and a military member, were sent to NARDAC for initial training in WORDSTAR and dBASE. They are teaching others, but their knowledge is still very limited. Current use of the computer includes word processing for routine administrative functions, and database for compilation of ships' information.

The Port Services Officer feels "not even one-quarter" of the computer's capability is being tapped due to their lack of expertise. He cited the following barriers to more effective use of the computer: personnel turnover, scheduling difficulties (time away from duties), and funding constraints.

He would like to have telecommunications capability so that the department could access Coast Guard databases and share information with other installations. [Ref. 18]

L. PUBLIC AFFAIRS OFFICE (PAO)

This department received its microcomputer approximately one year before the interview. The Senior Chief, who was already well versed in several word processing packages, attended the week-long NARDAC introductory course. He felt that this training was too elementary for him, but found the handouts to be useful when developing an instruction program

for his subordinates. He will continue to conduct all future training in-house. All (five) department personnel currently use the computer in the performance of their duties. Training was specialized to each individual's needs, with some cross-training.

PAO performs a great deal of word processing for general administrative purposes and more specialized ones such as the production of the base newspaper. Distribution lists are maintained as databases. Spreadsheets are not used now.

The following problems were noted:

- The system is too small and too slow.
- The standard printer originally supplied was inadequate to meet PAO needs; it was necessary to procure an additional, more versatile printer.
- Funding is insufficient. [Ref. 19]

M. SECURITY

The present Security Officer disclosed there was no computer in the department, although one had been allocated and delivered during the spring of 1985. It had apparently not been used and after some time was turned over to the Public Affairs Office. The command has no plans to furnish Security with another micro in the near future. At such time as a microcomputer is procured for the department, the Security Officer plans to obtain training through NARDAC classes and by tapping resources of trained personnel onbase.

An interview with the previous Security Officer clarified the situation. When he was first assigned to the department, the computer had been available but untouched for a few months. He began loading data (e.g. various types of cautionary letters, automobile decal information, etc.) simplistically, as flat files, as a first step toward automating the department. After only three months, this man was transferred to another department, and at the same time, three other individuals were lost. The longtime civilian employee in charge of the traffic division had no experience with computers nor did she wish to gain any. This negative attitude, coupled with the pressures of short-staffing, resulted in the machine being ignored and ultimately given to another department. [Refs. 20, 21]

N. STAFF CIVIL ENGINEER (SCE)

This department possessed one of the first computers on base, an Osborne. It was determined to be sorely inadequate, and was given to the Recreation Services department (which was not scheduled to receive a contract Zenith for a few years). SCE now has three Zenith 120s which are used for a variety of applications involving word processing, databases, and spreadsheets. The first Zenith was received approximately September 1985, and the other two approximately June 1986.

Originally, only three department employees were experienced computer users. Initial training for another three

was obtained through NARDAC. The individuals attended courses for the particular applications (i.e., spreadsheet, database, word processing) that they would be using. Of a total of eight employees, six are now computer-literate to some degree. One self-taught civilian employee is an advanced user and is considered the department expert; he writes programs and designs report formats. He directs other department personnel in how to input data. The department seeks guidance, when needed, from other experienced users onbase. The SCE Officer does not plan to use NARDAC for further training; he stated that his employees had some difficulty relating what they were learning to their actual job requirements. He does not attribute this to the quality of the training received, but more to the attitude of the individuals. Funding has not been a problem.

The SCE Officer noted the following problems and potential enhancements:

- Due to the heavy administrative workload, the department is forced to dedicate one computer to word processing. There is a demonstrated need for a dedicated word processing machine to free up the microcomputer for more appropriate tasks, but the department cannot buy one due to acquisition restrictions.
- Coordination between his two divisions, Planning and Maintenance, would be greatly facilitated by networking. He would like to see the establishment of a workstation (terminal) at every desk with shared peripheral equipment.
- The installation of an office automation package would also benefit the department. [Ref. 22]

O. STAFF JUDGE ADVOCATE GENERAL (STAFF JAG)

Staff JAG independently purchased a Zenith 150 microcomputer (not in conjunction with the contract) approximately one year ago. At some point since then, the only computer-literate person left the department. The department experienced serious manpower shortages and was unable to devote time to training until recently. The computer had been in use again for only four or five weeks before the interview.

Still in the initial training phase, all department petty officers are being sent to NARDAC for classes in word processing, database, and statistical analysis. There are plans to develop ongoing, inhouse training when personnel have become more experienced. The Staff JAG Officer owns a Commodore personal computer, and has worked with IBMs in the past; he has attained a level of expertise such that he is confident of being able to educate himself and of assisting with the development of department training.

He expressed dissatisfaction with several items:

- The size of the memory supplied is of concern; the average department workload may surpass the computer's capacity as presently configured.
- The printer is too slow.
- The word processing package (WORD) that came with the computer is inadequate for department needs.

He also discussed potential telecommunications capability, so that a link could be made between his department and

the local Naval Legal Service Office or with Commander, Naval Base San Francisco (local). [Ref. 23]

P. SUPPLY

The microcomputer was received only two weeks before the interview. It was not yet hooked up, nor had there been any training.

The Supply department will be using the micro primarily for inventory and requisition applications, and for typical administrative procedures such as correspondence, report preparation, and personnel management. Personnel will work extensively with spreadsheets and databases, and with word processing. At the moment, no individual in the department has much, if any, expertise. The Supply Officer plans to send a few people to classes offered by NARDAC, and then to develop in-house training for the future. He cited a lack of funding as a constraint on further use of outside training, including NARDAC. [Ref. 24]

Q. TRANSIENT PERSONNEL UNIT (TPU)

Major tasks currently performed on the command's microcomputer are the tracking of a large transient population that changes daily (status, time-sensitive and general information), and the maintenance of court martial lists (abundant, varied information). Both are database applications. Word processing, which accounts for a major portion

of the command's workload, is carried out on a dedicated word processing machine.

No individual in this command was computer-literate when the micro arrived approximately sixteen months ago. Two individuals were sent to NARDAC for the one week general introduction program, and the command is presently looking into sending personnel for additional training in specific applications. The Executive Officer expressed concern that his trained users have only the basic skills learned at their initial training; they have not been able to learn more on their own, and as a result cannot teach others effectively. This command is not yet at such a point that on-the-job training can be considered.

The Executive Officer discussed the following problems:

- The originally configured 192K memory was inadequate for the command's needs; it was necessary to procure a hard disk.
- As with most other departments, funding is a perpetual constraint. This impacts improvements to the system (e.g. the hard disk, purchase of additional or updated software, etc.) and especially training for personnel.
- Due to the long procurement cycle, the equipment and software may be outdated by the time it arrives. [Ref. 25]

IV. ANALYSIS

A. FINDINGS--CASE STUDY

The implementation of computer technology, even the "user-friendly" microcomputer, can be a very difficult, frustrating undertaking. Many factors influence the process, and measuring progress is not easy. The different departments at Naval Station Treasure Island illustrate a widely varying degree of success, and some classic problems.

1. Duration of Ownership

The command had been receiving microcomputers over the past two years; some had arrived as recently as a few weeks before the interviews. It would logically follow that (more) personnel should become (more) literate and department functions more completely automated the longer the department had the use of a micro. This did not necessarily hold true. Some departments had made little or no progress in over a year, while others had begun to effectively use their computers almost immediately on receipt. For example, neither the BOQ nor Security had made more than a token attempt to automate any operation over several months, and due to staffing shortages Staff JAG had only just begun to use its micro in the few weeks before the interview. In contrast, CCPO, while having just received its computer less than three months before the interview, was successfully

using database and spreadsheet programs. Clearly, time is not necessarily a variable with direct impact; other influences are at play.

2. Initial Level of Expertise

A factor which may have had the strongest impact of all was the existing level of expertise in the department. The presence of but one slightly experienced individual made a great difference. If that individual were truly computer literate, and possessed intermediate or advanced skills, the department had a substantial start on its way to successful implementation. CCPO was an example of a successful department that benefitted from the presence of a "resident expert," the department head. On the other hand, departments totally lacking in knowledgeable personnel found implementation to be fraught with difficulty (e.g., BOQ, Fire Department). Some department heads did not know how to seek sources of training, nor did they know whom to turn to for assistance.

3. Initial Training

An intensive one-week program was developed for the Naval Station by NARDAC San Francisco. It included a basic introduction to microcomputers (i.e., computer and system operations), and to software packages for word processing (Wordstar), database (dBase), and spreadsheet (Lotus 1-2-3). This command-funded, "comprehensive" training was arranged for two individuals from each department one time only. An

unfortunate situation occurred at least once when one individual resigned immediately after receiving the training. In another instance, a trainee left for a job in another department shortly after receiving the training.

While this training was well thought of, some users remarked that it covered too much in too short a time. Novice users were particularly insecure; they felt they needed additional instruction and a great deal more experience.

4. Follow-On Training

All follow-on training was left to the individual departments. Some chose to enroll personnel in courses given by NARDAC. Those with experienced personnel conducted training in-house. Departments that are now conducting their own training are doing so "as needed"; none has developed any type of plan for ongoing training even though personnel turnover and shortages, which continually erode the experience pool, will remain a problem. A few departments specified that they intended to budget funds for future training expenses--NARDAC courses.

5. Future Applications

"Just getting started" was a major concern for many department heads. Nevertheless, beyond the initial learning and set-up phase should come the automation of a multitude of activities. A major concern is that, without guidance, users and managers who have little or no background will be

unaware of candidate procedures for automation. It is possible that many tasks will continue to be performed manually. The benefits of the microcomputer's versatility and power will not be fully realized.

6. Common Complaints and Requests

Several interviewees expressed some dissatisfaction with the microcomputers. The small amount of memory, lack of telecommunications and/or networking capability, and non-letter quality printers were mentioned most often. Several individuals discussed the lack of funding for training and system upgrades, and in a few cases the need for more than one microcomputer. There was some interest in full office automation capability.

7. Command Policy and Guidance

There is no command policy or guidance pertaining to the use of the microcomputers. The command funds the equipment purchase and initial training, but beyond that point the departments are "on their own".

- Productivity standards have not been addressed. There are no checks to see if the computers are even being used.
- No training officer has been assigned, nor has training been coordinated at the command level.
- The individual "in charge of" the microcomputers is primarily concerned with their funding and acquisition; he has no responsibility concerning their use.

Thus, there is no point of contact at the command for users who have questions. Information is not readily

passed down or laterally; few individuals had contacted other departments for assistance. In a few interviews, where the departments had no corporate knowledge of computers and were only just getting started, the department heads had no idea where to turn for training, or of the cost involved. Before the interviews, they did not know that training was available through NARDAC. They were pleased to hear of it, of its quality, and of its low cost.

8. Summary

The summary of computer usage at the Treasure Island Naval Station is shown in Table 1 below.

B. FINDINGS--POLICY

An attempt to determine the Navy's position on training for microcomputer users resulted in the following:

- A computer specialist in the Naval Data Automation Command's (NAVDAC's) Technology Transfer and Planning Department was unaware of any written Navy policy concerning requirements for training related to computers, or their use. She believed that the control of microcomputer resources is left entirely to the commanding officer of field activities or individual users.

- A program analyst in NAVDAC's Information System Management Policy branch also believed that no overarching policy concerning the use of microcomputer resources exists.

- The Information Resource Center director at NARDAC San Francisco was unaware of the existence of any overall Navy policy concerning the training of computer users or the use of microcomputer resources. She believed that all commands are required to assign responsibility for overall coordination and control of systems (including training) to some individual, but most do not.

TABLE I

COMPUTER USAGE AT
NAVAL STATION TREASURE ISLAND

Department	Word Proc'g	Data-base	Spread-sheet	Skill[1] Level	#[2] mos
Admin	X	X	---	novice+	4
BQ	---	---	---	---	12
Brig	X	---	---	novice	>12
Chapel	X	X	X	intermediate	2
Comptroller	X	X	X	advanced	21
(above department also uses graphics packages)					
CCPO	X	X	X	advanced	4
CAAC	X	---	---	novice	<1
Family Services	X	---	---	novice	<1
Fire Dept	---	---	---	---	<1
Port Services	X	X	---	intermediate	8
PAO	X	X	---	advanced	12
Security	---	---	---	---	--
SCE	X	X	X	advanced	>24
Staff JAG	X	---	---	novice	12
Supply	---	---	---	---	<1
TPU	X	X	---	novice	16

Note 1: Skill Level is a subjective assessment by the author.

Note 2: The length of time, in months, that the department has had possession of (a) microcomputer.

- The Director of Policy at NAVDAC agreed there is insufficient emphasis placed on planning and training for microcomputer users. There are instructions, directives, bulletins, and publications which control the acquisition and management of systems from a regulatory (finance and inventory) perspective, but none that definitively addresses training or productivity requirements. There is a lack of commitment at the command level. NAVDAC is tasked with promoting the effective implementation and use of computer systems, and yet does not have feedback from field activities or authority over them.

V. TRAINING REQUIREMENTS

A. INTRODUCTION

The microcomputer has evolved from a novel idea to a powerful, versatile, affordable tool in little over ten years. What was once considered luxurious or a toy by many people has become accessible and practical through the development of easy-to-learn, general application programs and reduced prices. The technology has advanced to the degree that the microcomputer is fast becoming as ubiquitous and taken-for-granted as the typewriter once was. Newspapers and periodicals have run countless articles about this phenomenon, reporting exciting statistics proving the ever-increasing level of literacy of the average individual. It is easy to believe prophesies of a computer utopia in the near future, when programs and the machines themselves will be so advanced that anyone will be able to sit down at the terminal and easily learn the system.

For the present however, the average person, especially the average sailor, has little or no experience using a microcomputer. Commercial training offered by the hardware vendor, a training vendor, or school of some type, would require perhaps twenty hours' instruction to teach him the basics of microcomputer operation [Ref. 26:p. 74]. Without training, that novice individual who has no background or

experience may require an inordinate amount of time, perhaps ". . . sixty to eighty hours 'to figure out the computer on (his) computer on (his) own.'" [Ref. 26:p. 74]

A recent General Services Administration survey reported:

> The majority of those surveyed reported four major problems facing micro users. The most widely reported was the lack of adequate microcomputer training. GSA found that out of 208 users, just over 100 had formal training. the remainder were either self-taught or learned on the job. The report quoted one user as commenting that "employees need an extended amount of training time to become proficient in microcomputers." Another said experienced users must often stop their work to help new users and then work overtime to get their own work done. [Ref. 27:p. 61]

It is hard to imagine a sailor or civilian employee who can afford to spend much time away from his duties, either to attend lengthy training sessions or to teach himself new skills. The average individual, if left entirely on his own, will not be able to teach himself to operate a microcomputer. Naval Station Treasure Island's Bachelor Officer Quarters and Fire Department are worst case examples where the department microcomputer is not being used at all. The "trained" users at the Transient Personnel Unit have not progressed beyond basic skills taught them during their initial training. As a result, they can only perform simple, routine tasks and cannot teach others. Even after receiving initial training users require assistance.

> Once new users are left alone with their computers, even the simplest questions can become major obstacles.

> Therefore, not only is training important, but follow-on training support is just as important. [Ref. 26: p. 74]

Due to high personnel turnover, there is an ever-present demand for ongoing training. The accumulated costs of so much training purchased commercially would be difficult, perhaps impossible, to meet in the customarily austere military funding environment. It would also be quite difficult, perhaps impossible, for a command to regularly do without personnel for even short periods of time.

It is very important to match the type and level of training to the student. The Introduction to Microcomputer course given by NARDAC San Francisco was described both as too elementary (by the Brig Executive Officer) and as too intensive (by others interviewed). Constraints such as funding and manpower (scheduling) also come to bear on the type of training selected.

B. TRAINING METHODS

1. Classroom Training

Organized classroom training is generally given by established training vendors, schools, or corporate information resource centers or personnel/human resource/training departments. Classes in different applications, geared to different skill levels, are typically offered on a preset schedule at a fixed cost to the student. Course material and examples may be tailored to a specific audience, and emphasis may be placed on certain skills or areas of

interest. Instructors are knowledgeable, paid professionals, who be expected to be up-to-date in their field. They monitor student progress, and are available to answer questions , an especially important aspect of training for the new user. Professional training organizations are sought by many corporations or commands that do not have the resources--financial and manpower--to maintain their own.

Hands-on courses offer each student access to a properly configured computer. Some training authorities feel that each student should have his own machine during the course, while others feel that a ratio of two or three students per machine is sufficient. Each has advantages and disadvantages. One-to-one training (one student per machine) gives the student the maximum amount of time using the product, i.e. the maximum amount of hands-on training. Nevertheless, some students may have difficulty keeping up with the class, which may serve to hold back the entire class. Two- or three-to-one training still permits the slower students to have hands-on access, but with additional assistance from the other members of the group.

Lecture-only courses are rarely effective for true beginners. Simply listening to a lecture does not permit this level of student to grasp the subject; he must interact with the computer. On completion of this type of training, a beginner would not be able to immediately and effectively

use the product. Lecture-only courses may be quite effective, however, for more advanced students.

Classroom training does have some disadvantages. Cost is very often prohibitive. Courses may cost a few hundred dollars per person when purchased from a training vendor, and may go much higher.

> Aimed at providing management education as well as familiarity with personal computer software. . . . Typically such training will last for three full days, including approximately half a day devoted to computer software fundamentals. . . . At $1,500 per trainee, Micromentor's is the Rolls-Royce of pc software instruction. [Ref. 28:p. 90]

Training costs quickly add up for a command which has many people to train and typically high personnel turnover.

Scheduling is also a common problem. It often strains a department to "lose" an individual to training--even more so for a key individual. At times, it may be impossible to schedule training because of especially heavy workloads or special operations. The training facility itself may have problems scheduling training; some minimum number of students must report for training at the same time so that the facility can operate efficiently.

Classroom training may not attend to student skill level. A slower student may fall behind if the group is not carefully monitored, and a more advanced student may grow bored and lose his motivation to learn.

An example of classroom training will be discussed in paragraph E.2.b. of this chapter.

2. Computer-Based Training (CBT)

CBT is a method of instruction that allows the user to become familiar with a software package by working through an interactive program. It includes a variety of training products that use either a disk-based program that teaches a student through step-by-step instruction, or a video display (VCR) that shows the actions that should occur while the student uses the computer.

Information and instructions are presented through a series of screens using text and sometimes graphics. The user responds to instructions, and the system provides immediate feedback. Workbooks are usually provided along with the training diskettes. It is ideally used on the actual system that the student will be using.

Most early CBT packages were designed for mainframe applications, but more are being produced for microcomputers. Some CBT packages are modifiable to meet the needs of the organization; others are not. This form of training is gaining popularity for beginners and even intermediate level users.

Some packages require that the student go through the entire program; others are designed to permit the student to select only those topics he needs. In either case, the student progresses at his own pace. CBT designed as flexible instruction modules has many advantages for the student. A session may be interrupted and begun again at a

later time, and at any point in the program. A student may repeat a section if desired. This is beneficial for users who have many demands on their time, or who experience problems scheduling formal classroom training. However, because it can be started and stopped at will, it is likely to be interrupted by "emergencies" in the workplace. A remedy for this is to physically separate the student from the workplace during training. CBT is transportable to even the most remote locations.

CBT does not require the services of training staff, which would require a substantial, often prohibitive investment in resources. Nevertheless, the lack of an instructor is also a disadvantage for CBT, especially for the new user. Should the student have any sort of difficulty and be unable to work out the problem on his own, there is no instructor to assist him; therefore, the learning experience may be limited. Some feel that the student may experience the loss of the inspirational and motivational leadership of a dedicated teacher.

An example of a CBT package offered by a training vendor will be discussed in paragraph E.2.a of this chapter.

3. On-the-Job Training (OJT)

Due to a variety of constraints, including funding, personnel, and scheduling, the only training many people receive is OJT. It could conceivably be an unhurried, personalized, thorough indoctrination given by a

knowledgeable individual who is a skilled teacher. Given a favorable set of circumstances, such a one-on-one arrangement may be more successful than other training methods. OJT has been successful for a few of the departments at Naval Station Treasure Island. Examples are: Administration, Chapel, Consolidated Civilian Personnel (CCP) Office, Public Affairs Office. Unfortunately, this is not always the case.

Often, the student must learn some body of knowledge as quickly as possible so that he may become a productive, contributing member of an understaffed organization. The time constraint may require the student to proceed faster than he should. He may not be able to keep up with the pace of the instruction, or the instruction itself may have to be abridged. The individual tasked with teaching the new user may not possess much more than a superficial knowledge of the subject; he may know only the simplest software functions, or the most basic operation of the microcomputer. In such a case, the new user can derive benefit from only a limited body of knowledge. In either case, the "teacher" is diverted from his own duties. This situation exists in the Port Services department at Naval Station Treasure Island. Even though users are passing their (limited) knowledge on to others, the department head feels that because of their lack of expertise they are not using even one-quarter of the computer's potential.

After an initial training session, however good or bad it may be, further knowledge of how a system or software package works is passed by word-of-mouth, in an ad hoc manner. Again, the knowledge that is passed along is often incomplete and sometimes wrong. Organizations that do not plan training often cannot afford to teach new users on more than a task-specific, need-to-know basis. People learn "by asking impromptu questions that have meaning to them at the moment". [Ref. 29:p. 128] Unless users make an effort to expand their knowledge, and keep up with technological progress, the information they use and pass on will quickly become outdated. As a result, learning is fragmented and far less effective and complete than it should be.

Nevertheless, OJT can be successful. Advance planning is of the utmost importance, and should determine what information must be taught to new users, and which individual(s) would perform best as teachers. A thorough hands-on program of the subject application should be developed to ensure that all important functions are covered. Sample exercises should be realistic, representative examples of the work that will be performed, and should include how to handle errors. When the OJT is being given, interruptions should be as few as possible, and a positive, encouraging attitude maintained. This is especially important for the novice user.

4. Self Instruction

Users are often left totally on their own to educate themselves in general computer operations or in a specific software application. This also occurs following some level and amount of initial training. The user must then teach himself everything beyond the basics received in that introduction, and reteach himself information that he may have forgotten (or never fully grasped in the first place).

The success of this method is nearly completely dependent on the individual himself. There are those who aggressively seek sources of additional and more advanced information, and have the ability to comprehend and implement the new material. Many are entirely self-taught and are capable of the most advanced work. The budget analyst interviewed for the Naval Station Treasure Island Comptroller department received initial instruction in Lotus 1-2-3 from NARDAC. She continued to educate herself by purchasing a book on its use, and by contacting other users for guidance. Additional examples are the Chaplain, CCP Officer, and CAAC petty officer who are capable enough to teach themselves new applications. Nevertheless, this is difficult--even impossible--for many people, especially novice users. They may not be able to progress at all without a great deal of guidance. The lack of time to pursue this information while at the workplace, the cost of training which may fall entirely to the user, and the

inaccessibility to computer facilities during time off all contribute to the difficulty of self instruction.

C. WHO ARE THE USERS?

1. Skill Level

Users should be categorized by their current skill level so that the proper level and method of training may be applied. Training should take into account whether the individual is:

a. Novice/Beginner

This individual has had little or no previous contact with computers. He may believe that he is lacking a required technical aptitude, and therefore feel threatened by the computer.

b. Trained

This individual has used computers and has had training (possibly self-taught) in operating them. He may require instruction in a new application, or more advanced use of the one he is already familiar with. This category includes a wide spectrum of users, from an individual with limited skills to one who is able to teach himself new technology and applications, but may require instruction on more advanced material.

2. Organizational Level

Categorizing users by organizational level differentiates among the different levels of literacy required.

a. Executive Management

These individuals are key decision makers (those at the top of the military chain of command) who can benefit from access to timely and accurate information. They do not require in-depth familiarity with all application programs since they do not perform the routine operations. Nevertheless, they do need to be computer literate to take advantage of the benefits that microcomputers offer to support decision-making.

b. Management

These individuals are middle and first-line managers (in the military, petty officers through department heads) who can benefit from the use of microcomputers to provide information and information-handling tools which are helpful in controlling daily operations. Managers need to know how to operate the microcomputer and how to use and adapt application programs on an ongoing basis. They must be able to answer questions from staff personnel. Therefore, training for this category of individuals should be in-depth and should provide information for them to become more aware of the system's potential so that they can envision future opportunities for applications. Managers also need information on other training resources.

c. Administrative and General Staff

Though traditionally considered strictly clerical staff, this category may be expanded to include all

users who perform daily operational tasks, from non-rated personnel through department heads. Word processing assists with inter- and intracommand correspondence and record-keeping. Database and spreadsheet programs may be applied to many facets of daily operations, e.g. personnel management, budgeting, inventory, etc. Training should develop skills in a specific application program, and should be provided by skill level.

D. GEARING TRAINING TO THE USER

1. Beginners

True beginners require a great deal of hands-on, interactive work with the computer, and with the particular application being studied. Few beginners are capable of learning to use a computer by experimentation or by reading manuals. On-the-job training is often inadequate due to interruptions, lack of time, or the instructor's lack of knowledge. Recommended methods of instruction are: classroom training or CBT.

Classroom courses should stress a hands-on, versus a lecture-only, format. The ratio of students-per-machine should not be more than two- or three-to-one to ensure interaction with the system. The students-per-instructor ratio should be sufficiently low to ensure that students receive adequate attention. Training should not try to cover too much material in a given time; consideration must

be given to the new user's capacity to absorb information which is entirely new to him.

Individuals who have prior experience using computers, but not with the application being taught, fall into the "beginner" category for the specific application being taught. Putting these individuals in a classroom with true beginners may result in a bad experience for both. This type of student needs less of the general information, and is capable of absorbing more information overall; he may become bored and lose interest in the class. At Naval Station Treasure Island, the Brig's Executive Officer felt that NARDAC's Introduction to Microcomputers course "did not teach enough." This individual possessed an IBM personal computer and was already somewhat experienced when he took the course.

The selection of CRT packages must take into account the qualities discussed earlier to ensure that the student will derive the greatest possible benefit.

2. Intermediates

Determining which students are truly "intermediate" may be difficult. If students are not carefully screened, effort may be wasted due to an inappropriate skill level.

Organized classroom courses are the most common method for training intermediate skills. While hands-on access is essential for beginning students, its value for intermediate users is questionable; these students usually

know how to use the product and are looking for ways to use additional, more advanced commands. Lecture-only training, especially when combined with a large screen projection device, can be effective for intermediate students. CBT products have not been as effective for the intermediate user, however, this situation is changing [Ref. 30:p. 27].

3. Advanced

This skill level possesses a few special problems. Since the users themselves are developing advanced applications products, it is difficult to find qualified instructors to staff classroom facilities. The availability of students is perhaps an even greater issue at this level. An individual who requires advanced training is generally a very valuable or even key employee. It may create a great strain on the command to release such an individual for two or three days' training. CBT is not applicable for this level of expertise.

Publications are a viable source of training for advanced users. While the vast majority of books are written for beginners, more advanced topics are being published in increasing numbers. Advanced users already possess the experience and knowledge that will permit them to learn by reading. Contacting other users is another source of information at this level.

E. SOURCES OF TRAINING

This section will present sources of training that exist outside of organizations' in-house training programs.

1. Manufacturers

Nearly all mainframe hardware manufacturers offer some training for their customers in addition to documentation and manuals that accompany the purchased system. Actual training sessions are usually available for only a limited number of users as part of the system purchase price. The vendor will train other users, but at a price of (usually) a few hundred dollars. Due to intense competitive pressure, most have decreased customer support in this area.

Occasionally, microcomputer manufacturers offer a limited amount of formal user training to large customers as part of the purchase. However, they primarily offer only documentation, manuals, and CBT packages.

Software vendors offer training solutions which consist of various techniques depending on the cost of the product/purchase--the greater the cost, the more comprehensive the training solution; the smaller the cost, the more likely that the training will be computer-based.

2. Training Vendors

The tremendous growth of the end-user computer industry has been matched by the growth in training service and training package vendors. They offer an alternative to developing costly in-house training resources.

Services are offered by individual consultants, small local consulting firms, larger national organizations, and computer stores. They offer several techniques, including one-on-one training, lectures and seminars, formal classes where students hear lectures and are given hands-on experience, and CBT. A growing number of companies offer only independent study material, primarily as CBT.

a. Training Vendor's Product--Example

A sample brochure advertises LEARN-PC Video Systems' Lotus 1-2-3 Video Training Programs, as a cost effective "private tutor" capable of training entire departments. The programs are

> written in plain English . . . (sic) avoiding computer jargon. The video tapes clearly shows (sic) and explains (sic) what keys to press and how the computer monitor looks . . . the programs are self-paced assuring maximum comprehension.

The full package includes videotapes, a demonstration computer disk, a guidebook, and a command chart. The disk is used with the instruction on the videotape to show examples of commands and procedures as they are explained. It also contains unfinished worksheet examples and solutions. The guidebook is a printed description of the videotape content. It also contains additional exercises. Additional sets of disks and guidebooks are available at $15.00/set. A "special bonus" is a chart showing "the organization of over 200 commands." An enclosed magazine review of the product mentions that

there is a toll-free telephone number for customer support. The price for one package is $499.50 ($495 plus $4.50 shipping).

b. Training Vendor's Service--Example

The Information Resource Center (IRC) of the Navy Regional Data Automation Center (NARDAC) offers many different services. The training programs for microcomputers given at NARDAC San Francisco will be discussed here. The IRC offers information and command-sponsored training on applied computer technology to military personnel or civilian employees of any government agency. Its goals are to:

- Increase awareness of computer alternatives to
  * Enhance productivity
  * Assist in applying computer technology to meet organizational needs
  * Promote both information and resource sharing

The IRC is designed to support all levels of computer users:

- Managers: To support decision-making, generate reports and graphics, or maintain information files.
- Administrative and clerical personnel: To increase productivity.
- Computer specialists: To keep abreast of advancing technology.

A government activity itself, NARDAC understands the needs of the military and civil servant user. It is a fully professional operation, with experienced, well-trained instructors and management. For training purposes, it

offers: two classrooms, conference room, two types of microcomputers (Zenith and "PC look-alike"), and a self-paced learning center. Books, magazines, and papers are available for reference. There is a referral service for follow-on help after training.

Training is given in formally scheduled classes. Groups are limited to approximately 16 students so that each has his own microcomputer; all training is hands-on. Each class has two instructors; one lectures and the other assists individuals as needed. Courses are offered in word processing, database, spreadsheet, graphics, and project management applications software, as well as a general Introduction to Microcomputers course. Different skill levels are also available. Each course is one or two days long. To ensure that courses meet the students' needs, they are developed and modified by a training team made up of instructors.

NARDAC can develop a special course (e.g. for a software package that is not normally taught) or tailor a standard one to the needs of a particular customer if there is sufficient interest. For example, a special course was developed for Naval Station Treasure Island personnel as part of the microcomputer implementation. One or two individuals from each department receiving a micro attended five days' training that included a general introduction to the system, word-processing, databases, and spreadsheets.

Classes may also be taught on-site if there are enough students.

While NARDAC offers training services which are at least equal to those of commercial vendors, it also offers one additional, strong advantage--its price structure. One-day courses range in price from $75 to $85, and two-day courses from $150 to $170 (as of summer 1986). Equivalent training purchased from a private firm could cost several hundred dollars.

3. Books and Publications

As the microcomputer has gained popularity, a market for "how-to" literature has developed. Literature ranging from the most basic information on computer technology to advanced applications and engineering are available. Trade magazines and journals regularly feature reviews and in-depth discussions of new hardware and software. More and more books are being written which teach the use of specific software packages.

This source of information is better suited to intermediate or advanced users. A textbook that explains theory and technology may be inappropriate for a novice user who needs to know the "how's" of computer operation but not the "why's". Similarly, a comprehensive or advanced treatment of a particular software package would be too difficult. Most likely, the novice user will not be able to understand or assimilate all the information. Few novice

users can teach themselves; if a subject is unclear on reading, the user must ask someone. The intermediate or advanced user, however, may derive much from such sources.

4. Free Training

Free training may sometimes be acquired from the hardware vendor, but this is generally insufficient and often infeasible for Navy personnel due to the volume of the contract purchase and "nature of the work", i.e. number of personnel involved, turnover, etc. Training vendors occasionally offer free training as a lure for their regularly offered services, but as a source of training this could only be considered a rare stroke of luck for one-time training requirements only. Current prices for single application courses or training packages listed in advertisements and trade magazine reviews often reach several hundred dollars.

The possibility of obtaining free training should not be overlooked. Its use can help to hold costs down, and its quality may be comparable to any professional program. Some other sources are:

- Public libraries: Libraries sometimes offer free training or, at least, hands-on practice time.
- Hardware or software users' groups: A source of interested, knowledgeable, helpful people. Users' groups "establish support networks between those who are computer skillful and those who need to be . . ." [Ref. 31:p. 44]
- Coworkers and friends: Simply "asking around" may turn up individuals who are willing to help a new user, or an experienced one working with a new application or

> system. As with users' groups, ". . . people who already have computers are usually enthusiastic about them and eager to help others get started.: [Ref. 32]

5. Documentation

A user will logically turn to the manual that accompanies the system to be learned. The value of such documentation as instructional material is questionable; the "uselessness" and frustration due to the incomprehensibility of these works is widely known. An operating system manual contains the many system commands and shows their formats but does not explain what they mean; it does not teach. To a new user, the manual seems to be written in a foreign language.

> The formal presentation of information through documentation and manuals is to be avoided at all costs. In the mainframe world, users rarely receive printed material about the host computer. If they did, it would be mostly incomprehensible. Microcomputer users know firsthand the frustration of trying to comprehend the meaning and intent of the descriptions in these works of so-called prose. Experienced pc users generally try a program before even cracking the binding of the accompanying documentation, not because they're so knowledgeable they can ignore it, but because they don't see the sense in starting off on a bad note. In the Unix community, where the system's complexity begs for guidance, the multivolume documentation operating system is widely seen as an enigma bound in mystery, something to be dodged by all but the most masochistic individual. [Ref. 29:p. 127]

Documentation for software packages varies greatly. The software may be accompanied by a (typically) cryptic manual, or by a hands-on, active tutorial program (CBT) which is thorough and well planned. Independently authored "how-to" books have been published for many of the more popular packages.

F. SUMMARY

- Training Methods:

  * Classroom Training:

    -- For beginners: hands-on, one or few students per computer. For advanced: lecture only may be adequate

    -- Advantages:
    Various skill levels
    Instructors: knowledgeable, up-to-date, professional
    Feedback
    Organization does not have to maintain resources

    -- Disadvantages:
    Cost
    Scheduling

  * Computer-based Training (CBT)

    -- Advantages:
    Self-paced
    Scheduling
    May be started/stopped/repeated at will
    Transportable

    -- Disadvantages:
    No live instructor
    Cost

  * On-the-job Training (OJT)

    -- Advantages:
    Cost
    Tailored to users' needs
    Scheduling

    -- Disadvantages:
    Ad hoc
    May be rushed, incomplete, wrong
    Instructor may lack knowledge
    Scheduling

  * Self-instruction

    -- Advantages:
    Cost
    May be better for advanced users

-- Disadvantages:
Cost
No instructor
Access to resources
Scheduling

- Users

  * Skill Level:

    -- Beginner

    -- Trained

  * Organizational Level:

    -- Executive management

    -- Management

    -- Administrative and general staff

- Gearing Training to the User

  * Beginner:

    -- Hands-on

    -- Interactive

    -- Feedback

    -- Do not overload--not too much material at once
    Recommended: classroom, CBT

  * Intermediate

    -- Recommended: classroom, possibly lecture-only. Additional CBT packages are being developed for this level.

  * Advanced:

    -- Qualified instructors are difficult to find
    Recommended: self-instruction by reading publications and interfacing with other users

- Sources of Trainings

  * Manufacturers: hardware and software

  * Training vendors

* Publications: books, periodicals, reports

* People: hardware or software users' groups, other users

* Documentation

VI. INTRODUCING MICROCOMPUTER TECHNOLOGY

There is much more to implementing microcomputer systems than simply handing hardware and software to intended users. Meaningful productivity increases depend not only on an organization's equipment, but on the employees and managers who use it. Better performance and enhanced productivity are linked with effective training programs. Operations management specialists agree that vocational grooming of the staff is clearly one of the highest leverage functions in which an organization can invest [Ref. 33:p. 63]. Yes, a good understanding and appreciation of training is hard to find.

A. ORGANIZATIONAL SUPPORT

Surveys of management personnel often reveal that, in general, their organizations do not consider training to be important. These same managers express unhappiness that their workers cannot use new technologies, or determine how they may be used, to increase productivity. How can workers improve their skills when they are not afforded the opportunity to learn, or the time required to refine their expertise? As is often the case with the military, and with many civilian organizations, crisis management is the typical mode of operation. Training is set aside due to an

inordinate push for a quick fix which has little or no regard for quality or future costs.

The training process is not working properly in many organizations (commands). The organizations are unaware that they are failing to reap the benefits they should from their training programs. This (partial) failure often occurs because an organization's values conflict with its ability to achieve its goals. It may be unable to create an environment that permits higher productivity due to serious flaws: inflated or unreasonable expectations, conflicting objectives and priorities, insufficient executive management sponsorship, and sparse middle management participation.

1. Resource Conflicts

a. Personnel

Constraints may dictate that the most competent individuals are not suitable or available for training. As a result, the individuals chosen may not be appropriate or qualified, and may even be expendable (e.g. a temporary employee). An unfortunate example is the Naval Station Treasure Island Fire Department; of two selectees for initial microcomputer training, one was a temporary employee who resigned one week after receiving the training, and the other continues to exhibit "computer phobia" months later [Ref. 34].

Even the selection of an organization's overall "microcomputer manager" may be less than ideal; for example,

project management may be assigned to an individual based on his knowledge of purchasing procedures, without considering his (lack of) experience with microcomputers. It is imperative that the individual given responsibility for managing a microcomputer, a training program, or a project, have knowledge of and experience with the technology. This is true for all levels, from agency-wide planning down through field activity division officers.

b. Budget

When it becomes necessary to optimize the use of limited funds, the prioritization of an organization's activities usually puts training at the bottom. Many organizations forget the benefits of training; they see it as a superfluous function that can easily, or should, be cut when funding is lean. Later, they may be surprised and upset by the inefficiencies, errors, and reduced quality observed in work performed by poorly trained or untrained personnel. With computers it may not be that errors are being made, or that the quality of the work is poor, but that the machines are not being fully used and the bulk of the work is still being performed manually. At worst, it may be that the computers are not being used at all. By the time such problems are noted, the organizations may have forgotten the advantages of strong educational strategy. They may not relate their problems to the earlier decision that cut training.

2. The Chain of Command

a. Top-down Support

Successful implementation can only be achieved with strong top-down support. Because upper management's attitude determines acceptance of a new program, success is directly proportional to the level of managerial participation and influence. For the military, "management" does not merely mean a department head or the commanding officer of a field activity. Planning and goal setting should begin high in the chain of command and be passed down through each level to the user. Responsibility for ensuring project success, which may be simply the productive use of a microcomputer, should be treated the same way.

If managers lack a clear understanding of what it takes to fully implement a microcomputer system, they may fail to realize or support success-oriented training strategies. All levels of management must understand how microcomputer technology fits into organizational priorities and then give sustained, visible support. Otherwise, projects are likely to fail.

b. Management Block

While the potential for successful implementation is set by upper management, it is also directly influenced by the support that users get from their immediate supervisors. Circumstances may prevent students from exercising the skills they have learned; such situations may

arise due to "'middle management block', a condition in which middle managers become obstacles. . ." [Ref. 33:p. 68]

The cause of this block may be a natural reluctance to change. However, this problem occurs more often because middle managers do not have an understanding of what is being taught to their employees, nor have they been given the opportunity to learn. The managers are unaware of how computer technology can be applied to operations. They may have little or no understanding of such new approaches nor the requirements for implementation. When this is so, inadequate support may be given. This is painfully illustrated by the Bachelor Quarters and Security departments at Naval Station Treasure Island. Key managers did nothing to implement the technology even though the use of available microcomputers would have greatly benefitted their departments. It is <u>essential</u> that middle managers (from division petty officers up the chain of command) have an understanding of microcomputer technology, its potential uses, and of specific application software packages being used by their personnel.

3. <u>Recommendations</u>

Ongoing training is required for most personnel, and usually more than just a quick and dirty review of the basics. This is particularly important for military organizations due to high personnel turnover. A training

program that is flexible enough to meet both the technical and managerial needs of the organization should be developed. All levels of management should be held responsible for ensuring that valuable and hard-won computer resources are used to their fullest for productivity enhancement.

Follow-up training support should be established as workshops and consulting services. Personnel should be encouraged to learn new applications and apply new techniques to their work. Especially knowledgeable individuals should be sought out and strongly encouraged to act as command or department resident experts, for additional sources of training, troubleshooting, and assistance. New technology and products, and new releases of standard software packages, should be reviewed regularly so that users will be able to take advantage of advances in the field.

> . . . the need for employee education cannot be denied. The costs of poorly trained workers are lost opportunities, low morale, reduced quality, inefficiencies . . . all of which can blow . . . productivity right out the window. [Ref. 33:p. 70]

B. STUDENTS' NEEDS

Many training aspects and techniques contribute to its success or failure.

1. Management Involvement

Optimal job performance depends not only on employee skills and knowledge but also on the availability of needed resources, performance goals set by management priorities, feedback, and incentives to support desired behaviors. Without management support, a training effort, no matter how effective, will not greatly change the job environment.

> Training needs to flow from two primary sources: a validated analysis of the current job tasks, with the skills required to complete these tasks, and a model of the future technological directions of the organization, agreed upon by upper management. . . . Because job analysis will only identify current skill needs, the need to identify new technological applications must supplement the job analysis approach. . . . Upper management should set the tone by identifying the desired directions for the future and coordinating their implementation with the training organization. [Ref. 35:p. 25]

The manager must choose among the different forms of instruction available: classroom, computer-based training (CBT), on-the-job (OJT), self-study. The appropriateness, availability, costs, and benefits of each must be weighed.

The transfer of skills to the job will be enhanced if supervisors take responsibility for their employees' training outcomes. Supervisors should discuss their expectations for the employees before training commences; the supervisor should clearly describe how the employee will be expected to use his newly-learned skills in the work-place. After training is completed, the supervisor can make specific follow-up assignments that link the training to job requirements.

2. What to Look for in a Training Program

How does a manager choose among various training programs? There are many qualities to be considered. Paragraph 3 of this section specifically addresses the selection of a "good" CBT package.

a. Student Involvement

Training, particularly for novice users, should be highly participative and interactive. For any mode of training, this means hands-on involvement. The student should participate in the learning process by answering questions and completing exercises. This is necessary to reinforce the student's newly acquired knowledge. Feedback should be appropriate, adequate, and timely.

b. Tailored to the Student's Level

The program should be selected with consideration for the student's level of expertise. Training should not try to cover too many different topics at one time, and sessions should not be too long. The program should be designed with the student's success in mind, rather than as one possible outcome. Success is a potent motivator and enabling agent in learning.

c. Realism

Examples and exercises should be representative of actual situations that the student will encounter in his job; they should seem "realistic" to him. Not only should

exercises be solvable, but they should also illustrate and permit error conditions and how to deal with them.

Training should never create a separate frame of reference in the training environment than the student will have when he has returned to his workplace computer. A training session in which the instructor uses creative terms to help explain things will create difficulties when the student later refers to the product manual and cannot find the familiar terminology. [Ref. 36:p. 57]

d. Classroom Training Considerations

The number of students per class and the number of students per instructor contribute to the effectiveness of classroom learning. Class size should not be so large that all students cannot ask questions freely. NARDAC San Francisco's arrangement of two instructors per class of (approximately) 16 students permits one to help individual students at their computers, as needed, while the other lectures.

Instructors should be patient, helpful, encouraging, and friendly. They should treat all students with respect, and stress the attitude that there are no stupid questions.

e. Testing

Tests and exams should ascertain whether students have acquired the knowledge and skills that the training objectives set forth. They should not be a contest

of wits or an endurance contest. Work simulations--the ability to apply the newly-learned skill under job-like conditions--are the most desirable way to test learning. Unless memorization is required by the job, open book exams seem the most reasonable approach to testing. Pass-fail grading satisfactorily indicates learning outcome.

3. CBT Quality

Good CBT combines an understanding of an application with an appreciation for situations in which specific activities, commands, or procedures can be used. The quality of the CBT package is very important. The manager who is tasked with making a selection must be familiar with some key design elements. The following guidelines are discussed in [Ref. 37:pp. Id/37-44].

a. Content

Many early packages did little more than automate user's manuals. The student read screen after screen of text, and was then tested. As the technology developed, graphics and illustrations were added. The learning process grew more active; simulations that showed practical applications and real-life examples were included and the student was drilled. CBT is continuing to be more exciting and interesting. This is especially important when the users are beginners, and possibly skeptical or afraid of computer technology.

> If these students do not find the instruction exciting and practical, they not only will reject the CBT course, they will reject the personal computer as well. [Ref. 38:p. 41]

b. Appropriateness

A CBT package should be judged for its appropriateness to the target audience. CBT that covers a software package's most widely used features can reach a broad audience, and will therefore be more cost effective. It should not be too advanced if it is to be given to beginners. It should reflect the most recent release of the software.

c. Design

Modular design is highly desirable so that the material is manageable in terms of time and learning requirements. Flexibility should be built in so that the student is permitted to select his topics of interest, and in any order. A unit consisting of three or four related subjects, followed by a review, application, and exercises, reinforce the learning process. Short units help students retain information. A facility for backpaging is helpful.

d. Sequence

The sequence of instruction is important. CBT which lacks a clear design, e.g. using logical "step-by-step structure and "least-to-most complex" ordering of concepts, does not build on the student's growing body of knowledge and skills. The result may be a disorganized user who does

not know how to approach the actual software. [Ref. 37:p. ID/39]

e. Interactive Learning

Most, if not all, instruction should take place at the terminal. CBT that relies too heavily on textbook or video support may lose the ability to simulate the software being taught. It should be highly interactive, engaging the student in an active process of thinking and responding to the instruction. [Ref. 37:p. ID/39]

f. Qualifying Student Responses

The answer-judging capability of the package should give feedback specific to an incorrect answer, rather than a generic error response, and it should be able to recognize partially correct or close answers. So that the student will never be "trapped" in a question, after a few incorrect responses the student should view the correct answer and move on.

g. Humor and Game Techniques

The use of humor or appropriate game techniques may help a student to maintain interest in a training program. Some CBT specialists feel that it should be more social in nature, and that humor may aid the learning process. Of course, its use must be judicious so that it does not trivialize or detract from the learning experience. Games are not only fun, but serve to demonstrate the student's increased proficiency.

C. SUMMARY

- Organizational Support

  * Resource Conflicts

    -- Personnel: select the right person to receive training. Select the right person to manage the computer system.

    -- Budget: give training high priority

  * Chain of Command

    -- Top-down support: upper management must plan, set goals, and assume responsibility for the program
    -- Management block: managers must be computer-literate, supportive

  * Recommendations

    -- Ongoing training: plan for all personnel

    -- Responsibility: make all levels of personnel responsible for ensuring success

    -- Follow-up training support: workshops, consulting services, resident experts, seek new applications and technology

- Students' Needs

  * Management Involvement

    -- Availability of resources

    -- Performance goals

    -- Feedback

    -- Incentives

    -- Choice of appropriate type of training

  * What to Look for in a Training Program

    -- Student involvement: Hands-on, interactive

    -- Appropriateness: to the student's level of expertise and to the application

-- Examples and exercises: realistic, applicable to daily operations

-- Classroom considerations: number of students per class and per instructor, instructor attitude and quality

* CBT Quality

-- Content: interesting, interactive

-- Design; modular, step-by-step instruction and least-to-most-difficult sequencing

-- Response qualification: constructive feedback appropriate to a specific incorrect answer, recognition of a partially correct or close answer

VII. CONCLUSIONS AND RECOMMENDATIONS

Insufficient emphasis on training for microcomputer users must be corrected if improved levels of productivity are to be achieved. This is especially important while the manpower problem is expected to continue. A thorough quantitative study should be performed to determine the impact of poor (or no) training on productivity [Ref. 39].

A. POLICY

Definitive policy concerning the use of computer resources should be promulgated high in the chain of command and passed down through all levels. It should give guidance related to system implementation and management, including points of contact for acquisition, life cycle management, training, and general information. It should set standards for recommended levels of computer literacy for key individuals (e.g., broadly by job categorization, level of responsibility, etc.). All field activities should be required to promulgate local directives which support the use of microcomputer resources.

B. MANAGEMENT

A knowledgeable individual should be designated coordinator, with responsibility for ensuring that a training program is developed. He should identify local

sources of training, coordinate (and offer, as necessary) in-house training, build a library of educational materials, and be able to field general questions. He should act as a general point of contact for computer issues.

C. FUNDING

From the very beginning of a project, additional funds should be made available to support training. This is closely tied to the issue of setting priorities. It may be sufficient to ensure, at the command level, that additional funds be used for training. It is of the utmost importance that the project coordinator be included for training, if required.

D. MANDATORY TRAINING

Basic training in computer operations should be included in certain training programs. Ideally, all personnel should learn the rudiments of file maintenance and word processing but, at the least, individuals in the administrative ratings (yeoman, personnelman, storekeeper) should receive intensive training while attending A school. All officers should be educated in the use of microcomputers, by receiving general introductory training in system operations and common application programs (i.e., word-processing, database, spreadsheet), before commissioning during Officer Candidate School, ROTC, and the Naval Academy. Further training should be given during Division Officer Training, at

Department head school, and at PCO/PXO school. Senior enlisted personnel should also be trained at equivalent career points.

E. NAVY-PRODUCED CBT

The Navy possesses considerable programming expertise and resources. It could develop its own CBT packages for standard application software (Wordstar, dBase, Lotus 1-2-3, et al.). If not full-fledged CBT to include testing and progress tracking, then simple interactive tutorials (such as are included with many software packages) could be written. These Navy-produced packages should be distributed, or made available, to all commands.

LIST OF REFERENCES

1. Bikson, Tora K., Stasz, Cathleen, and Mankin, Donald A., Computer-Mediated Work, The Rand Corporation, Santa Monica, California, November 1985.

2. Hager, Peter, "Agencies Double Their Micro Buys in 1985," Government Computer News, Vol. 5, 1 August 1986.

3. McGee, Cornelia, "Poor Salesmen, Mgmt., Manuals Complicate Training," Government Computer News, 4 July 1986.

4. Coletta, Paolo, E., United States Navy and Marine Corps Bases, Domestic, Greenwood Press, 1985.

5. Navy Regional Data Automation Center San Francisco Project UAHAD02X8401, Naval Station Treasure Island Automated Information Systems Study: Feasibility Study Report and Recommendations, April 1984.

6. Phoncon between Anne Thompson, Naval Regional Data Automation Center, San Francisco, and the author, 19 August 1986.

7. Phoncon between Admin Officer, Naval Station Treasure Island, and the author, 28 August 1986.

8. Interview between BOQ Manager, Naval Station Treasure Island, and the author, 3 July 1986.

9. Phoncon between BEQ Manager, Naval Station Treasure Island, and the author, 3 September 1986.

10. Phoncon between Executive Officer, Navy Brig, San Francisco, and the author, 21 August 1986.

11. Interview between Chaplain, Naval Station Treasure Island, and the author, 2 July 1986.

12. Phoncon between Budget Analyst, Comptroller Department, Naval Station Treasure Island, and the author, 6 August 1986.

13. Phoncon between CCP Officer, Naval Station Treasure Island, and the author, 20 August 1986.

14. Phoncon between CAAC Director, Naval Station Treasure Island, and the author, 7 August 196.

15. Phoncon between CAAC Counsellor, Naval Station Treasure Island, and the author, 3 September 1986.

16. Phoncon between Family Services Officer, Naval Station Treasure Island, and the author, 6 August 1986.

17. Phoncon between Fire Chief, Naval Station Treasure Island, and the author, 20 August 1986.

18. Phoncon between Port Services Officer, Naval Station Treasure Island, and the author, 7 August 1986.

19. Phoncon between Senior Chief, PAO, Naval Station Treasure Island, and the author, 21 August 1986.

20. Phoncon between Security Officer, Naval Station Treasure Island, and the author, 4 August 1986.

21. Phoncon between CAAC Director, Naval Station Treasure Island, and the author, 7 August 1986.

22. Phoncons between Staff Civil Engineer, Naval Station Treasure Island, and the author, 4 August 1986, 3 September 1986.

23. Phoncon between Staff Judge Advocate General Officer, Naval Station Treasure Island, and the author, 25 August 1986.

24. Phoncon between Supply Officer, Naval Station Treasure Island, and the author, 4 August 1986.

25. Phoncon between Executive Officer, Transient Personnel Unit, Naval Station Treasure Island, and the author, 25 August 1986.

26. Lechleitner, Matthew L., A Systems Development Life Cycle Study of the Information Center, Master's Thesis, Naval Postgraduate School, Monterey, California, March 1985.

27. Bass, Brad, "Government Micro Users Report Problems," Government Computer News, 15 August 1986.

28. Ditlea, Steve, "Befriending the Befuddled," Datamation, 15 June 1985.

29. Hall, Mark, "Oral Tradition," Datamation, 1 August 1985.

30. Farrar, Samuel A., Jr., "Training--What Do We Do?" The Government Microcomputer User's Catalog, Winter 1986.

31. Thiel, Carol Tomme, "An MIS Productivity Tool," Infosystems, September 1984.

32. Price, Douglas S., "Training Should be Crucial Part of Computer Plans," Government Computer News, 6 June 1986.

33. Zells, Lois, "Your Policies May be Hobbling Productivity," Computerworld, 28 October 1985.

34. Phoncon between Fire Chief, Naval Station Treasure Island, and the author, 20 August 1986.

35. Clark, Ruth Colvin, "Making it Stick: Ensuring Skills Transfer," Data Training, January 1986.

36. Needle, David, "Selective Shopping Yields Greatest Training Payback," Computerworld, 5 May 1986.

37. Anderson, Carol Kowle, "Computer-based Courses: Not All are Created Equal," Computerworld, 12 March 1984.

38. Livingston, Gary, "Perfect for Micros," Computerworld, 22 October 1984.

39. Phoncon between Director of Policy, Naval Data Automation Command, Washington, D.C., and the author, 13 August 1986.

BIBLIOGRAPHY

Colby, Wendelin, "Letting Users Learn at Their Own Pace," Infosystems, September 1985.

Delaney, Chester, "The Trainee Stops Here," Data Training, January 1986.

Eblen, Pamela L., "With Flying Colors," Business Software Review, December 1985.

Efroymson, Sharon, "Executive Seminars Draw Top Managers, Rally Support for PCs," Computerworld, 5 May 1986.

_____, "Managing End-user Training," Computerworld, 5 May 1986.

Fiderio, Janet, "Humor, Interactivity Enhance CBT Training," Computerworld, 5 May 1986.

"Florida Center Trains Users in Micros' Fine Points," Government Computer News, 4 July 1986.

Garcia, Beatrice, "The Information Center Adapts to Corporate America," Computerworld, 28 October 1985.

Hamilton, Dennis, "Doomed without Courseware," Business Software Review, December 1985.

_____, "The Unstoppable Phenomenon," Business Software Review, December 1985.

Head, Robert, "Information Centers, Information Systems: They Stand," Computerworld, 15 April 1985.

Hochberg, Steven, "After Training . . ." Computerworld, 22 October 1984.

Johnson, Steven Eric, Computer-Based Training for the U.S. Coast Guard Standard Terminal Microcomputer: A Basis for Implementation Utilizing the Elaboration Theory of Instructional Design, Master's Thesis, Naval Postgraduate School, Monterey, California, March 1985.

Kerns, I. Steven, "What End Users Don't Know May Hurt Them You," Computerworld, 8 October 1984.

Korbak, Michael, Jr., Computer-Managed Instruction: Theory, Application, and Some Key Implementation Issues, Master's Thesis, Naval Postgraduate School, Monterey, California, March 1984.

Loewenstine, Richard, "Can the Software Vendor Deliver Training?" Computerworld, 20 August 1984.

Lucas, Henry C. Jr., Why Information Systems Fail, Columbia University Press, 1975.

McDonald, Evelyn C., "Automating People Requires New Training Approach," Government Computer News, 4 July 1986.

McKibbin, Wendy Lea, "Training PC Users," Infosystems, April 1984.

Myers, Del, "Classroom, Self-Paced, and On-The-Job: An Integrated Approach to Operations Training," Data Training, January 1986.

Myers, Edith, "Training Comes of Age," Datamation, 15 October 1985.

Navy Personnel Research and Development Center Report R 83-5, Ship-Initiated Microcomputer Applications: Lessons Learned, by John A. Dollard, November 1982.

Needle, David, "View from across the Desk: Trainees Offer Tips on Courses," Computerworld, 5 May 1986.

Quick, Thomas, "Trainers Deserve Leadership Role," Computerworld, 5 May 1986.

Rhodes, Wayne L. Jr., "The Information Center: Harvesting the Potential," Infosystems, November 1985.

Seidman, Marsha, "Three Systems," Computerworld, 22 October 1984.

Tichy, Noel M., Managing Strategic Change, John Wiley and Sons, Inc., 1983.

Vizachero, Rick, "Evolution of Info. Center is Tied to Emergence of Micro," Government Computer News, 7 June 1985.

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