Training: Prerequisite to Successful End-User Computing

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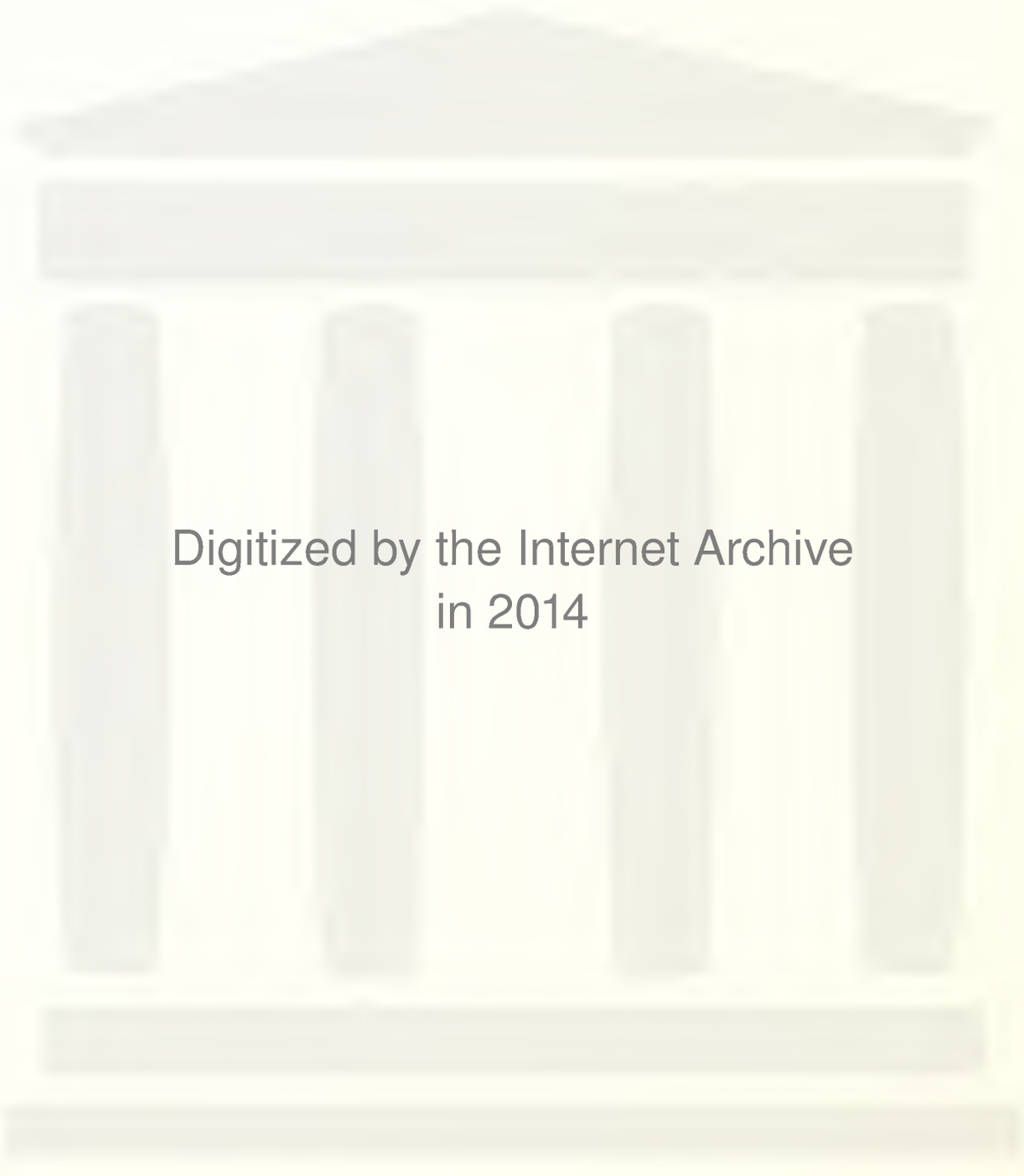
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TRAINING:
PREREQUISITE TO SUCCESSFUL
END-USER COMPUTING

U-ETP
1985 c.1

AUTHOR

Training: Prerequisite to

TITLE

Succussful End-User Computing

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TRAINING:
PREREQUISITE TO SUCCESSFUL
END-USER COMPUTING

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TRAINING:
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EXHIBITS

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I INTRODUCTION

- This report is part of INPUT's Information Systems Program (ISP). The report identifies and examines the issues that information systems (IS) must address in establishing effective training programs for end users who are applying information technology and for IS personnel responsible for supporting end-user computing activities.

A. PURPOSE

- End-user-developed information systems are rapidly becoming the rule rather than the exception. Information technology is touching the working lives of nearly every knowledge worker and information handler from senior executives to word processing operators. The end-user computing phenomenon has mushroomed so quickly that organizations have only had time to apply stopgap measures to the enormous training problems created by the influx of information technology.

- Because end users are turning to IS for guidance in how to use software and hardware, the training problem has come to rest on the shoulders of the IS management. Some of the IS managers do not realize the impact that inadequate training will have on future information systems. They may believe that the training problem is solved by adding a few videotapes on the subject of end-user computing to the video-based training program. They may also believe that the information center has the training issue under control.

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- This report answers the following questions:

  - What are the issues raised by the training needs of end users?

  - What are the ramifications of end users receiving minimal education and training in the application of information technology?

  - How can IS management be assured that the most appropriate training alternative is being employed for each training situation?

  - What steps can IS management take to initiate an effective training program?

B. SCOPE

- This report will concentrate primarily on the issues raised by the training requirements of the end users involved in computing activities. There will be some references made to the overall training and education requirements of the IS staff, but this will relate to the training needs of end users. The report will not only analyze the alternate training approaches, but will also discuss the strategic plannning issues surrounding the entire end-user training problem.

- The following people should find this report pertinent:

  - Senior information systems management.

  - Information systems training staff.

  - Information center/end-user computing management.

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- Corporate training manager.

- End-user management.

C. OTHER RELATED INPUT REPORTS

- Training Techniques for End Users.

  - Identifies the issues and requirements of end-user training, and evaluates the training sources and techniques being utilized by industry.

- Future Skills Requirements for Software Development.

  - This report examines many of the latest productivity schemes, including end-user computing, to determine the impact that new methods are having on the skills mix of IS.

- Organizing the IS Department for End-User Computing.

  - This report analyzes several end-user computing strategies being employed by large firms from a variety of industries.

- End-User Systems Implementation Approaches that Work.

  - This report examines the roles and missions of end users and IS departments in the justification, planning, design, implementation, and operation of advanced office systems.

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- New Opportunities for Software Productivity Improvements.

  - This report assesses the impact on software productivity of the trend toward decentralized systems development and evaluates the tools being used to promote and control this trend.

- Organizing the Information Center.

  - A key issue examined by this report is the extent to which the information center complements, or serves as an alternative to, the personal computer.

D. REPORT ORGANIZATION

- Chapter II is the executive summary in presentation format.

- Chapter III identifies the key end-user training and education issues, with emphasis on future trends in end-user computing.

- Chapter IV discusses the factors that must be addressed in determining training strategies and in developing training plans and programs.

- Chapter V takes an in-depth look at the current state of computer-based training for end users.

- Chapter VI examines the impact of end-user computing on the training requirement for the IS staff.

- Chapter VII contains conclusions drawn from the research and provides recommendations to IS management for establishing effective end-user training programs.

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II EXECUTIVE SUMMARY

- This executive summary is given in presentation format to help the busy reader quickly review key research findings. It also provides an executive presentation, complete with script, to facilitate group communications.

  - The key points of the entire report are summarized in Exhibits II-1 through II-6. On the left-hand page facing each exhibit is a script explaining that exhibit's contents.

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A. THE EVOLUTION OF END-USER COMPUTING IS SHORTENED BY TRAINING

- Each organization is at a certain stage in the evolution of end-user computing. Some organizations are at the bottom of the evolutionary process, with standalone personal computers performing such functions as word processing and spreadsheet calculations for individual end users; some are at the stage of installing comprehensive office systems that provide gateways to corporate data bases. Others are nearing the top of the scale with applications that require the interdependence of the micro and the mainframe.

- Normally, one end-user computing stage is not abandoned when the next one is entered. Several stages can be progressing concurrently.

- The contributions that each stage of end-user computing makes toward the goals and objectives of the organization is dependent on the ability of the participants to apply information technology. In-depth knowledge about the application of end-user computing tools should start with an effective training program. Adequate training at each stage will help realize benefits sooner and will shorten the time between stages.

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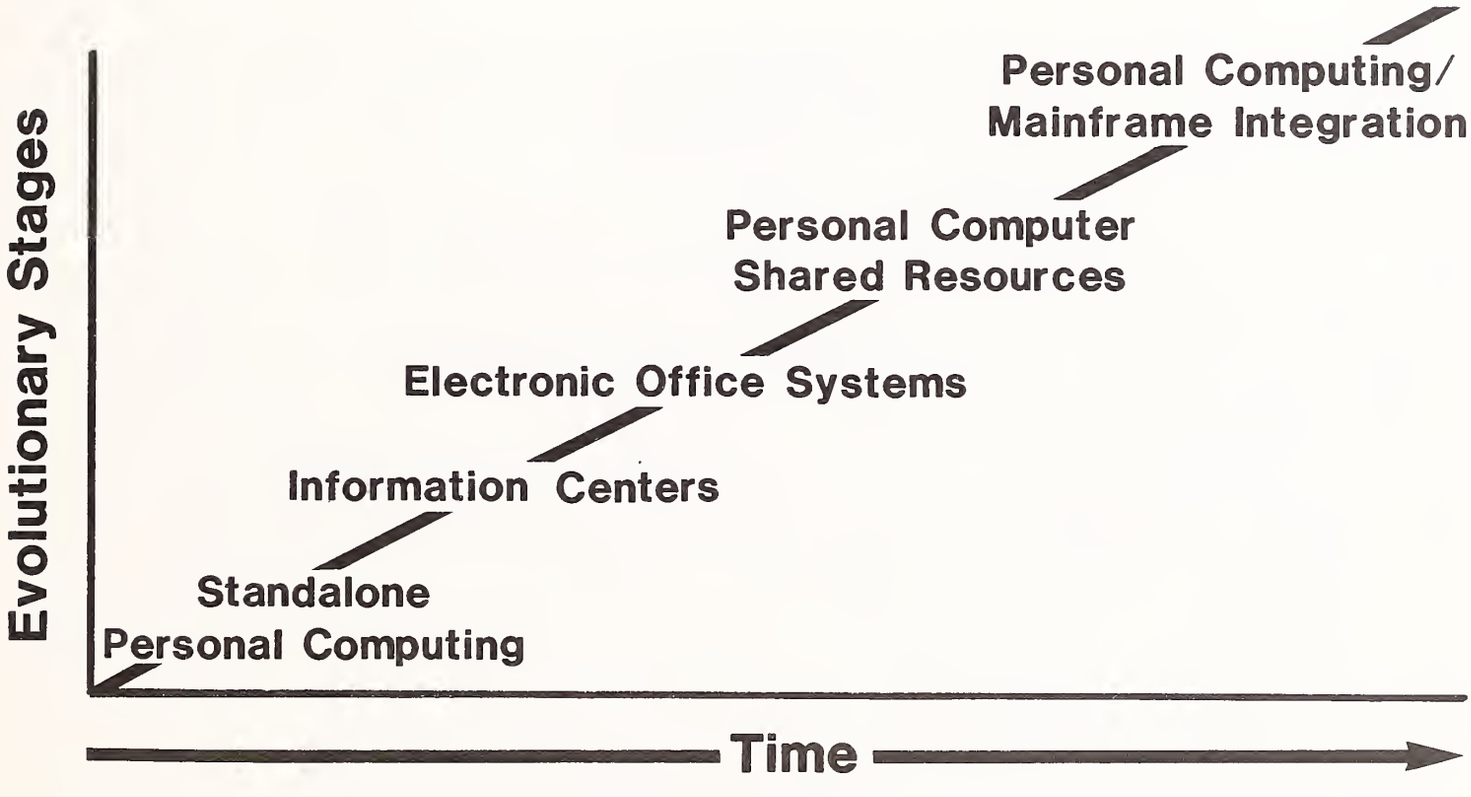
THE EVOLUTION OF END-USER COMPUTING IS SHORTENED BY TRAINING



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B. THE INFORMATION SYSTEMS (IS) TRAINING FUNCTION—HUB OF ALL I.S. TRAINING

- The dynamic nature of information systems creates many levels of training and education, from IS entry level programming training to computer education for senior management. There is training designed to teach end users how to apply generic software packages, and training designed to teach IS professionals about new operating systems.

- Regardless of the number of training issues or the number and rank of the employees to be trained, there should be a central corporate IS training function.

- Quality and uniformity are two essentials in administering training programs to a heterogeneous group of workers that may be scattered over a wide area. These essentials can be controlled through a central coordinating training group.

- The IS training function should oversee all IS-related training and education activities throughout an organization, to ensure training continuity and adequacy.

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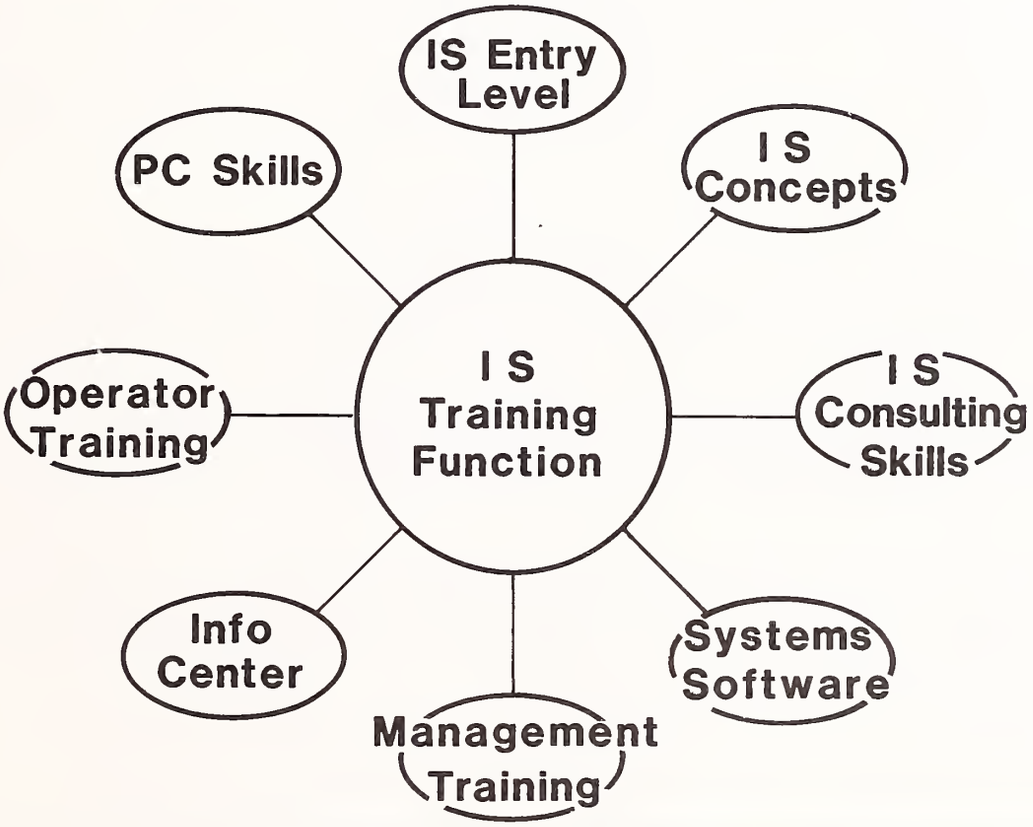
THE INFORMATION SYSTEMS (IS) TRAINING FUNCTION - HUB OF ALL I.S. TRAINING



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C. THE I.S. TRAINING FUNCTION—THE CENTRAL COORDINATOR

- Full-time IS instructors in any IS-related training and education courses should report directly to the manager of the IS training function.

- Media-based training should be managed and administered by the IS training function. This includes training in needs assessments, facilities management, vendor liaison, student scheduling, and student record-keeping.

- End-user training conducted by the information center support staff should meet the approval of the IS training manager. The IS training function could get involved in course curricula development and training methodology selection.

- Outside training consultants should report to the IS training manager throughout the duration of the consulting contract for guidelines and direction.

- The IS training function should periodically publish a list of approved seminars and outside courses, and should coordinate attendance at these functions.

- The IS training function should act as a liaison between the corporate human resources training group and IS on subjects related to information systems education.

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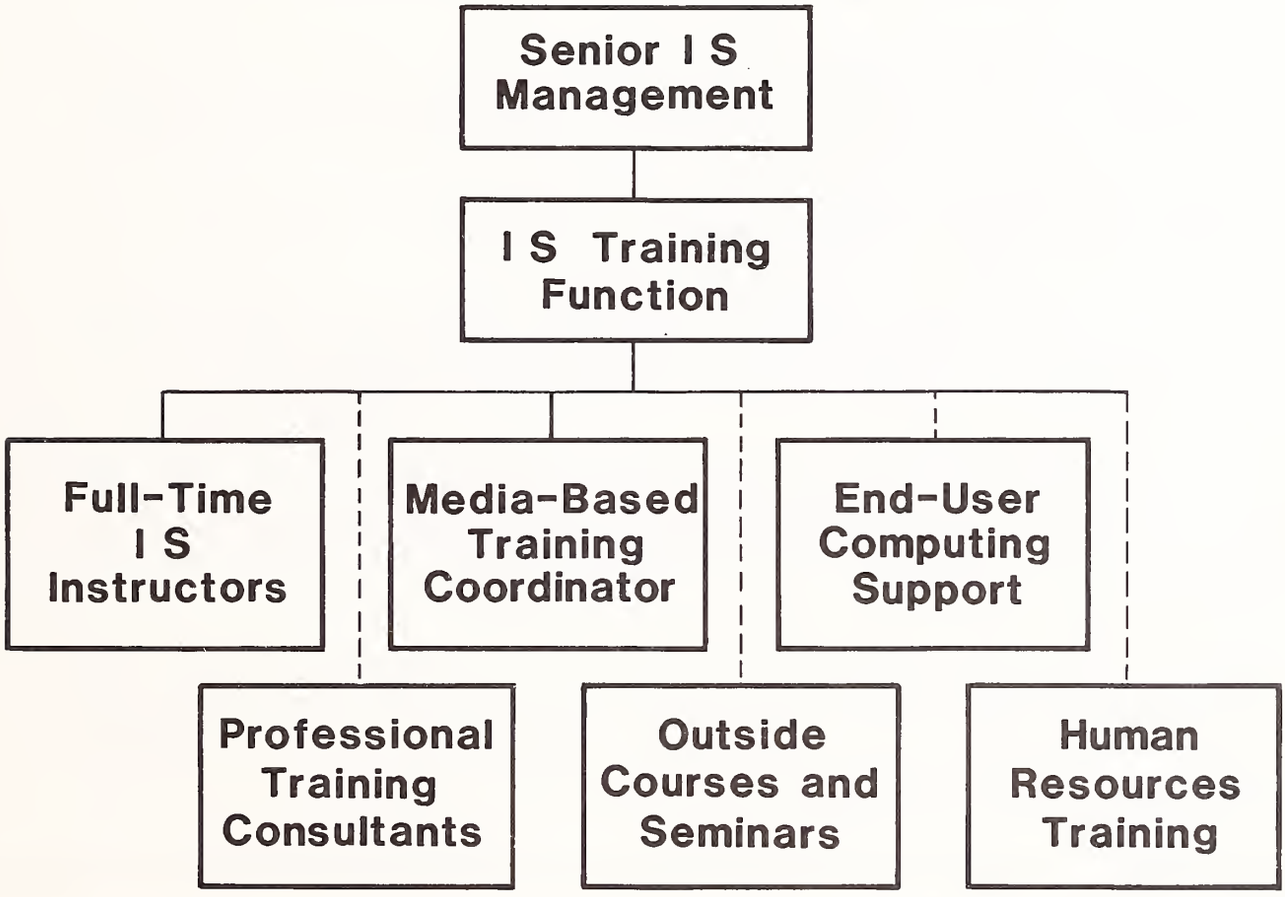
THE I.S. TRAINING FUNCTION - THE CENTRAL COORDINATOR



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D. ANTICIPATE TRAINING REQUIREMENTS THROUGH THOUGHTFUL PLANNING

- Just like any other information systems endeavor, training has to be carefully planned to realize the potential benefits. Waiting until training becomes a critical issue will result in a haphazard approach, which could prove ineffective.

- Training requirements for end-user computing issues should be based on a conceptual three- to five-year information systems plan. The conceptual plan should indicate when each stage of end-user computing development is expected to be reached.

- The plan should identify how information will be handled five years hence, and what the logical evolutionary steps toward this conclusion will be.

- With the overall information systems plan, the IS training groups can determine the type of training needed and the training resources required for each year.

- The training plans should be reviewed with IS management, at which point individual managers can be assigned responsibility for their respective portions of the training programs.

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ANTICIPATE TRAINING REQUIREMENTS THROUGH THOUGHTFUL PLANNING

- Conceptualize Five-Year IS Strategy
- Identify End-User Computing Milestones
- Determine Type of Training For Each Milestone
- Assign Training Responsibility

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E. EDUCATING SENIOR MANAGEMENT AND I.S. SUPPORT STAFF

- End-user training programs should start at the top. To obtain approval for the training staff and material, as well as for an adequate budget for vendor-supplied training, senior management must be convinced of the importance of training. The best way to achieve this is to educate senior managers.

- End-user computing awareness training for senior managers can be effectively administered in three stages:

  - An introductory course on videotape that can be viewed at home.

  - Instructor-led workshops with a group of colleagues.

  - Learn-by-doing instruction through computer-based training.

- The IS staff assigned to supporting end users in their computing activities should be the first to receive any training earmarked for end users. The support staff must be knowledgeable, and it can act as a review board for new training material and techniques.

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EDUCATING SENIOR MANAGEMENT AND I.S. SUPPORT STAFF

- Senior Management Must Understand Information Technology and The Risks of Inadequate Training
- I S Support Staff Must Receive Special Training
- I S Support Staff Should Critique Courses
- The Trainers of End Users Must Also Be Trained

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F. I.S. TRAINING FUNCTION SHOULD REPRESENT AT LEAST 3% OF THE TOTAL I.S. STAFF

- What must IS management do to address the training issues? First of all, if it is not already in place, a formal training function should be established. The training department should report to a senior IS manager, such as the manager of administration or the manager of technical support.

- The responsibilities of the training department would include formulating strategic training plans for end-user computing, conducting information technology familiarization courses for senior management, and coordinating and administering all IS-related training activities.

- With the growing need for end-user training and the accompanying IS training, the training staff should number at least three for every 100 IS employees.

- The end-user support group, which will number one for every 50 end users (IBM's recommendation), or represent around 10% of the IS total staff, will be responsible for one-on-one training and, if qualified, for instructor-led workshops. Any course material would have to meet the approval of the training department.

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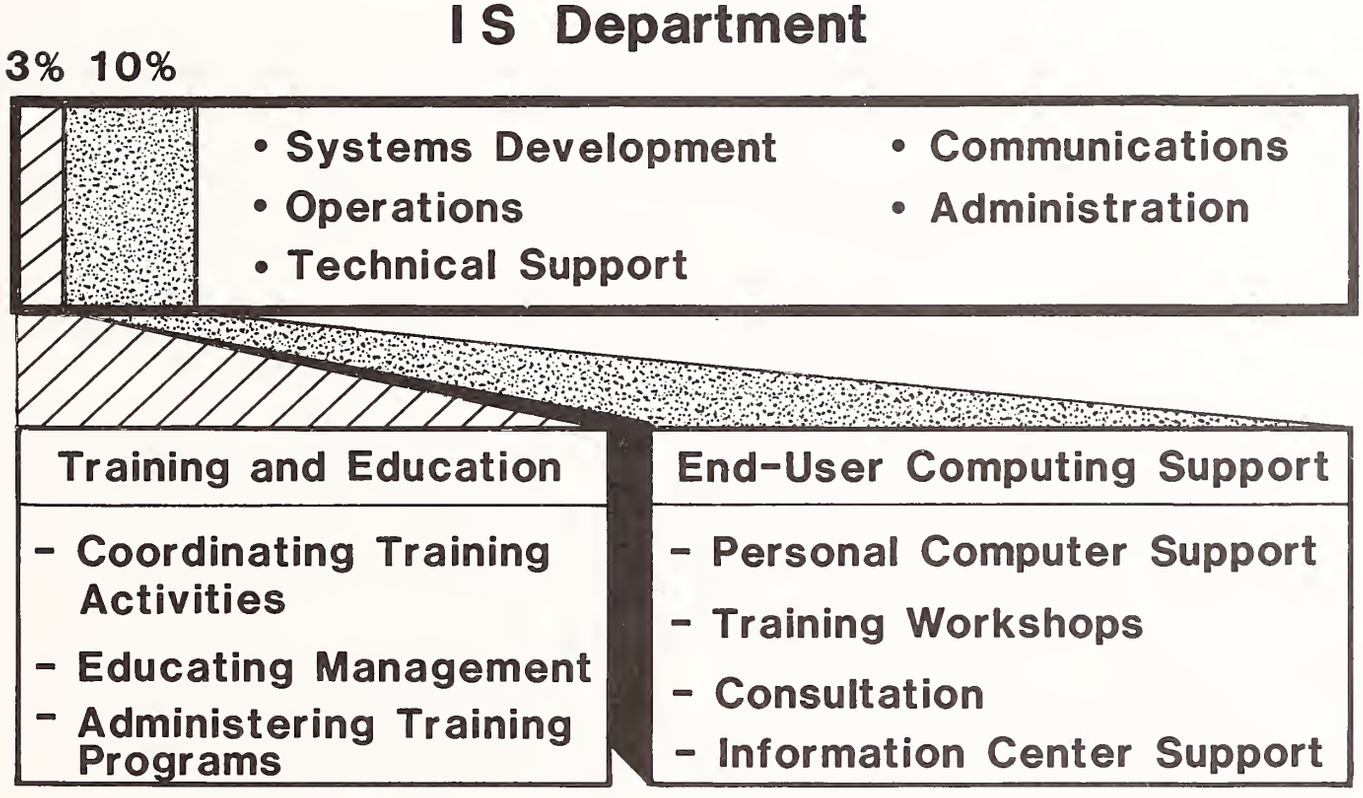
I.S. TRAINING FUNCTIONS SHOULD REPRESENT AT LEAST 3% OF THE TOTAL I.S. STAFF



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III END-USER TRAINING AND EDUCATION ISSUES

A. IMPACT ON CORPORATE COMPETITIVENESS

1. BENEFITS OF AN EFFECTIVE TRAINING PROGRAM

- Because information technology affects how the knowledge worker and information handler perform their day-to-day duties, computer proficiency is vital to an organization's ability to remain competitive.

- In the past, education and training budget dollars for information systems were usually earmarked to send IS technical professionals to outside classes to learn how to use a new piece of mainframe software and/or hardware. These education and training funds were normally doled out at the discretion of the IS manager, and the benefactors were usually systems programmers. The applications programmers and analysts were encouraged to use independent study material on their own time.

- The benefits of this limited approach to computer technology training were measured by the timeliness and effectiveness of the newly installed products.

- Today, IS personnel must still be taught how to use new mainframe tools, but there is another facet of training and education--brought about by the advent of end-user computing--that needs to be addressed.

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- Middle and first-line managers of organizations are turning to decision support systems (DSS) to help them make strategic business decisions by forecasting, through the use of modeling tools, the organization's future performance.

- The proficiency with which these managers apply such systems governs the accuracy and timeliness of the resulting information.

- Nearly every office worker's job, from entry-level clerks to senior managers, is being affected by information processing technology. Computer-based information technology is being employed to provide:

  - Reduced operating costs.

  - Increased productivity.

  - Improved decision making.

  - Improved interdepartmental communications.

  - Better working environment.

  - Increased job satisfaction.

  - More accurate business data.

  - Improved customer relations.

  - Improved product quality.

  - An edge over competition.

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- To profit from the potential benefits of computer-based information technology, its users must understand its capabilities and limitations, and must acquire the skills needed to use the tools of the technology efficiently and effectively. Thus, training and educating the end users of these computer-based office tools has become one of the major issues facing IS management.

2. RISKS OF INADEQUATE TRAINING

- If senior management is ignorant of the concepts and benefits of end-user computing tools, it is unlikely that a proposal to install such tools will be readily approved. An effective training program must include educating the senior decision makers. Through education, the senior management will also become aware of the necessity to allocate more resources to the information systems training and education function.

- End-user computing is evolving from the performance of spreadsheet calculations and word processing tasks to fulfilment of a significant segment of an organization's information systems processing requirements. End-user computing will revolutionize the architecture of future business systems. An inadequate training program will impede the evolutionary process of end-user computing by slowing down the progression from one phase of end-user computing to the next.

B. FUTURE TRENDS IN END-USER COMPUTING

- As depicted in Exhibit III-1, INPUT believes that future end users will use microprocessor-based workstations linked to a minicomputer or small mainframe (e.g., 43XX) located in their functional areas.

  - These departmental processors will service local data processing needs and will share data and processing with the host mainframe, located at corporate headquarters in the IS department.

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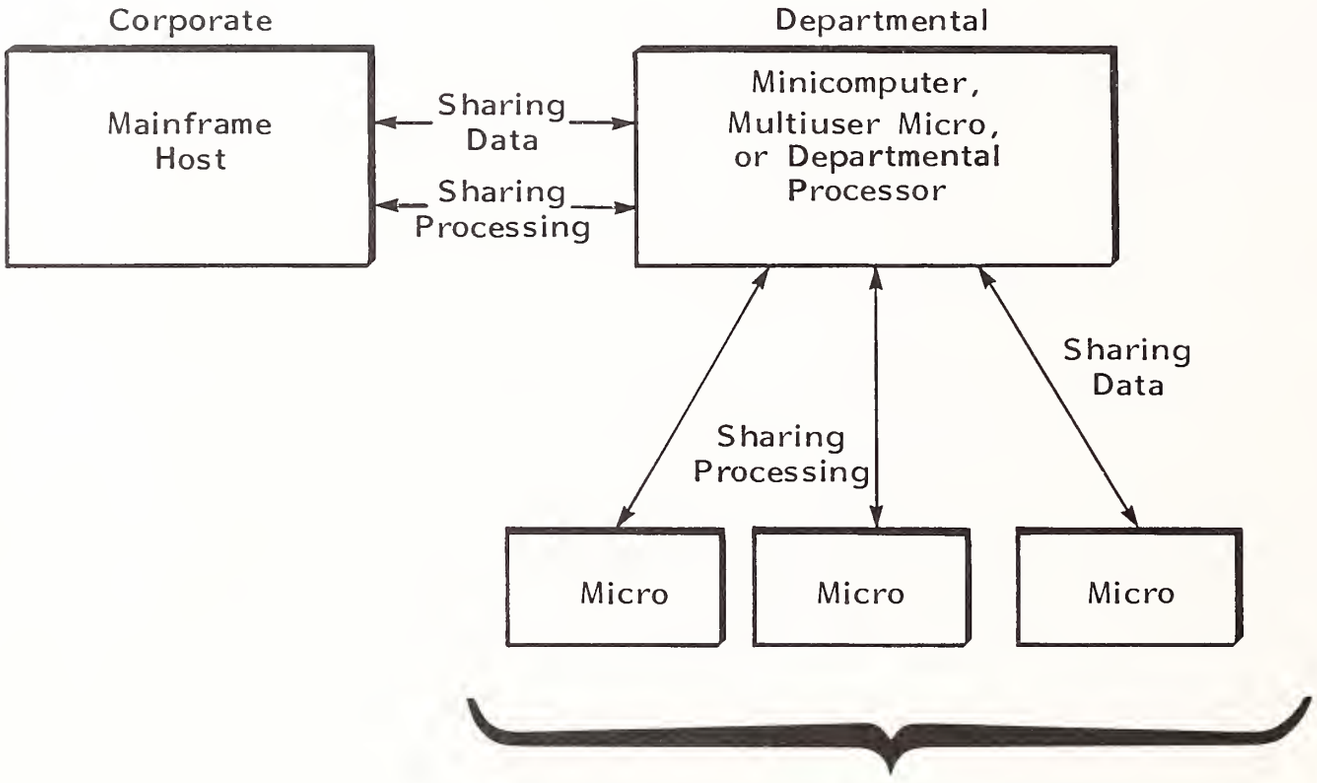
EXHIBIT III-1

THE FUTURE OF END-USER COMPUTING



Individual Microprocessor Workstations:

- Transactions; Input/Edit
- Corporate Data Analysis and Modeling
- Decision Support Systems
- Electronic Mail/Filing
- Report and Graphic Preparation

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- From the micro-based workstations the end users will be able to communicate with the departmental processor and with other workstations, as well as--indirectly or directly--with the mainframe data bases.

- Information-intensive functions, from preparing and mailing intercompany memos to analyzing corporate data for decision support, will be handled through the micro-based workstations.

- Future corporate systems will be designed to take advantage of processing power at the departmental level, and end users will become more involved in designing that portion of the system that directly affects their day-to-day functions.

- In the 1984 INPUT report entitled Micro-Mainframe: Telecommunications, it is stated that 85% of the corporate respondents saw micro-mainframe links as involving the sharing of processing logic as well as the sharing of data between micros and mainframes. This can only mean that micro-based workstations will play a significant role in future information systems.

- The more that end-user computing becomes intertwined with corporate information systems through micro-mainframe products and end-user mainframe software, the more important an effective training program becomes.

C. CHANGING I.S. SKILL REQUIREMENTS

- Traditional systems development methodology involved the phased approach, including phases such as requirements definition, analysis, design, programming, testing, and implementing. User management reviewed the results of each phase and signed off on input/output designs, but for the most part the IS

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analysts identified the system need and developed the solutions, with the IS programmers providing the necessary computer instructions. This methodology is still valid and prevalent, and calls for analytical and technical skills.

- The biggest problem associated with the traditional systems development approach is the time it takes to accomplish the many phases. It is not unusual for systems to be under development for several years.

- This is the main reason for the growing interest in end-user computing. Through the information center or a personal computer, an end user can satisfy individual information needs without waiting years for a new system to be operational.

- However, in order for end users to take advantage of these products that allow them to develop solutions to some of their information problems, they must first know what tools are available, and then acquire the skills to apply these tools.

- End users look to IS for guidance and advice in selecting the proper solutions to their information processing problems. This end-user-computing consulting role is new to most IS professionals, as is the associated hardware and software products.

- Exhibit III-2 lists the new skills required for those IS professionals assigned to supporting end users. Learning these skills requires that new topics be added to the education and training curriculum for the IS staff. (For more on changing IS skills requirements, please refer to INPUT's 1984 report entitled Future Skills Requirements for Software Development.)

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EXHIBIT III-2

I.S. SKILLS FOR END-USER SUPPORT

- Interpersonal Communication Skills
- Diplomacy and Tact
- Awareness of Available End-User Products
- Analytical Problem Solving
- Understanding of Business Dynamics
- Teaching Skills (Advising, Coaching, Counseling)
- Selling Skills (Concepts, Approaches, Approved Products)
- Negotiating Skills (Vendor Coordination)

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D. WHERE DOES THE TRAINING FUNCTION BELONG?

1. DEFINING THE LEVELS OF TRAINING AND EDUCATION

- Before an IS manager can develop a comprehensive training and education program, the requirements for training and education must be identified. In identifying the requirements, the following should be included:

  - Computer technology familiarization education for senior and middle managers.

  - Education in end-user information systems products' capabilities and limitations for managers, supervisors, and IS professionals.

  - "Hands-on" applications skills training in end-user IS products for information workers and IS support staff.

  - Interpersonal communication and consulting skills training for IS end-user support staff.

  - In-depth education in systems software changes and additions for systems programmers.

  - Applications skills training in systems software changes and additions for the IS systems development staff.

  - Training and education in how to use a new system, for end users of IS systems.

  - Data center skills training for computer operations personnel.

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- General staff development training and education for all levels of management.

- Entry-level training and education for IS programming positions.

2. USING VARIOUS METHODS IS THE BEST APPROACH

- From the above list of training and education requirements that can directly or indirectly affect the success of end-user computing, it becomes clear that a single approach will probably not meet all training and education objectives.

- There are various approaches to practically every situation requiring training and education. The key to successful training is to make use of this variety so that the most effective approach can be selected for each situation. The responsibility for training and education can be distributed among several groups, depending on the nature of the requirements. Exhibit III-3 shows a possible distribution of responsibilities for the various training and education requirements.

  - Note that within each group of training and education requirements there are functions related to end-user computing. The formal IS training department should have authority for approval of all IS-related training, including the curricula and methodology used by the end-user support group.

  - Some human resources training departments are becoming involved in helping to train end users in how to use personal computers, but this is the exception.

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EXHIBIT III-3

ASSIGNING TRAINING AND EDUCATION RESPONSIBILITIES

GROUP OR FUNCTION	TRAINING AND EDUCATION RESPONSIBILITIES
Formal IS Training Department	• Entry-Level Programming Training • Computer Operator Training • Computer Familiarization Education • Classroom Education on Standards and Techniques for I S Personnel and End Users • Coordination for the Acquisition and use of Media-Based Training • Coordination of Outside Courses and Consulting
The Information Center or End-User Support Group	• "Hands-On" Training for End-User Information Systems Products • Introductory Courses on End-User Hardware/ Software Products
Human Resources Training Function	• General Staff Development Training and Education • Interpersonal Communication and Consulting Skills
Information Systems Project Development Team	• Training in How to Use a New System for End-End Users

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IV ESTABLISHING A TRAINING STRATEGY

A. SYSTEMS PLANNING--THE KEY TO AN EFFECTIVE TRAINING PROGRAM

- Because end-user computing has entered the corporate world by fits and starts with little or no planning, the related training and education issues have been addressed on an as-needed basis. The problem with this spontaneous approach to handling training needs is that time does not permit a careful evaluation and selection of training methods and education tools.

- In some organizations, IS has a firm grip on end-user computing and is dictating the direction of this phenomenon by issuing capability standards for the acquisition of personal computer hardware and software. As IS exercises more control over end-user computing, it is requested to provide more guidance, counseling, and training to the end-user community.

- IS should now be in a position to assess the role of end-user computing in future systems architecture. Conceptual information processing schemes should be formulated that depict how organizations will be handling the information flow in three to five years. As mentioned earlier, INPUT believes that the state of the technology will allow an influx of departmental processors interacting with micro-based workstations and corporate mainframes to handle all aspects of information processing.

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- Three- to five-year conceptual system plans should be evolutionary in format and should indicate milestones on the way to fulfilment of the scheme. The training and education needs for each stage of the evolutionary process should be identified so that plans in this area can be formulated.

- By mapping out the stages of future systems architecture, training and education needs can be anticipated and appropriate programs can be implemented well enough in advance of the actual systems change to provide the necessary training to all involved personnel. This holds true for information center products, office automation products, personal computer applications, and systems involving micro-to-mainframe links.

B. I.S. STAFF TRAINING AND EDUCATION REQUIREMENTS

- An effective training program begins with a training staff well-versed in the subject matter.

  - In the case of end-user computing, the primary instructors could be a part of the IS staff. The IS personnel most likely to become involved in end-user computing matters will be those individuals assigned to the end-user support group, the IS programmers and analysts working on systems involving end-user computing, and the individuals assigned to the IS training adepartment.

  - The two areas of end-user computing support in which IS personnel must be schooled are associated with the new consulting role and with the application of those information systems products directed at end-user computing (e.g., personal computers, Lotus 1-2-3, MultiMate, dBase II, FOCUS, SAS, QBE, and OFFICE SYSTEMS).

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1. THE CONSULTING ROLE

- The consultant provides expert opinions and professional advice, but doesn't normally get involved in the detailed development, implementation or operation of a business system--concepts contrary to most job descriptions for systems analysts. In order for the IS end-user support staff to assume consulting status, it must become familiar with:

  - Effective oral and written communication.
  - Business dynamics (knowledge of specific business function being serviced).
  - Available end-user computing resources.
  - Persuasion skills (selling concepts, standards, techniques).
  - Teaching skills (advising, coaching, counseling).
  - Negotiating skills (vendor coordination, IS liaison).

- For the analysts and programmers who have been assigned to the end-user computing support function, many of the needed consulting skills will be learned through actual experience gained from working with end users; their chances for success in their new role will be greatly enhanced, however, if they receive some formal training and education in the related subject. The corporate training group within the human resources department should be able to identify the best source of training in consulting skills.

2. MICROCOMPUTER CONCEPTS AND APPLICATIONS

- A mistake that IS managers might make is to assume that experienced programmers and analysts who have been working in on-line mainframe applications need little or no training in microcomputer concepts and applications.

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- Mainframe programming and systems design and development are quite different from the typical information center or PC application, and it is extremely important that programmers and analysts assigned to support end users understand this difference.

- Many IS professionals are reluctant to admit that they do not know how to operate the simplest of PCs. Instead, they avoid detailed involvement out of fear of showing their ignorance and losing credibility as professionals.

- The IS end-user support staff should be the first group to attend any courses being considered for training end users on how to use computer hardware and software products. This will serve a twofold purpose: it will equip the support staff with the necessary skills to assist end users, and it will also allow the IS professionals to be the first to critique course content and teaching methods.

C. TRAINING OBJECTIVES AND COMPANY ORGANIZATION

- A company with all of its employees in one general location that has one centrally located information center certainly has an easier task administering and managing training and education than does the company that has major divisions in various locations (sometimes in several states).

- INPUT contends that it is advantageous to have all information technology training and education issues coordinated by one group that has an overview of the various related situations and problems. This has not been a standard practice in the past because IS management has been unaware of the critical training problem arising from the end-user computing revolution.

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- A corporate IS training and education function can evaluate courseware and training methodologies and can screen training vendors for the entire company, thereby ensuring uniform quality in training and education. It can also negotiate discounts through site-licensing to allow open-ended reproduction of training software for a fixed fee. Exhibit IV-1 lists the general steps that a corporate IS training coordinator should follow to ensure an adequate program for each training and education situation.

D. ALTERNATIVE APPROACHES TO TRAINING AND EDUCATION

- Fortunately, there are several effective alternatives from which to choose when faced with the problem of educating employees about information systems end-user tools. The method of training end users in the specific details of a particular software package will be different from the method of educating senior management in the benefits of information systems technology.

- The various factors that influence the decisions of each organization regarding training and education are the

  - Size and proximity of the various divisions.

  - Degree of decentralization of the information systems function.

  - State of end-user computing activities.

  - Qualifications of the end-user computing support staff.

  - Proximity of professional training companies.

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EXHIBIT IV-1

PRIMARY DUTIES OF A
CORPORATE I.S. TRAINING COORDINATOR

- Assess end-user training and education needs.
- Determine the most cost-effective training method for each situation and/or location.
- Identify sources for each selected method.
- Evaluate the various sources of training and education.
- Select the source (e.g., training vendor, inhouse course, existing media-based course, etc.) for each situation.
- Negotiate vendor contracts.
- Coordinate scheduling and implementation.
- Report training and education progress.
- Evaluate results.
- Conduct courses as required.

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- Attitude of senior management toward information systems technology training and education.

- Current approach, if any, to IS training.

I. THE TRAINING COORDINATOR

- Most large IS organizations (over 100 employees) will have one or more people designated as a training coordinator. Some of these coordinators know very little about the technology and do not conduct any courses, but merely administer a video-based training service such as the service offered by DELTAK or Advanced Systems, Inc.

- The primary duties of these coordinators include working with the various IS section heads to determine the training requirements for each employee, and then ordering the appropriate monthly video-based courses and scheduling media facilities. INPUT believes this function is extremely important to the success of a video-based training program.

- Scheduling IS professionals for outside courses can also fall under the responsibilities of the training coordinator function.

  - The total IS budget for training and education can be a part of the senior IS manager's cost center budget.

  - By personally coordinating all requests for special training, the senior IS manager is better equipped to meet changing needs: at budget time, each section projects its anticipated special training requirements and associated costs; as the fiscal year progresses, training programs can be rearranged where necessary.

- A few training coordinators are qualified instructors and do get involved in developing and conducting classroom courses. They may also be responsible

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for selecting and scheduling professional on-site trainers; normally, however, the coordinator is an administrator who is capable of dealing effectively with IS managers.

2. THE END-USER SUPPORT GROUP

- Traditionally, end users have been introduced to information technology either through an information center or through the personal computer. Unfortunately, in many instances the training for end users has been informal and unstructured.

- IS organizations have come to realize the importance of establishing a group--usually as a part of the information center--expressly to assist end users in their computing pursuits. They act as consultants to end users in selecting the best solution to their information processing problems, and they can be available to answer questions about the functions of software and/or hardware.

- Some end-user support groups have developed workshops to instruct small groups of end users in how to use personal computers and in how to apply the IS-approved software packages. These workshops are conducted in a "hands-on" environment. Some companies have installed TV monitors in the training area to provide a clear view of the instructor's personal computer screen to each participant.

- The success of an end-user computing workshop conducted by members of the IS end-user support group depends on two factors: the ability to develop the curriculum, and the ability to instruct a class. An individual might excel at analyzing problems and selecting solutions but might be less than adequate as a teacher. IS management should make a point of sitting in on a workshop session to assess the instructor's effectiveness, and end users should be asked to critique any classes they attend.

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- Feedback from the students about the worth of courses should be solicited. Exhibit IV-2 presents a sample course evaluation form that should be completed by students at the end of each course. Students' evaluations of the instructors, the material, and the facilities are important in the development of future courses.

3. THE PROFESSIONAL TRAINING COMPANY

- Each company contemplating workshops for end users should consider retaining a professional outside training service. On the surface, it may appear more economical to have the internal support staff or training group develop and conduct courses for end users, but before doing so, an outside group should be evaluated.

- As an example, The Training Company, a division of Carlsen-Dublin, Incorporated of San Francisco offers hands-on microcomputer training workshops for business managers and executives, as well as customized, instructor-led training programs for corporations, information services vendors, and microcomputer distributors and dealers.

- Firms such as The Training Company have qualified professional trainers with expertise in business, adult learning techniques, and microcomputing, along with a full array of courseware that they will modify for specific needs; also they conduct the courses either at their facilities or the client's.

- The professional training companies' workshops may be the most cost effective way to teach the skills required to profit from the potential benefits of microcomputer applications. The factors involved in deciding on an outside service include the following:

  - The number of end users to be trained. Very large numbers may make the outside costs prohibitive because of the cost per student charged by the service company.

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EXHIBIT IV-2

SAMPLE COURSE EVALUATION FORM

Course Title _____ Instructor _____ Date ____

1. Was the subject matter relevant to your needs?

☐ Irrelevant ☐ Somewhat Relevant ☐ Very Relevant

Comment: _____

2. Did the instructors present the material in an easy-to-understand and interesting manner?

☐ Poor ☐ Adequate ☐ Excellent

Comment: _____

3. Did the workshop exercises help you learn how to use and apply the material?

☐ Definitely Not ☐ Adequately ☐ Thoroughly

Comment: _____

4. Were the facilities conducive to learning?

☐ Poor ☐ OK ☐ Excellent

Comment: _____

5. Are the student workbooks providing a quick reference for answers to ongoing questions?

☐ Not at All ☐ Answers Main Questions ☐ Excellent Reference

Comment: _____

6. Did the instructors provide sufficient answers to questions raised by the students?

☐ Evaded Most Questions ☐ Most Questions Answered ☐ Sufficient Answers to all Questions

7. Would you like to take another course from the same instructors?

☐ Definitely Not ☐ Perhaps ☐ Most Definitely

Comment: _____

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- The location of the end users. If extensive travel is involved, the cost of the outside service may be prohibitive because of additional travel costs.

- Products to learn about. Courses on software products other than the most popular may not be offered by outside firms. Training companies will provide custom workshops for additional fees.

- If the number of end users needing training is large and the end users are dispersed over a wide area, a business might still consider using the professional training company to train a select group, like the end-user support group and/or the internal trainers. The interactive training environment of the professional workshops is a quick and effective way for the internal IS support staff to become proficient in the use of end-user computing tools.

- Most professional training companies are qualified to assist the IS management in developing a strategy for training. They assess the total end-user computing training needs and prepare the most cost effective program to meet those needs. If a training plan calls for hiring full-time trainers, the professional training company should be able to provide recruiting assistance. Training is an art, and requires qualities not possessed by most IS professionals.

- An outside training company's consultation services include:

  - Need assessment.

  - Development of overall training program objectives.

  - Curriculum development.

  - Design and development of learning materials.

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- Design, development and delivery of train-the-trainer programs.

- Provision of workshops and seminars.

- The cost of workshops conducted by professional training companies can vary depending on the number of students and the level of training. Most training companies will quote a per-student fee and a workshop fee.

  - For example, introductory, "how-to-use" workshops could either be quoted at between $135 and $175 per student, per day; or at around $1,500 for a one-day workshop for up to ten students. Advanced workshops are in the range between $150 and $200 per student, per day. The workshop fee for advanced students can run from $2,000 per day for small groups (less than ten), to $3,500 for larger groups.

  - If the number of end users to be trained is very large and the professional-instructor-led workshop appears to be the best alternative, special fees based on the volume of students can be negotiated.

  - The Training Company divides its workshops into three levels of training: introductory, intermediate, and advanced. Each level normally requires a one-day workshop of six to eight hours. They recommend a break of a week or so between levels to give the students a chance to absorb the instruction material.

4. FORMAL IN-HOUSE TRAINING

- For every 100 IS employees there will probably be one full-time employee devoted to internal IS education. Most of the internal IS training staff's time has been allocated to entry level programmers and computer operators. This group may also conduct computer familiarization courses for corporate management and handle the use of media-based training material.

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- INPUT firmly believes that the IS department should have a training and education function that reports close to the top of the organization, either to the director of IS administration or to the manager of technical services. Exhibit IV-3 indicates that IS managers believe education, recruitment, and retention are their most serious personnel problems. This can only mean that IS management is having a difficult time satisfying the growing skills mix requirements. INPUT recommends that the IS training and education function be staffed with three instructors for every 100 employees.

- The demand for end-user computing support skills have grown at a much faster rate than the supply; it is, therefore, extremely important that IS have qualified staff members addressing the problem of skills training for IS professionals.

- This in-house training function may not be responsible for conducting the actual courses for end users, but it should be responsible for planning and selecting the methodology and techniques to be used. It could also evaluate training products and vendors, and handle contract negotiations. The end-user computing support group should consult with end users on training matters, but the IS training function should help determine how the end users should be trained.

5. VIDEO-BASED TRAINING

- One of the leading suppliers of video-based skills training programs is DELTAK of Naperville, Illinois. DELTAK has been developing video-based information technology courses for 14 years, and their catalog lists over 3,000 courses. The videotapes are available in VHS and Beta formats and are about 20 to 30 minutes in duration. The videotapes are accompanied by a booklet containing introductory and review information as well as discussion topics.

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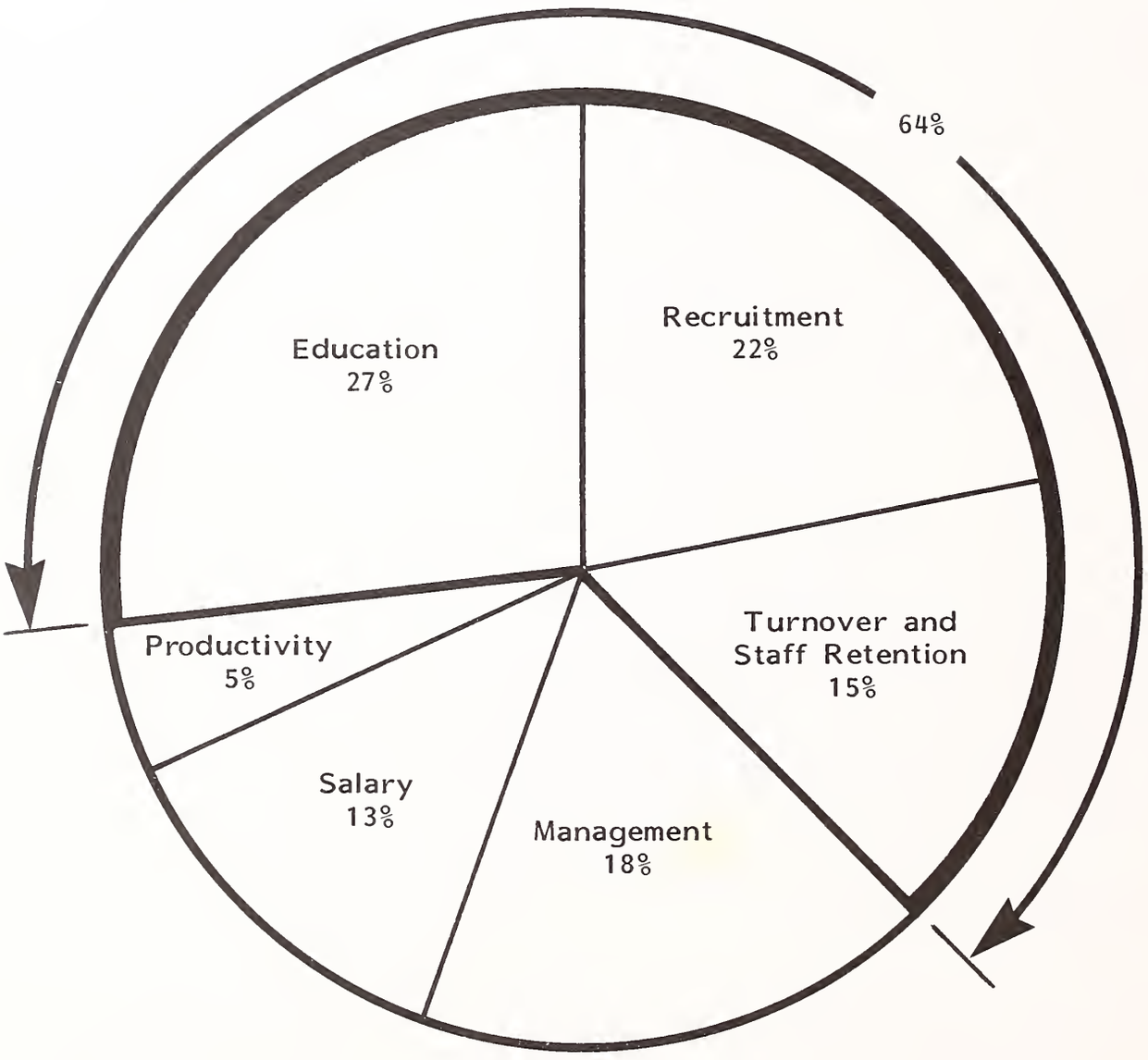
EXHIBIT IV-3

I.S. PERSONNEL PROBLEMS
(According to Managers)



Percent of Total Response

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- Advanced Systems, Incorporated (ASI) of Arlington, Illinois is another leading producer and worldwide distributor of multimedia training courses for on-site use by large organizations. ASI offers more than 3,000 videotapes, microcomputer diskettes, audio casettes, and associated course materials for training in the areas of data processing, management, manufacturing, engineering, and sales.

- The videotape courses are normally conducted in a classroom setting with professional instructors or lecturers. The student reads the introductory material from the text and then views the lecture on the videotape. It is important that the training facilities are so located as to provide an environment conducive to learning.

- If possible, each videotape course should have a knowledgeable tutor available to field questions that are not thoroughly answered by the taped material. Students will become discouraged and frustrated if they are unable to receive answers to their questions.

- Essential to a successful video-based training program is the presence of an individual or individuals with responsibility for administering the program. This entails:

  - Assisting each manager with the assessment of training needs.

  - Assisting in the development of lists of courses to be taken for each employee/student.

  - Ordering and returning the course material.

  - Tracking and reporting students' progress.

  - Coordinating the assignment of tutors.

  - Negotiating contracts with the suppliers.

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- Video-based training programs have primarily been used by IS personnel for ongoing education in technological advancements, IS management, and applications development techniques.

- It is rare to find an organization relying on video-based training to handle end-user computing training. There are quite a few video courses for learning about PC software and information center products, but they are not as effective as the workshops or computer-based training programs. To use the videotape PC courses for skills training requires a videotape player, a television set, a PC, and a workbook. Juggling these various training tools discourages the average end user. The videotapes are good for an overview of a particular software package's capabilities, but not for proficiency training.

- Video-based products are normally rented. An organization should assess its requirements for video-based training in both end-user computing training and IS general education.

  - The video-based training vendor, such as DELTAK, will ask the client for a commitment to rent a certain number of courses during a year. The courses are ordered each month from the catalog. Based on the number of "course months" purchased, the vendor sets the price. Video-based products from DELTAK, for example, will cost between $50 and $130 for one course for a month, depending on the size of the "course months" commitment. There is no limit to the number of students that can take the course during a course month. If a course is held over, the client will be charged an additional "course month."

- The other expenses associated with video-based training are the cost of the meeting space for the students and of the video equipment.

  - The training location should be isolated and quiet. The number of video players and TVs will depend on the number of students and the number of courses to be taken, but generally there should be one set of equip-

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ment for every 50 students. Employees outside of IS who want to see the video-based training facilities should be charged for the time, to enable IS to control the cost. Someone should be assigned to coordinate all of the video-based training activities (i.e., ordering courses, scheduling students, maintaining records, etc.).

- DELTAK has some microcomputer courses available in 3/4-inch Beta and VHS formats that their clients can purchase for $60-70 each. How to Get Started with Your IBM PC and How to Use Software on Your IBM PC are titles of two such courses. These video courses are designed to be taken with an available PC at hand. Courses that are rented under the "course months" agreement can be purchased for $1,500-1,700.

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V COMPUTER-BASED TRAINING (CBT) FOR END USERS

- Computers have been used as self-training tools in the academic world for some years. When the end-user computing revolution started gaining momentum in the early 1980s, and software companies began to flood the market with products directed at end-user consumers, a massive training task was created.

- The media-based training vendors, such as ASI, DELTAK, American Training International, and Data Processing Educational Corporation seized the opportunity to supply computer-based training courseware for the widely used generic end-user software packages. Many of the hardware vendors such as IBM, DEC, CDC, and Apple also got into the CBT business.

- Along with the training vendors and the hardware vendors, companies such as Cdex, CRWTH, and Courseware Applications, Inc. have sprouted up to meet the demand of end-user computing training. The CBT choices are vast, and careful consideration should be given to the decision to employ this approach.

A. THE ELEMENTS OF COMPUTER-BASED TRAINING

- CBT for end-users covers a wide spectrum of topics, from information center concepts for senior managers and executives to "how-to-use" courses for word processing operators. There is courseware designed for mainframes as well as

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for standalone personal computers. There are "how-to-use" courses for Lotus 1-2-3, WordStar, VisiCalc, and Multiplan, and there are courses on FOCUS and SAS. Nearly every popular software package designed for microcomputers or information centers has CBT courseware available.

- The courseware for CBT is developed through authoring systems such as IBM's Interactive Instructional System; Goal Systems International, Inc.'s PHOENIX for mainframes; IBM's Personal Computer Instruction System (PCIS); and Cavri Systems, Inc.'s Ghostwriter for microcomputers.

- Designing effective courseware requires not only a thorough understanding of the subject matter, but also extensive experience with adult training. Courseware should simulate actual work environments and should require a student to perform specific tasks to master a particular skill. The biggest complaint about early CBT courseware was that it was nothing more than a copy of the text presented on a screen.

- CBT courseware suppliers are becoming more sophisticated in their instructional design methodology and are now stressing the learn-by-doing aspect of CBT. ASI markets its business PC courseware under the name of MicroTutor, which is advertised as performance-based training. ASI identifies performance-based training as having the following seven characteristics:

  - Business focus. Courses are presented in the context of job performance.

  - Performance objectives. Course objectives identify the skills people need to perform the job.

  - Job simulation. The student is required to use actual skills in order to progress through the course.

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- Validated instruction. Course context and materials are tested on both experienced and inexperienced members of the intended audience.

- Performance implementation. Courses materials designed for instruction and for additional support on the job.

- Performance evaluation. Courses are judged by how quickly and how successfully students can perform on the job.

- Not only are the media-based training vendors producing CBT courseware that simulates actual work problems, but they have also begun concentrating on training programs that show students how they can apply the software to their own business problems.

  - DELTAK, for instance, produces its microcomputer courseware under the name Microsystems, under which they have produced many "teach-yourself" courses including courses on PC-DOS, dBASE II, and Lotus 1-2-3. Now DELTAK has added to its catalog courses such as Managing Your Business with the Lotus 1-2-3 Program and Analyzing Financial Statements Using the Lotus 1-2-3 Program.

  - Cdex Corporation of Los Altos, California produces CBT courseware for Apple and IBM microcomputers and now has "how to apply software" packages marketed under their Business Applications Training Series. Cdex has been one of the main producers of microcomputer CBT courseware for DELTAK, before DELTAK established Microsystems.

  - IBM calls its CBT courseware for experienced users Extensions. The Extension Editions describe how packages from the IBM Business Management Series can be used in conjunction with packages from the IBM Personal Decision Series.

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- ASI has a series of interactive diskette-based training courses that address the more sophisticated "how to apply the software" issues, which they are calling "Advanced Architecture" MicroTutor courses.

- Because most of the independent software vendors do not supply training programs along with their packages, INPUT believes there will be more cooperative development agreements between training and software vendors. DELTAK has development agreements with EXECUCOM, Software AG, Mathematica, and Informatics.

B. CBT DELIVERY REQUIREMENTS

- Most organizations considering CBT will probably require courseware for IBM mainframes and PCs or Apple microcomputers. The ability to download courses from mainframe to microcomputers will help to ensure training uniformity and to manage course distribution and administration.

- Exhibit V-1 identifies the major suppliers of CBT authoring and presenting software products directed at IBM mainframes and PCs. Goal Systems, whose PHOENIX is a predominant force in the mainframe CBT arena, is now getting involved at the micro level with PHOENIX/micro. PHOENIX has a large following and there are over 16 PHOENIX user groups across the nation.

  - DELTAK has an agreement with Goal Systems International, Inc., whereby DELTAK utilizes Goal's PHOENIX author and presentation system for its mainframe CBT courseware, and then makes available to its customers--at no additional charge--a special version of the PHOENIX presentation package called DELTAK/PHOENIX. This special version of PHOENIX will only present courseware from DELTAK.

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EXHIBIT V-1

MAJOR IBM MAINFRAME AND PC CBT SYSTEMS SOFTWARE VENDORS

VENDOR	PRODUCT	CHARACTERISTICS	COST
Boeing Co., Inc. Computer Services Division	Scholar/ Teach 3	IBM mainframe and PC versions; upload and download capabilities; courseware can be developed on standalone processors or through Boeing's timesharing network. Custom courseware available.	$1,000-1,250/Mo. for Author/Presentation Package. $495/Mo. for IBM PC version.
Goal Systems International, Inc.	PHOENIX	Courseware can be developed on IBM mainframes and downloaded to IBM PCs. Courseware vendors like DELTAK and CRWTH use PHOENIX. Customer courseware available. User groups established.	$1,375/Mo. for Author/ Presentation Package. $38,500 Perpetual License
	PHEONIX/ Micro	Enables users to run courseware written in Goal's EASE authoring language on the IBM PC. Includes student record keeping.	$14,980 per Site Perpetual License. $5,407 on year-to-year License.
IBM	Interactive Instructional System (IIS)	IBM mainframe (IIS) and PC (PCIS) versions. Upload and download capabilities. Courseware development aids available through course structuring facility (CSF) and simulation/exercise facility (SEF). Color graphics supported through graphical data display manager (GDDM).	$430/Mo. for Author Package. $250/Mo. for Presentation Package. $139/Mo. for Graphics

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- Boeing's Scholar/Teach 3 also has user groups, and courseware can be created, presented and administered through IBM computers or through Boeing's nationwide timesharing network. The Boeing Computer Services Division will assist their clients in developing custom courseware.

C. EVALUATING THE CBT APPROACH

- INPUT believes that an organization should not rely too heavily on any one training approach for teaching end users how to use and apply software packages and associated computer hardware. In some cases, the most expedient and cost effective approach might be the formal, instructor-led workshop.

- If, for instance, microcomputers have been installed to support a particular business function and are a part of a larger integrated information system, then the employees affected by the installation must follow exact procedures and standards. If they are all in close proximity to one another, the instructor-led workshop would be the best approach to teach the employees how to use the new system. The intricacies and uniqueness of a specialized system can best be taught through personal interactive communications.

- If, however, the participants in a new on-line system are widely dispersed and in large numbers, then custom CBT courseware could be developed to train these systems end users the new methods and procedures.

- The individual employee, on the other hand, who wants to learn how to use and apply a generic software package, will probably find off-the-shelf CBT courseware the best approach. The individual can set the pace for learning and can repeat sections of the course in which more training is required. The greater the number of individuals needing generic software training, the more economical CBT becomes over instructor-led courses. The cost of this type of courseware can run between $60 and $100 per copy. Special site licensing agreements can be arranged.

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- Senior managers who will actually get involved with the application of generic software packages should be taught in three levels. The first level would be an introductory course on video tape that they can view in the privacy of their home after hours. The second level would involve an instructor-led workshop with their colleagues, and the third level would involve learning by doing through CBT. If possible, this three-tiered approach would be ideal for any group of end users.

- Along with good simulation methodology, CBT courseware should allow the student to practice a skill as many times as is required to master it. The student should be able to skip around in a course and not be forced to adhere to a rigidly prescribed curriculum. Tests should be designed around the concept of exercises based on problem simulation.

D. INTERACTIVE VIDEO

- Interactive video, whereby videodisc or videotape equipment is connected to a microcomputer through an RS-232C interface, as depicted in Exhibit V-2, is being used by large firms to keep workers up to date in areas such as automotive mechanics and high-tech repairs or training jet pilots and mariners. By combining the sound and high-quality, moving pictures of a videodisc with computer courseware capabilities, an extremely realistic instructional environment can be created.

- Generally, interactive video systems are not being employed to educate and train end users in the concepts and uses of information systems technologies because:

  - Additional video hardware is expensive.

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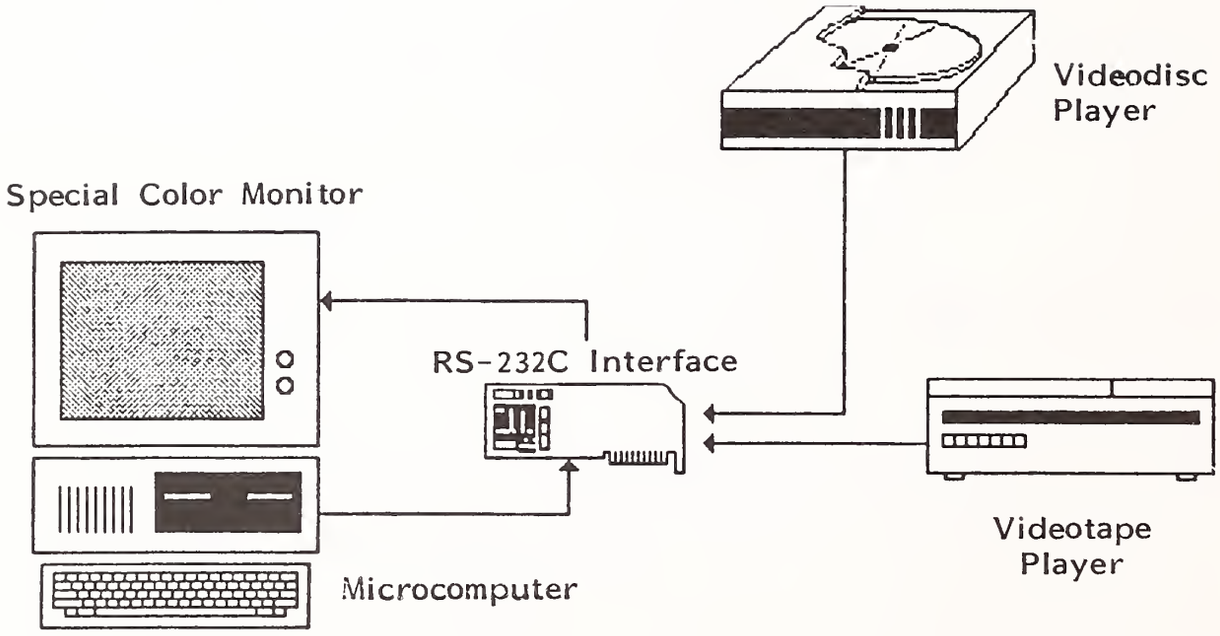
EXHIBIT V-2

INTERACTIVE VIDEO SYSTEM



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- There is a lack of off-the-shelf interactive video courseware.

- The cost of custom-made courses is prohibitive ($35,000 to $100,000 per hour of instruction).

- Simple menu- or command-driven interactive video courseware can be produced by non-programmers through available authoring systems, but creating realistic, sophisticated interactive training systems requires professional writers, directors and actors.

- More information about interactive video authoring systems can be obtained from:

  - Micro Visual Authoring
    Bell & Howell
    Chicago, IL

  - Interactive Authoring System (IAS)
    McGraw-Hill Book Company
    Microcomputer Software Unit
    New York, NY

  - PILOT Plus
    Online Computer Systems, Inc.
    Germantown, MD

  - The Educator
    Spectrum Training Corporation
    Salem, MA

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VI I.S. CAREER DEVELOPMENT CONSIDERATIONS

A. TEACHING OLD DOGS NEW TRICKS

- Topics such as decision support systems, electronic office systems, and micro-to-mainframe links are new to the dyed-in-the-wool COBOL programmer or systems analyst. Some of these senior IS professionals will have an easy time adding end-user computing skills to their knowledge of information systems technology, whereas others will find it difficult and frustrating.

- It has been suggested that students critique each course they take to aid in an overall assessment of the curriculum and instruction; the instructors, as well, should alert IS management about IS students that are having a particularly difficult time grasping the new concepts.

- Management would be failing in its responsibilities if it allowed subordinates to take on assignments for which they are not prepared. Traditional systems development and programming still accounts for the bulk of IS personnel, and there is no need to force a long-time productive worker into a new and perhaps unsuitable environment.

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B. ROTATING I.S. STAFF FOR CROSS-TRAINING

- INPUT firmly believes that future information systems development will integrate the capabilities of the microcomputer and will handle the personal computing needs within a department or section, as well as business transaction processing requirements.

- In light of the above statement, the future systems designers are advised to learn as much as they can about end-user computing techniques and methodologies so that they will be equipped to build end-user decision support capabilities into future systems architecture.

- Instructor-led courses and video- and computer-based training are a good start for gaining a grasp of the needs of end users, but by far the best way to learn about end-user computing is to become a consultant within the end-user support group.

- Many companies have started an employee rotation program, whereby people from the IS systems development group are assigned to the information center or end-user computing support group to gain first-hand experience with all aspects of information systems. They might get involved in an office automation project, or in a fourth generation programming problem in the information center. They will thus become proficient in using microcomputer tools and can assist end users in the selection and implementation of micro software packages.

- After six months they can either return to the more project-oriented team systems development group or remain in the end-user support group. If an individual possesses appropriate interpersonal skills and has the ability to learn new concepts quickly, then he or she might be best suited for end-user computing support. They may find that they prefer consulting on several short-term projects with individual end users to the long-term life cycles of the major systems undertakings.

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- Senior members of the end-user computing support groups should be asked to participate in the phases of a systems development life cycle that involve aspects of end-user computing.

- IS must assume responsibility for investigating the benefits of integrating personal computer capabilities with the traditional transaction-driven systems. This can only be achieved by an exchange of knowledge between the two IS factions: the people who design large corporate information systems, and those who work with end users on personal computing problems.

C. TRANSFERRING PERSONNEL BETWEEN I.S. AND THE USERS' BUSINESS UNITS

- A practice that might fall under the heading of training and education is the transfer of employees either to or from one of the IS groups, as depicted in Exhibit VI-1. An end user that demonstrates an aptitude and interest in applying information systems technology could be a tremendous asset to the IS end-user support group. By the same token, a line function could benefit from having a knowledgeable IS technician in its ranks.

- INPUT believes there will be more line management positions occupied by ex-IS people in the future because of management's ever-increasing reliance on information technology. Senior management will seek middle managers with first-hand computer applications knowledge. Someone who understands business dynamics and has in-depth experience in information systems development could help move a company ahead of its competition in the employment of information technology if placed in a position of responsibility and authority.

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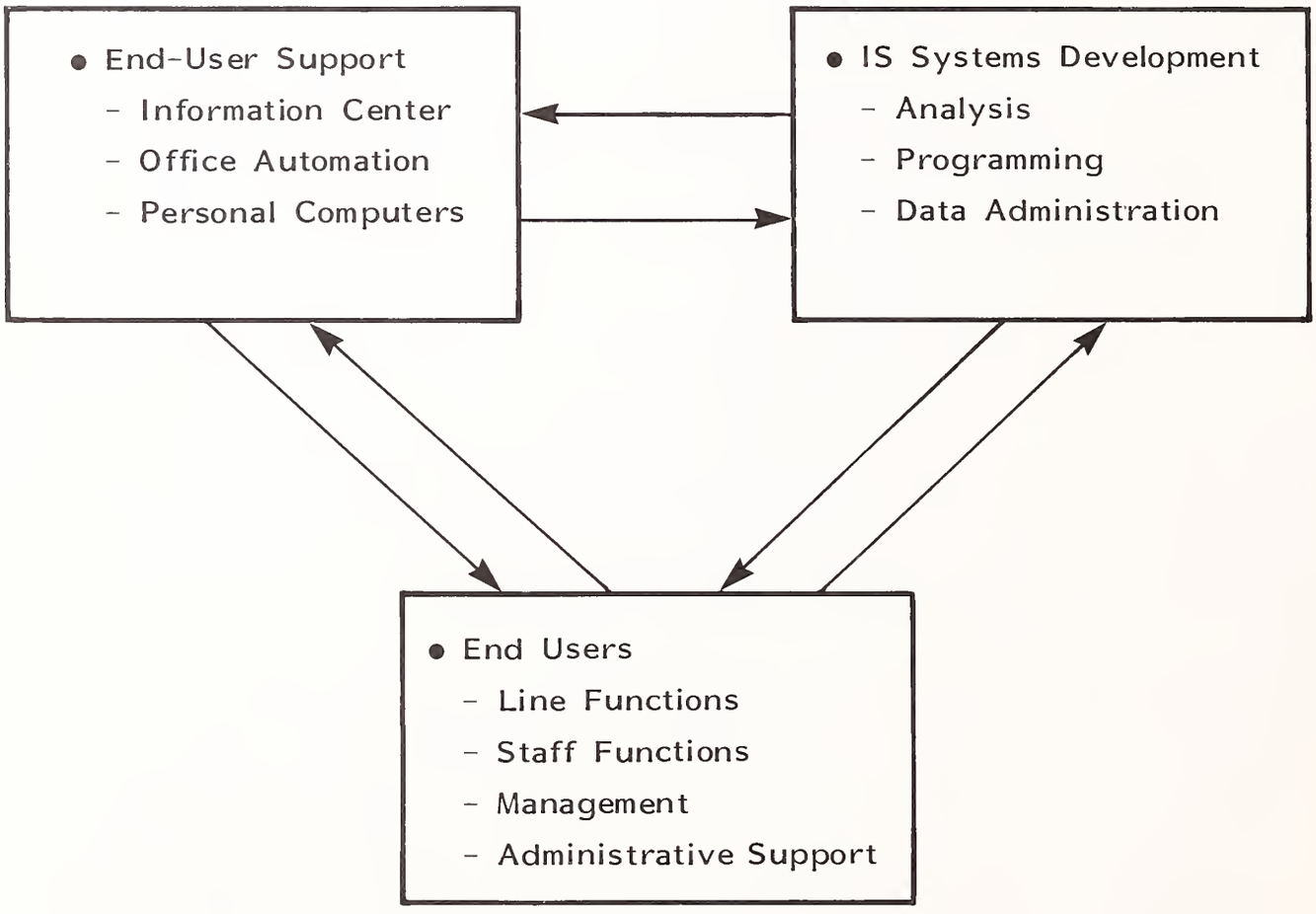
EXHIBIT VI-1

KNOWLEDGE EXCHANGE THROUGH
INTERDEPARTMENTAL PERSONNEL TRANSFERS



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- Moving personnel to and from IS falls under the category of cross-training. Because of the skills requirements for an IS technician, it is more likely for senior IS employees to transfer to end-user functions than senior end users to transfer into IS. However, filling entry-level IS positions with end-user professional and administrative personnel will still bring company business knowledge to IS.

D. CHANGING RECRUITING CRITERIA

- Most IS organizations have formal job descriptions, sanctioned by Human Resources, that cover skill requirements, educational requirements, and duties to be performed. When there is an opening to fill, the Human Resources group's recruiter uses the job description as a guide in screening applicants.

- Recruiters should be made aware of any additional skills that IS might be trying to acquire that are not covered in the job description. If, for instance, there is an opening for a systems analyst, and IS is in the process of recruiting current systems analysts that either have previous end-user computing support experience or have the qualifications to work in an end-user support group, the recruiters should be cognizant of these requirements in interviewing applicants. Eliminating training requirements through astute recruiting lessens the overall training problem.

- Keeping in mind that end-user computing and traditional transaction-driven systems are on a collision course, and that end users will become even more involved in systems development through prototyping and software package selection, future information systems workers will require new skills. These will be in the area of consulting, which will require interpersonal communication skills and a technical knowledge of end-user computing products, along with a better understanding of business dynamics.

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- Finding someone with the needed skills during the recruiting process is certainly more cost effective than trying to train existing staff, which may or may not be capable of adapting to a new work situation. These experienced recruits will then help to educate existing staff.

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VII CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

- INPUT believes that the information services industry is entering a stage of decentralized information systems technology, brought about by the advent of end-user computing. The more end users learn about the technology, the more they will want to put it to work solving their business problems.

- Information systems technology is beginning to affect every knowledge worker and information handler, from word processing operators to senior executives. Skills training and familiarization education in the uses of information technology tools are rising to the top of the IS manager's list of critical issues.

- There is much being said about the computer becoming a competitive weapon if integrated into the strategic business plans of a corporation. This can only be initiated by educating senior management in the various aspects of information technology.

- The evolution of end-user computing in its potential to improve the knowledge worker's contribution to corporate goals and objectives will be impeded by inadequate training programs.

- IS personnel assigned to support end users in their computing pursuits must learn new skills associated with applying software and hardware products that are directed at the end-user consumer.

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- The IS training function has traditionally been directed at keeping IS personnel up-to-date on changes in the technology or at training entry level programmers and operators. Some survey respondents indicated maintaining a ratio of 1:100 of trainers to IS personnel. With the additional burden of training end users this ratio appears inadequate, and should be closer to 3:100.

- End-user computer training has evolved from the information center, where users could receive one-on-one instruction on how to use an information center product. The end-user (or client) support staff within the information center has accepted the responsibility for training end users on the use of both PC and mainframe end-user products.

- Use of instructor-led computer training workshops is the most desirable approach for teaching end users how to apply information technology in their work environments. These "hands-on" workshops are either conducted by members of the support staff or by outside training professionals.

- Video-based training has been widely used by the information services industry for a number of years to keep computer professionals abreast of the changing technologies and methodologies. Presently, there is an array of videotape courses on microcomputers and information center software that are being used mostly for conceptual awareness education.

- Computer-based training (CBT), which integrates courseware into generic software and fosters self-paced learning, is gaining in popularity. The survey respondents claimed to be using off-the-shelf CBT material from either DELTAK, ASI, or CRWTH.

- Authoring and presenting systems from IBM (IIS), Goal Systems International (PHOENIX), and Boeing (Scholar/teach 3) were mentioned in the surveys as developing custom end-user CBT courseware. Custom courseware is not normally developed to teach end users how to use generic software, but rather

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how to use a new corporate system. Custom CBT is especially effective in companies where systems users are geographically dispersed (e.g., hotels, restaurants, travel agencies, department stores, etc.).

- None of the respondents were employing interactive video in conjunction with CBT material to train end users on information technology. The additional cost of the connecting equipment and associated courseware makes this impractical for most organizations. Interactive videodisc courseware can cost anywhere between $35,000 and $100,000 to produce one hour of instruction. Combining the technology of videodisc systems with the technology of computer-based training is presently being used to instill specific skills for such jobs as jet pilots, mariner pilots, automotive mechanics, and repairmen of high-tech equipment.

- Some survey respondents are producing their own in-house videotapes from formal classroom instruction that can be viewed by employees in outlying areas or local employees who were unable to attend the original class. The quality of these home-grown courses is, admittedly, poor.

- As shown in Exhibit VII-1, the costs for the different training methods varies considerably. There are other cost factors not listed in the exhibit that have to be included in a selection process. These factors include employee time cost, associated travel cost, space, facilities, and any special training equipment, e.g., a videotape player and TV. For more detailed information on training cost considerations refer to INPUT's report entitled Training Techniques for End Users.

- To maintain central control over end-user training, IS should charge back all training to the cost centers receiving it. This will provide an equitable allocation of the training costs and will shift responsibility for selling the end-user training budget to senior management from IS to user management.

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EXHIBIT VII-1

TRAINING METHODS COST COMPARISON

TRAINING METHOD	COST	COMMENTS
Professional Instructor-led Workshops	$135-225 Per Day Per Student	Provides class/instructor interaction, disciplined environment, comprehensiveness.
Off- the-Shelf Computer-Based Training (CBT)	$60-100 Per Student Down to $5 Per Student with Site Licensing	Provides student-paced training. Conducted at user's workstation or the information center. No instructor required.
Video-Based Training	$50-130 Per Course Per Month (Rental); $60-$1,700 Per Course (Purchase)	Provides classroom simulation. Can be replayed infinitely; quick way to get subject overview.
Custom Interactive Videodisc/CBT	Varies Considerably Depending on Quality of Video Production. $35,000 to $100,000 Per Course Hour to Produce	Excellent for teaching special occupational skills (Piloting, Repairing, Manufacturing, etc.)

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B. RECOMMENDATIONS

- IS must assess the role of end-user computing in future systems architecture and identify the evolutionary stages of end-user computing, so that training and education requirements can be anticipated and thoughtfully planned. The reactive approach to training will not keep pace with the demands for training.

- A qualified training staff with an adequate budget must be established within the IS organization to:

  - Assess all IS and end-user training needs.

  - Develop an overall training strategy.

  - Determine training methodology for each situation.

  - Evaluate course curricula.

  - Approve training vendors.

  - Coordinate training programs.

  - Evaluate training results.

- The training staff should report near the top of the IS organization and consist of at least a 3:100 ratio of trainers to total IS population. The end-user support group should be responsible for conducting end-user courses and the ratio of consultants to clients should be at least 1:50. All training activities should be coordinated by the formal training staff to ensure uniformity, quality, and cost control.

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- The best way to get the training budget increased is by educating senior management in the capabilities and benefits of information technology. They must be made aware of the importance of information technology applications at all staff levels of knowledge worker. Senior management should attend concepts courses and "hands-on" courses with their colleagues.

- No single approach to training will satisfy all end-user computing training requirements. Each situation must be evaluated separately and the most appropriate program employed. Some of the main factors that will affect the choice of training methods are:

  - Qualifications of the end-user support staff.

  - The total numbers and proximity of the end-users requiring training.

  - The number of different products to be discussed.

  - The quality of available off-the-shelf training material.

  - The average cost per student.

- IS end-user support personnel should be the first to attend any type of course being considered for end-user training. They will not only benefit from the instruction, but will also be able to assess the effectiveness of the material.

- Students (end-user or IS personnel) should be asked to evaluate each course taken, regardless if the course is in a formal classroom setting or a self-teaching environment. Evaluation forms should be forwarded to the corporate IS training group for analysis.

- Professional training consultants should be retained to assist in the assessment of training needs and to help develop an overall training plan. They may conduct end-user workshops or they may get involved in training the in-house

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trainers. These consultants should not be tied to any training products so that their recommendations will be objective.

- The advent of end-user computing (personal computers, informtion center, office automation, decision support systems, etc.) has brought about a wealth of new information technology. The IS professional staff should have a technical knowledge of these new end-user products. If at all possible, the IS systems development staff should be exposed to end-user computing activities by actually working in the end-user support group for a period of time.

- Walls between the traditional systems development staff and the end-user computing support staff should not be allowed to exist. INPUT believes that future information systems designed for mainframes will integrate the capabilities of microprocessors. End-user computing needs will be considered during the systems requirements phase and the systems architecture will take this into consideration. A smooth and successful end-user computing evolution can only be guaranteed through a thoughtful training program for each stage.

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About INPUT

INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions. Continuing services are provided to users and vendors of computers, communications, and office products and services.

The company carries out continuous and in-depth research. Working closely with clients on important issues, INPUT's staff members analyze and interpret the research data, then develop recommendations and innovative ideas to meet clients' needs. Clients receive reports, presentations, access to data on which analyses are based, and continuous consulting.

Many of INPUT's professional staff members have nearly 20 years' experience in their areas of specialization. Most have held senior management positions in operations, marketing, or planning. This expertise enables INPUT to supply practical solutions to complex business problems.

Formed in 1974, INPUT has become a leading international planning services firm. Clients include over 100 of the world's largest and most technically advanced companies.

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