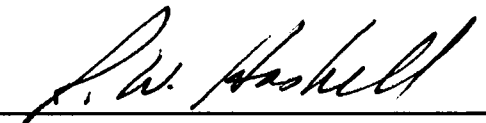
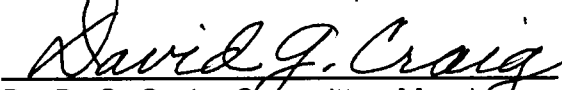


To the Graduate Council:

I am submitting herewith a thesis written by Susan D. Rozsnyai-England entitled "Training Effectively for Computer Competency Improvement within an Organizational Context." I have examined the final copy of this thesis for form and content and recommend that it be accepted for partial fulfillment of the requirements for the degree of Master of Science, with a major in Human Resource Development.

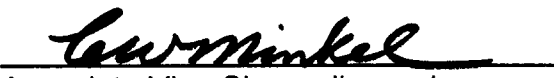

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**TRAINING EFFECTIVELY FOR COMPUTER
COMPETENCY IMPROVEMENT WITHIN
AN ORGANIZATIONAL CONTEXT**

A Thesis
Presented for the
Master of Science
Degree
The University of Tennessee, Knoxville

Susan D. Rozsnyai-England
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ABSTRACT

The heart of the quality improvement process within an organization is the ability to show actual improvement. This research was conducted in an effort to determine a basis for measuring improvement in PC competency and to suggest effective training methods that are likely to help improve PC skills and knowledge within an organization.

Two questionnaires surveyed managers (17 with 85% responding) and PC users (173 with 90% responding) within the engineering department of a major consumer electronics company. Both instruments listed 31 skills/knowledge at the introductory level of Windows v3.1 and five additional competencies thought to be important by this organization. PC users were also asked five questions to gain additional insight into influences on their perceived level of competence.

Results indicate that managers expected PC users to have 85 percent of the skills/knowledge at the introductory level of Windows v3.1 -- all managers agreed on the importance of 11 competencies. As a group PC users did not perceive themselves as having the competencies managers' expected. In some cases this difference was significant. Influences on perceived competence found to be significant were: a) use of a computer more than once a week at home, b) having a clear understanding of their managers' expectations, c) using Windows on a near daily basis. PC users who volunteered to teach a co-worker perceived

themselves to have a significantly higher level of competence than those respondents who did not volunteer. Traditional lecture/lab training was found to be preferred by 42 percent of PC users, tutorial by 33 percent, and computer-based instruction by 20 percent. It may be practically significant that only five percent chose video-based instruction as a preferred training method.

The literature review provided information on ways to help make training more effective. The training technique repeatedly encountered emphasized that training should support an organization's business objectives. Giving employees training choices appears to encourage personal responsibility for learning outcomes. Computer-based training provides numerous benefits. Time and cost savings are the most significant. Organizations with established networks will want to consider putting training courses on a server for ease in trainer updating and access on demand by PC clients. Using World Wide Web technology internally (intranets) is an effective way to provide interactive training with multimedia and hypertext capability. Because employees are adults, for training to be effective, those with the responsibility for providing training should consider the special needs of the adult learner.

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CHAPTER I

INTRODUCTION

use in letter

A business may have satisfied customers, but to remain competitive through and past the millennium corporations must constantly improve. The heart of the quality improvement process is the ability to show actual improvement and in the highly competitive consumer electronics business this ability is especially important.

Background

The Engineering Information System (EIS) department of a major consumer electronics company responded to its employees' request for personal computer (PC) training. A training program of introductory windows and basic application instruction was provided by a local community college. Employees determined what, if any, classes they would take, subsequently, EIS asked the engineering community if it was satisfied with the training provided. All responses to this question were positive, yet there was a missing element in these results: measurable improvement in performance.

Problem

Management expectations for PC competency and engineering personnel's level of skill and knowledge are not known (continuous improvement cannot be measured). The traditional lecture/lab training method was used in 1995. Because this was the only training choice, it was not known if this was the preferred method for engineering personnel or if this was the most effective training method for this organization's PC users. Moreover, although a 1994 company-wide employee motivational survey showed that 88% of the respondents felt that "the people I work with are willing to help each other, even if it means doing something outside their usual activities", proficient PC users have not been identified and encouraged to assist others in a structured way. These human resources may be willing to help others with PC hardware and software problems that are unique to this organization.

Purpose of the Study

The purpose of this study was to provide a basis for measuring improvement in PC competency and to suggest effective training methods that were likely to help the engineering community continuously improve its PC skills and knowledge.

By understanding managers' expectations for PC users competency at the introductory level of Windows v3.1, training objectives for 1996 can be matched to business objectives. Additionally, training programs using external

instructors or internal experts can be focused on the goals of this organization. Employees will also be able to concentrate their effort on improving those areas where their perceived competency level is lower than the standard expected by management.

Knowing the impact of frequency of use of a PC at home may be helpful in determining certain company policies. For example, if employees using a PC at home are significantly more competent, support personnel might want to consider this fact when asked to help with home-PC problems. However, certain restrictions to support may be prudent if having a PC at home does not significantly effect PC competency. Also, if using a PC at home has an important positive effect on perceived PC competency, programs that assist employees in purchasing a PC for home may be beneficial in increasing productivity at work.

The frequency with which personnel use Windows is important in understanding what portion of PC users may be primarily using DOS rather than Windows v3.1. This information directly relates to the task of moving to Windows 95 which is a windows-based operating system. The transition to Windows 95 will be easier for those who are comfortable with Windows v.3.1.

Considering characteristics of adult learners is important during training program development if its benefit to the organization is to be maximized. However, even before investments are planned to improve employee PC competence, understanding of how training can be made more effective will help

the engineering department within this consumer electronics company continuously improve its competitive position through training.

Significance of the Study

Two major software changes are scheduled for 1996: 1) the engineering community will move from Microsoft Windows v3.1 to Windows 95 and 2) a major engineering CAD application that is currently running on a UNIX workstation could possibly move to a PC. These events may directly impact the productivity of both primary and secondary PC users within the company.

Shortening the product-design-cycle is of major importance in the consumer electronics industry. Key players in this effort are CAD engineers. Changing the hardware they use from a UNIX workstation to a PC may have an indirect effect on the product-design-cycle. CAD trainers in 1995 were less effective because some CAD users had little understanding of basic UNIX commands. Over the years these engineers were not concerned with the UNIX operating system or UNIX commands because they logged-in directly to their CAD application. Anticipating user's PC training needs and method preferences may be beneficial in lessening the learning curve impact on the product-design-cycle.

Other departments within this consumer electronics company may want to use this model in their quality improvement process as they move to the new PC operating system. Indeed, any company that plans to either change its PC

operating system or move an engineer from a UNIX workstation to a PC will benefit from the information in this study.

Research questions

1. What basic competencies do managers expect from PC users?
2. Do all PC users within engineering possess these competencies? If not,
 - A. Of those who were trained in 1995, what is the perceived level of competency for primary and secondary users?
 - B. Of those who were not trained in 1995, what is the perceived level of competency for primary and secondary users?
3. Is there a significant difference in users' perceived competency level between those who use a computer more than once a week at home and those who do not?
4. Are there proficient PC users in the engineering department of this company who are willing to teach a PC topic to a co-worker?
5. Is there a significant difference in users' perceived competency level between those who have a clear understanding of their manager's expectations of their skills and knowledge and those who do not?
6. When using Windows at work, does frequency of use make a significant difference in the user's perceived competency level?

7. What PC training methods do engineering personnel prefer?
8. How, according to the literature, can an organization's computer training be made more effective?
9. What information can be gleaned from the literature with respect to characteristics of adult learners that should be considered when selecting a training method?

Limitations

This study will be restricted to the engineering department of a consumer electronics company. Although one survey included all managers, the second is limited to engineering employees who have a PC available to use at their workplace. Survey results will be confined to the data received from the respondents.

The literature review is not intended to be comprehensive in nature. Rather it is an attempt to summarize findings from recent literature related to effective computer-user training methods and provide a concise source of information beneficial to managers, instructors, and those who are empowered to influence improvement in computer competency within an organization.

Assumptions

It is assumed that responses from managers and PC users will be truthful and accurate. It is further assumed that representative statements of computer

training needs can be projected from examination of the managers' expectations and employee perceptions within the company context of this study.

Definitions

Knowledge. An organized body of knowledge usually of a factual or procedural nature, which if applied makes adequate job performance possible (Goldstein, 1986).

Managers. Individuals listed on the October 1, 1995 Engineering Organizational Chart either under the heading Engineering Project Leaders or who have subordinates listed below their names.

PC users. Used interchangeably with employees or subordinates.

Primary PC user. An engineering employee who uses PC hardware and software.

Secondary PC user. An engineering employee who uses a PC emulator on a UNIX workstation.

Skill. The capability to perform job operations with ease and precision. The specification of a skill usually implies a performance standard that is required for effective job operations (Goldstein, 1986).

Trained PC user. An engineering employee who took an Introduction to Windows class in 1995.

CHAPTER II

REVIEW OF THE LITERATURE

To discover the information already available concerning industry-related computer training and characteristics of adult learners, a computer search was conducted in Educational Resources Information Center (ERIC), ABI/Inform, and the Dissertation Abstracts. Organizational documents were also reviewed.

Computer technology has changed the nature of the work environment in most businesses today. It has been found that many factors influence the benefits of computer-user training within an organization. To integrate new technology into the workplace, emphasis needs to be placed on training and education where the enterprise is challenged with addressing the needs of a diverse group of adult learners working with ever changing computer technology.

Effective Computer Training Techniques

Why train?

For a computer training program to be effective, before choosing *where* to train or *whom* to train or *how* to train, management must know why they plan to invest time and money in training. Requests for training can originate from a variety of sources. One such source is apt to be from frustrated PC users who are expected to keep their knowledge and skills current as computer operating

systems change, new applications are introduced, and their favorite faithful software is revised. Another may be from computer support personnel who are caught between giving good customer service and being bogged down with what they see as elementary questions. However, Dean, Dean, and Guman (1994) caution that frequently, what employees want instead of what the organization needs drives training choices.

Organizational objectives should make clear where management wants performance to improve. The "why train" question can then be answered by PC users, support personnel, and managers in stating how function, process, or individual performance that supports organizational performance objectives can be improved through training (Benscoter & Guman, 1994; Reynolds & Davis, 1983; Rummler & Brache, 1995). Dean (1994) asserts: "They [employees] must have standards against which to compare themselves. Providing well-defined, accomplishment-based expectations is one of the responsibilities of management" (p. 4). Without this direction trainees may have learning goals based on job-related activities -- such as reports -- that are more attractive, rather than on job performance objectives that support the organization's objectives (Sleezer, Cipicchio, Pitonyak, 1994). Dutton (1995) points to Bureau of Labor Statistics reports which show that U.S. productivity growth rate dropped from an annual increase of 3.2% between World War II and the late 1960s to just 1.2% for 1992-1993. She concludes that providing computer hardware and software alone will not increase productivity.

Watkins and Marsick (1993) give an example of how Exxon Research & Engineering changed its organization's view of training:

Traditional training focus	Component	Future learning focus
No direct link to company mission	Mission, goals, strategies	Learning requirements aligned with organization's vision and requirements for future success (including organizational and individual goals)
Structured, traditional, formal training resources; short-term focus to help do one's job better; teacher/expert-initiated, separate from work; curriculum loosely organized	Delivery vehicles	Both formal and informal learning resources; long-term, future-oriented, building strategy; learner-initiated, integral part of one's job; curriculum is strategic set of integrated programs

Baird, Schneier, and Laird (1985) support the notion that training is most effective when it enhances an organization's ability to fulfill its mission and when the training function manages resources and directs its efforts toward supporting organizational objectives.

Organization culture that supports learning

Watkins and Marsick (1993) believe that a democratic culture promotes learning within an organization. They report that research consistently finds a correlation between high performance and a collaborative working environment. This is not meant to diminish the importance of managers giving clear expectations of performance. Most employees want to contribute to a company's growth and success, but can only maximize performance

improvement if given learning objectives and feedback (Goldstein, 1986).

Vallejos (1996) suggests that efficient training is the result of a strategic training plan that blankets the entire organization. He believes that this policy will bring consistency to the training sponsored among managers and ensure that managers are held accountable to provide appropriate training. Block (1996) would disagree with this approach. He states that employees should be encouraged to be responsible for their own development and they and their units be able to choose training, especially at the lower levels of an organization. Block appears to support Watkins and Marsick's opinion of the importance of a democratic organizational culture.

Rummler and Brache (1995) say that the Human Resource Department within an organization can either be inactive and just wait for training requests, or they can take the initiative and design training programs that support the organization's short- and long-term objectives. Watkins and Marsick (1993) say that for organizations to continuously improve, a strategy must be in place to encourage continuous learning. They present a definition of continuous learning by Judy O'Neil, Consumer Communications Services, AT&T:

Continuous learning is the ongoing formal and informal acquisition, both on and off the job, of individual, team, and organizational skills, knowledge, and abilities. Continuous learning is part of an overall strategy of achieving business results through continuous improvement.

(p. 40)

AT&T adopted a commitment to continuous learning as a way to retain and attract new customers in the face of new competition. Weisbord (1987) believes, that to be effective, an organization's culture must support continuous learning.

He states that a learning organization will:

- Involve people in setting important goals
- Structure the chance to learn
- Offer feedback and support
- Provide tools and ideas
- Stay out of the way

Benscoter and Guman (1994) report that for several years Motorola thought that organizational quality objectives would be met by offering training. To understand what effect "quality" training had on these objectives, two universities were asked to evaluate the company's return on this investment. Central in providing a positive return on the company's investment was feedback -- feedback that told newly trained employees how well they were meeting Motorola's goal for total customer satisfaction in a quality environment. In fact, a \$33 return was realized for every \$1 invested in those cases where on-the-job feedback followed training. Conversely, if no feedback occurred, there was actually a negative return on this "quality" training investment.

Tapping the local talent resource

Within an organization, in addition to organized training programs, continuous learning can spontaneously occur through discussion. Local experts are usually a well known but often a greatly under-utilized resource within a corporation (Baird, et al., 1985). Dean and Dean (1994) have found that an important contribution to promoting sustained high levels of employee performance is the use of exemplary performers as trainers. Those who are highly proficient are generally delighted to be recognized for their special accomplishments (Spitzer, 1995).

Training programs

Cowlshaw (1991) cautions that problems can occur if volunteer peer help is not supported by well-designed training programs. One concern is that employees who must train themselves may end up procrastinating. Also, casual instruction can be a burden to those with computer experience and, contrarily, not result in a systematic approach to improving the kind of specific performance that supports organizational objectives. Those responsible for training should ensure that, (a) non-computer-literate workers become familiar with the basics, (b) computer user training needs are identified, (c) individual learning styles are considered, (d) deadlines are set for acquiring computer skills, and (e) training is done in stages (Cowlshaw, 1991).

Many large companies favor formal training programs. The typical training program is one to two days long, in house, and by a training specialist (Ellis, 1995). Organizations depend on standard manuals, training workshops, computer labs, or other skill-development centers to facilitate employees' computer learning (Results . . . , 1993). When new computer software or hardware is introduced, department heads usually determine the need for training (Ellis, 1995).

Who should do the training?

As companies become more dependent on computer-driven technology, the need to train every employee to a functional level of computer literacy has become obvious. To be successful, a training department requires people, money, space, time and direction (Hubbard, 1994). Many companies prefer to outsource their PC training to computer training companies, community colleges, or adult education resources (Kiss, 1994; Kowall, 1995). DeMarzo (1995) says that the information technology training market expects double-digit or even triple-digit growth in the next five years where Windows 95's portion is estimated to be \$800 million by 1998.

Preparing to provide training

When employees lack the skills or knowledge necessary for the organization to meet its objectives, management may determine that training is

advisable. Goldstein (1986) recommends that instructional objectives be derived from an organization, task and employees needs analysis. Many companies perform training needs assessments. Consideration should be given to the organization's short- and long-term goals and also to trends that are likely to affect these goals. Insufficient use of computer-based technology, for example, can handicap an organization. One of the largest capital asset items for many organizations (approximately 30% of total capital assets in financial and service firms) is computer technology (Gattiker, 1992). The systematic formulation of instructional objectives will help maximize the potential of these tools and, predictably, greatly improve the competitive position of any organization.

The effectiveness of instructional objectives depends on understanding the job that is to be performed by the trainees when they complete the training program (Goldstein 1986). These objectives are then communicated to trainees so that they will understand what they are expected to be able to do after training. Goldstein (1986) has found that individuals who are given specific challenging goals perform better than those given specific easy or do-the-best-you-can goals -- or no goals at all.

Spitzer (1995) has found that part of preparing for training -- and important to the success of a training program -- is conveying the importance of the training, involving employees in the training design, and by giving them choices about the kinds of training they receive. Motivation to learn can be stimulated, according to Baird, et al. (1985), by making the individual aware of

any sub-standard behavior, skill, or knowledge, and helping them understand what performance is required to overcome the deficiency. To promote transfer of new skills to the workplace, supervisory support is a motivational link between training and on-the-job performance. Spitzer (1995) also suggests encouraging skill transfer to the workplace by training together those who work together so that they can be of mutual assistance.

The benefits of "pairing" in training should not overshadow necessary prerequisite skills. Basic abilities such as typing skills, may be necessary to accelerate performance (Gattiker, 1992; Goldstein 1986; Spitzer, 1995) even within an engineering environment where computers may be primarily used for design purposes. Goldstein (1986) suggests that valuable time will be saved if trainees are measured on what they know before they begin training. This will help in determining, (a) which trainees do not need this training, (b) which trainees need review, and (c) which trainees are ready for training. Pre-training assessment allows alignment to be made between training content and the employee skills/knowledge (Gattiker, 1992).

Learning outside the classroom

Gattiker (1992) likes to give trainees an opportunity to practice and review lessons by conducting training sessions on an intermittent basis. This method, he finds, enhances the transfer of learning to the job by giving trainees time to discover the applicability and usefulness of their newly acquired skills.

This extra time individualizes the learning process and allows the trainees greater flexibility in scheduling time to complete their assignments. With extra practice time the learner builds confidence and can assimilate and apply the newly acquired skills or knowledge. Baird, et al. (1985) see the traditional role of the instructor changing from being the transmitter and controller of knowledge and skills to one of a facilitator to self-directed learners. If resources are provided, time outside the classroom can be used not only for practice, but also for continuous learning.

Self-direction does not mean using a trial and error approach to learning. This method is too time consuming -- most employees require guidance. When employees are improving PC skills and knowledge they need to learn sequentially and be provided with a way to track their own progress. Many computer-based training courses keep track of the employee's progress (Spitzer, 1995). According to Stein (1994), performance can be improved in a self-directed way when a typing instructional program on a computer also analyzes missed keystrokes and speed. He looks for word processing and spreadsheet programs to also track the user's work and suggest ways to improve performance rather than just give random hints at helping in dialogue boxes.

AT&T tracks employee training through the use of controlled documents (see Appendix A) such as, (a) the Employee Training Procedures/Record, (b) the Hourly Employee Record of Job Skills and Training, (c) the Salaried Employee Record of Job Skills and Training, (d) Record of Training, and (e)

Request for Seminar/Course. This procedure fulfills its ISO 9002 requirement for employee training documentation. Watkins and Marsick (1993) state that accurate data are important if an enterprise is to compare where it is with where it wants to be. They say that IBM accumulates the data from employee skill assessments into a computer "skill bank". This information provides a basis for setting skill goals. Also, Tellabs has implemented a computerized assessment of skills based on the organization's strategic goals. Its assessment is adapted each year and used to plan training and hiring and is part of Tellabs approach to continuous improvement (Watkins & Marsick, 1993)

Many companies use videotapes to provide training outside the classroom. An advantage of videotapes is that they can be played to one or more people at a time. If videotapes are used without certain other learning aids there is no record of what was mastered, no evidence that knowledge transferred to the workplace, and no material available for review.

Because computers can be programmed to respond to input, they have become not only a tool, but a private instructor for PC users. Phillips (1991) defines computer-based training (CBT) as a universal phrase that encompasses all forms and uses of computers to support training or learning. One of the most familiar types of CBT is the tutorial. When using the tutorial the learner interacts one-on-one with the program. Reynolds (1983) report that a good tutorial advances in the same manner as a good instructor would, covering a portion of the material and then checking the learner's comprehension.

Multimedia-based training is just an expansion of CBT; the distinction is that multimedia-based training includes sound and video. A learning center can be used to provide resources such as multimedia courses that enable employees to take training just-in-time (i.e when training is needed) rather than just-in-case. At significant cost, management has been known to mandate training on a suite of applications, such as Microsoft Office, in an effort to combat computer illiteracy. Just-in-time training ties new skills to the job when needed, thereby avoiding expensive re-training (Spitzer, 1995).

Most companies are now using CBT (Chaddock, 1995; Ellis, 1995). Larger organizations are likely to turn to CBIMT to teach computer skills because of the flexibility and individualization that CBIMT provides (Cleland, 1994; Ellis, 1995; Loney, 1994; Mangelsdorf, 1994). Educational CD-ROMs are used for Windows word processing and spreadsheets (Cleland, 1994; Wildstrom, 1995).

According to Calmbacher (1994), computer-based interactive training requires the following hardware investment:

- CD-ROM reader
- Graphics quality display
- Audio-video board
- Expanded RAM
- Sufficient hard-disk space

Hall (1995) found that training time was shortened and the quality of learning improved by using computer-based interactive multimedia training

(CBIMT). To ensure a positive return on an investment in software development requires a training population large enough for the additional development costs to offset the lower delivery costs as compared with traditional training. Excluding development costs, he reports that Price Waterhouse reduced the cost-per-learner over five years from \$760 using traditional instructor-led training to \$106 using a multimedia training program. Intel experienced an 80 percent reduction in training time for participants in their desktop training solution program as opposed to the usual seminar for new program introduction. According to Marx (1995), interactive multimedia has the potential to improve learning while saving companies millions of dollars.

Target Stores used CBIMT as the solution to making employee training consistent across more than 600 stores (Kay, 1995). While currently programs are usually on CD-ROM, trainers look to be able to use networks to access training programs. Current methods of distributing CD-ROMs, which must be replaced as procedures change, might well be replaced by a program that is on a networked server which could be kept current from a trainer's PC.

It has been found that CBT is 70 percent more effective at transferring knowledge to the workplace than traditional forms of training, and training time can be reduced by 30 percent (Cole, 1994). Moreover, if an organization chooses to stay with low-tech software such as floppy disks, employees may be able to take training at home.

Robbins (1994), Coordinator of Quality Management for World-Wide Sales for Eastman Chemical, points to failure to train at time of need as one reason Eastman did not win the Malcolm Baldrige National Quality Award in 1988 (Eastman won this prestigious award in 1993). CBT allows a employee to take training just-in-time. The amount and depth of the material covered is controlled by the trainee, as is the ability to review or skip topics. Training is consistent -- a point is never forgotten. Watkins and Marsick (1993) state that by the end of the 1990s technology will be used in about half of the training Ford delivers and new programs Motorola develops.

Hwang (1994) sees corporate enthusiasm for multimedia applications reflected in the \$4.93 billion worldwide revenue for these products in 1993. By 1994 CD-ROMs began to gain market share and dominate the multimedia market. One of the five top areas for CD-ROM development and sales for 1995 is in the fields of education and training (Herther, 1995). Corporations can be expected to take advantage of lower prices for better quality products and turn even more attention to in-house CD-ROM production.

Phillips (1991) summarizes the advantages of using CBT into six points. 1) CBT is cost effective in that under the right conditions training results are either the same as or better than classroom training. As mentioned earlier, 2) the ability of students to be self-paced brings with it trainee control over the learning process. They are self-sufficient and can self-correct through feedback that is built into the training program. 3) CBT is efficient because individualized

instruction takes 30% to 50% less time than group instruction, quality training products use subject matter experts, and employees can be taught during times that are suitable to their workload. 4) The situational advantages are apparent because employees work at a computer so it is simply practical to teach them there as well. 5) The information distribution advantage of CBT can be magnified many times in global corporations or those with dispersed facilities. In most large companies employees are provided with a PC that is networked to one or more servers. A centralized location can deliver all employees standardized training at the same time because training programs can be downloaded to a local server for PC user access. A server with one copy of a training program can share it with all client PC users. Another advantage of CBT according to Phillips is 6) the availability of computers. CBT can take advantage of existing infrastructure and almost eliminate logistics support for training.

The World Wide Web as a training resource

Another resource to promote continuous learning within an organization is the use of the World Wide Web (WWW). Wulf (1996) defines WWW as a multimedia, hypertext interface for navigating the Internet. Netscape and Mosaic are standard Web browser software being used by most organizations. Companies such as National Semiconductor use the WWW to convey its company's concept of a learning organization and the need for a strong partnership between the organization and the training department (National

Semiconductor, 1995). But even without access to the Internet, internal corporate "intranets" located behind the corporate firewall so that they are only accessible to employees, can provide inexpensive information sharing within an organization (Silicon Graphics, 1995; Wulf, 1996). Currently, according to Wulf (1996), SGI has 300 Web servers within the company firewall and 100,000 internal Web pages. SGI suggests using this technology for employee training (Silicon Graphics, 1995) and is studying the use of its intranet as an interactive training device (Wulf, 1996). Human resource departments can use an intranet for address updating, W-4 status changes, training course selection and registration, employee handbook, posting internal jobs, and providing online help to computer users (Wulf, 1996).

Evaluating training outcomes

Whether training occurs in a traditional classroom or at a computer, the trainees need feedback on any progress they might make toward specified learning objectives. Computers can help manage instruction; this is called computer-managed instruction or CMI (Phillips, 1991). CMI is done not only by including tests that measure the learner's knowledge of the learning objectives, but also by generating a prescription for additional study which is based on goals that have not been mastered (Reynolds, 1983, Phillips, 1991). One advance in computerized testing is "adaptive testing" in which the test itself changes in response to the trainee's answers (Baatz, 1995). As learning activities are

completed, a data base accumulates information from (a) completed tests that have measured mastery of learning objectives, (b) how the trainee interacted with the program, and (c) problems they may have encountered (Phillips, 1991). Managers appreciate this method of having a reliable and objective way to measure employee performance (Baatz, 1995) and CMI provides the means to bring accountability to the training effort (Phillips, 1991).

Goldstein (1986) stresses that feedback is also necessary to continuously monitor training programs -- training programs are never finished products. The instructional process should be a closed loop where feedback is used in order to ensure that training programs achieve their purpose. Unlike normative tests, criterion-referenced performance tests measure competencies based on an absolute standard of quality (Baird, et al., 1985; Goldstein, 1986) and do not make performance comparisons among trainees. To fulfill management's expectations for training, organizational objectives for performance rather than just skill requirements should be the basis for learning objectives and related competency tests. Unfortunately, in some organizations neither trainees nor supervisors can describe the cause and effect relationship between their performance and that of their organization's performance objectives (Sleezer, et al., 1994).

Effective computer training in an organizational context is based on to what extent improving individual performance, directly or indirectly benefits the

organization. Rummler (1996) suggests several questions that should be asked when making decisions about training. Some of these are:

- What organization or functional performance is subpar?
- What desired output of this key performer is subpar?
- What desired output is subpar?
- What is the cause of the subpar output?
- How does the subpar performance of the process impact the performance of the department or organization?
- Is training in this area the best return on the training dollar?

Swanson and Gradous (1988) state that choices among possible training investments can be determined by forecasting the value to the organization of future changes in performance and then deducting the cost to produce that change. More problematic will be predicting the length of time it will take to achieve increased productivity and the dollar value of qualitative benefits training provides. When formulating a training investment strategy, these authors stress the importance of knowing what change in performance is needed by the worker, work-group, or organization and ensuring that this objective supports the mission of the organization.

Characteristics of Adult Learners

Recent research provides new insights into computer-user attitudes and performance within a business environment. Chang (1995) found that 55 percent of an organization's employees use a computer for their job requirements. Current information on the characteristics of adult learners will be beneficial to managers and instructors who are faced with planning training for varying levels of computer literacy. Furthermore, training programs must be adapted to a diverse group of individuals who use computers at different frequency levels. Adult learning styles, abilities, attitude and age all impact the effectiveness of a training program.

Over the years many engineers may have been promoted to management positions after investing considerable time understanding abstract concepts such as mathematics, and very little time on issues related to human resource development. Being familiar with the characteristics of adult learners is a tool that will help management in its efforts to make training programs more efficient and effective and thereby, improve productivity.

Rapidly changing technology may make computer skills obsolete in a short period of time, forcing computer literacy requirements to rise for most job levels in today's organizations. To maximize the benefits of new and more complex PC programs designed to help employees be more productive, an

organization's trainers will need to be ever-more sensitive to the needs of its adult learners.

Changes in technology pressure most employees to frequently feel the need to update their computer skills. The skills of the older employee are more likely to become obsolete, as it has probably been some time since their last formal training (Gattiker, 1992). Understanding the changes that adults experience as they grow older will help managers and instructors plan more effective training programs.

Factors in an adult's ability to learn

Research at the University of Nebraska indicated that the average older adult in a adult education program is as intellectually able, and performs as well, as the average younger participant (Baird, et al., 1985). Other research, (Merriam and Caffarella, 1991) leaves the question unanswered as to whether adults lose their intellectual abilities as they grow older. Adult intelligence, they report, may decline in the highest levels of functioning in those over 60, yet at average levels adult intelligence appears to be stable. A key ingredient in adult learning is the adult's perception of the value of a new skill or knowledge. If the current method gets the job done, the employee may need to be convinced that the new way is better. It has also been found that older employees who see a weak link between improving current skills and receiving rewards will be less

likely to upgrade their skills (Gattiker, 1992). Conveying why a training activity is important and giving positive feedback are two ways to increase the effectiveness of a training program.

The factor of aging and memory in the adult training process

Merriam and Caffarella (1991) state that there is less decline in the memory process as we age if new information is presented in the context where it will be used. Losses in long-term memory occur as we age, but the impact on everyday learning activities may be slight. Older people will perform better on recognition tasks than on recall because recall requires more processing resources (Gattiker, 1992). Many computer training classes teach topic components in a linear fashion. Because adults are more problem-centered than subject-centered in learning and tend to respond more favorably to instruction that has an immediate application (Merriam & Caffarella, 1991), adults will derive more from a class that directly relates to a specific job task. Providing learning aids, such as workbooks, will also give the older trainee a valuable tool with which to enhance his/her recall capability.

Accelerated learning

Even with minimal financial investment organizations can benefit from more effective training programs by adopting techniques that include

consideration of the environment in which the training will take place. McKeon (1995) explains that accelerated learning is a multisensory, brain-compatible teaching and learning methodology with roots in the work of Bulgarian psychiatrist, Georgi Lozanov. Lozanov's method used various techniques in an effort to involve both sides of the brain in the learning process. His class of 60 Bulgarian students learned about 80 new English words a day and in eight hours split into two sessions, they learned 500 new words. McKeon (1995) goes on to say that by using information from brain research, less time is wasted than in more traditional learning processes because students absorb and retain material faster by overcoming traditional barriers to learning. When accelerated techniques are used students are prepared to learn by giving them a nonthreatening environment that is comfortable and colorful. They are told what they can expect to learn and how this will be personally beneficial. Accelerated learning activities are designed to appeal to many learning styles. Such accelerated activities should be fun, enjoyable, and nonthreatening. During instruction visual imagery is used to increase longterm retention and the five senses are stimulated in an effort to make the learning experience realistic. By encouraging trainee participation with both physical and emotional involvement, Levy (1983) confirms that both sides of the brain participate in the learning process regardless of subject matter.

Dove (1995) states that accelerated learning is based on two fundamental concepts that relate well to computer-based training (CBT), they are: stress reduction and the integration of holistic methods (i.e. viewing the individual and the environment as a single system). Smith (1993) concludes that the total ecology of the adult learner must be considered in order to develop successful learning environments for adult education in a business setting. With CBT, all of the trainee's senses are focused on the task at hand with little or no disruptions. Using the accelerated learning method, trainers and trainees are partners in the learning process (Marx, 1995).

Factors of attitude and achievement

Attitude has been found to influence a learner's level of achievement. Employees with high self-esteem will expect to be successful. This optimistic attitude and self-evaluation will motivate them both to participate in training and to derive a positive outcome from this training (Merriam & Caffarella, 1991; Gattiker, 1992). This finding supports an assumption by Knowles (1985) that adults are motivated to learn by internal factors rather than external ones.

Another study of adult learners' computer attitude and achievement in a computer application training program was done at Ford Motor Company by Owolabi (1994). This study investigated the relationship between demographic variables and adult learners' computer attitude and achievement. Participants

were mostly males and half were engineers with considerable computer experience. Owolabi found that computer experience, the number of computer classes completed, and spreadsheet use predicted high scores on her Computer Achievement Test, and that male participants scored higher on the achievement test than females. Long tenure had a negative effect on performance and attitude: the longer the participants had been with the company, the stronger the tendency to perform poorly. Older respondents were also more likely to have a negative attitude toward computers in society. Owolabi concluded that highly educated and more experienced computer users tend not to reject computers either at work or in the business environment.

A pre-test and post-test was given by Morris (1994) to 28 older adults who completed a computer course. Highly positive changes in computer attitudes were found and also enthusiasm and eagerness for future computer training were shown through subjects' computer diaries. He attributed attitude improvement to consideration for age-related learning needs, such as, longer training time, self-pacing, and pair training.

Dyck and Smither (1994) examined the relationship between computer anxiety and computer experience for older (over 55) and younger (under 30) adults. Here older adults were found to be less computer anxious than younger adults but had less computer confidence. No gender differences were found when computer experience was controlled.

If there are employees who feel anxious, lack experience, or are not confident using computers, it is possible that they may not voluntarily attend training classes. Some employees could also have a negative attitude about computers or lack self-esteem. Setting specific training goals is one way to ensure that every employee meets a minimum standard for computer-skills within an organization. Understanding and responding to age-related learning needs is another way to help motivate employees to improve their computer competency and thereby be more productive. As noted earlier, less motivated trainees have an especially important need for positive feedback from their manager and their instructor.

Beneficial anxiety

Many researchers have found that anxiety can be a beneficial stimulus to the adult learner -- a motivator. According to Merriam and Caffarella (1991), life transitions account for 83 percent of the impetus that motivates a learner to participate in adult education. Knowles (1985) summarizes Gail Sheehy's *Passages*: "If you want to engage an adult in a learning program in which he'll be highly motivated, highly ready, then find out what his life crises are, and build your learning around his life crises." (p. 92)

When an employee can not cope with a situation automatically, the need to learn is triggered (Merriam & Caffarella, 1991). Weisbord (1987) believes that anxiety

is stored as energy while the individual decides where to invest it. And Knowles (1985) agrees stating that: "Readiness to learn is a product of an adult confronting the need to know something or be able to do something in order to perform a life task that he is about to undertake or to cope more effectively with a life problem" (p. 91)

As organizations downsize and reorganize, employee anxiety may be a motivator that will stimulate a desire to improve computer competency. This energy can be channeled to learning activities that increase productivity and thereby, give individuals a sense of control over both their and the organization's future.

Testing to predict adult learning styles

Smith's (1993) research explored how psychological testing could be a predictor in matching adult learning styles with computer instruction in a business environment. This study revealed that although there was significant correlation between psychological testing and assessments of computer literacy, the preferred learning styles of adults are not as easily predicted as with those of children. Self-selection of the instructional method was determined to be a significant predictor of success among adults.

Processes older adults use to learn

Rich (1994) examined the processes older adults over 55 used to acquire computer and word processing skills. Findings from this research showed that older adults need a high level of teacher direction, teacher dependence, and structure at the introductory level of training. They neither wanted nor expected a role in planning their learning. More negative than positive instances of transfer of learning were found when the older adult participants applied their past experience with typing or with computers. It was also found that older adult computer learners preferred small, age-segregated classes, teacher-directed instruction, written directions, and material they could preview and review at home. The subjects were eager to learn word processing, exhibiting cautious, but not negative, attitudes about computer technology.

This study points once more to the need for learning aids in an organization's training classes. Introductory level classes are likely to be more effective if they are taught using the pedagogical method. After trainees' computer skill and knowledge in a particular topic have been established, a self-directed approach is likely to be preferred by most adults.

Putting adults in control with technology-based training (TBT)

"Now that we've begun to treat adults like adults, it's making an enormous impact " (Knowles, 1985, p. 92).

While pedagogical learning methods appear to be preferred by older novice computer-users, other individuals have different learning styles. Technology-based training is an alternative to the traditional classroom learning method. Sophisticated computer-based interactive multimedia training (CBIMT) is being used in 80 percent of Fortune 500 companies (Marx, 1995). Multisensory, interactive, learner-directed instruction where employees can set their own pace, depth, and direction of their learning (Cole, 1994), or go back for remediation training (Cleland, 1994), is possible through the use of multimedia. Baird, et al. (1985) also found that adults learn more effectively when they are permitted to learn at their own pace. Many adults want to be in control of their learning -- self directed -- and seem to appreciate the way computer-based instruction handles this task in a individualized way. Because they are in control, in general, the adult learner sees computer-based learning as far less threatening than classroom experiences .

Hewlett-Packard (HP) gives engineers control over the time and pace of training by having the National Technological University (NTU) transmit object-oriented technology training (Geber, 1994). A 3-way linking system joins a computer, a videocassette player, and the satellite feed from NTU. With a guarantee from HP on the number of subscribers, NTU transmits the course for engineers to record and watch at their desk. This training method is both cost effective and delivers training on time.

Features to look for in multimedia training programs

Trainers must be cautious because no standards currently exist for defining the content of CBIMT. According to Marx (1995) features to look for in multimedia training programs are:

Consistency. How you navigate through programs and receive help should be consistent throughout.

Non-linear design. The program should adjust for student learning, allowing a student to branch into different sections of a program at his or her own rate.

Information. Make sure the program has more than just bells, whistles, and whiz-bang multimedia.

Fun factor. There should be sufficient multimedia to enliven the subject.

Relevance. Make sure the program simulates the job environment.

Like a first-rate teacher, the best interactive programs adjust to a student's learning, modifying the program based on a student's response.

Training's Influence on computer usage

Research by Duncan (1994) confirmed the notion held by designers of computer training courses that training influences computer usage behavior essentially by its impact on skill. He examined skill, beliefs, attitude and intentions to determine how these four variables mediate the relationship

between training and computer usage. His findings show that skill is a direct and important determinant of computer usage and a key link between training and computer usage. Intentions to use the computer also accounted for some of the variation in usage, but its impact was not as consistent or as large as that of skill. Perceived usefulness and perceived ease of use had little or no effect on usage. Self-efficacy perceptions did not explain any of the variation in usage not explained by skill and intentions.

A comparison of the effectiveness of instructional video and computer-based tutorial

Understanding that one-on-one classroom lecture format training represents a large expense to organizations, Chang (1995) compared the effectiveness of training using instructional video or computer-based tutorial (CBT). His study also evaluated the effect of an individual's visual ability and pretraining motivation to learn on training outcomes. Results suggested that (a) instructional video is much more effective than CBT in training novice computer users, (b) high visual subjects performed better than low visual subjects and developed higher self-efficacy beliefs, (c) high visual subjects were held back by CBT while low visual subjects benefited from CBT, and (d) subjects with high motivation performed better than those with low motivation.

Results using computer based interactive multimedia training

Managers and trainers will find research data from using CBIMT encouraging. Ernst & Young tested students who completed a one-day auditing class with those taking a three-and-a-half-hour desktop program. The results showed that students taking the interactive course scored 20 to 25 percent higher than those having classroom training (Marx, 1995). Burton-Cooper and Burton-Cooper (1995) report that multimedia learning can be achieved 30 percent faster, and performance increased by 25 percent over traditional training methods. They say that experts have found that we retain up to 80 percent of what we see, hear, and do simultaneously. Managers can therefore use interactive multimedia to shorten the training time as employees are likely to absorb information faster and retain it longer than if traditional lecture lab methods are used.

Other training techniques that research indicates are successful

Whether age 18 or 80, putting forth more effort will compensate for less ability. Grades have been shown to equalize when the low-ability student spends one to three hours per week on homework compared to the average-ability student who spends no time on homework according to Gattiker (1992). He has also found that less able students benefit from peer training using computer-aided instruction and that in a cooperative learning environment,

where students study in dyads, they can recall significantly more than those students who studied alone (Gattiker, 1992).

Baird, et al. (1985) believes that learning skills require practice. He found that adults learn more effectively when they have an opportunity to continue their participation in learning experiences when compared with those who do not.

Yoon (1993) investigated the effectiveness of six PC training methods: self-study/tutorial, course/seminar, computer-aided instruction/computer-based instruction, use of videotape, vendor training, and resident expert. He concluded that self-study/tutorial, course/seminar, and resident expert training methods significantly impacted the end-users' success.

Summary

The literature contains a great deal of information on how training can be made more effective. An organization's and an employee's training needs are unique and both must be considered if training is to be effective. Employees are adults. They want to be self-directed, be in control, know the reason for training, and know why training is important.

Several researchers believe that a good way to start building an effective training program is to take the organization's objectives and employees' skill and knowledge level and look for areas where there may be a mismatch. For this to be possible, accurate data on employee competencies must be available. The

ability to track training is not only important for organizational planning, but also to give employees a way to measure their progress.

Involving proficient PC users in a training program is one way to encourage high levels of performance. Another way is through the use of computer-based training (CBT). There are numerous reasons why CBT is a cost effective training method for most organizations. By taking advantage of the network that is usually in place in most large companies, training via a server can be made available to PC users 24 hours a day. Giving PC users a choice of different training methods will help make training more effective.

Learning can be a thrilling experience. The excitement is tied to being able to do something new that is important. An effective training structure will guide PC users to ever higher levels of competence and thereby, help the organization continuously improve performance.

CHAPTER III

METHODOLOGY

Introduction

As operating systems change and applications compete to improve corporate efficiency, management will want to take advantage of these new tools. An understanding of employees skills and knowledge level will help in determining the possible effects of upgrades and changes on an organization's productivity. This information will allow the organization to provide training where needed and thereby, give a cushion against the adverse impact of application changes on productivity. Furthermore, to establish a benchmark from which continuous improvement in computer competency can be measured, it is necessary to know managers' expectations and have an objective way to measure improvement in the level of PC users' skills and knowledge.

This study focused on providing both an analysis of PC users' perceived skills and knowledge level, and a summary of managers' expectations for competency. Managers were asked to indicate on a skill list the competencies they believed an employee should have if the manager were to provide the employee with a PC valued at approximately \$2000. PC users were given a similar skill list and queried on their perceived skills and knowledge. They were

also asked additional questions in an effort to isolate other possible influences on their perceived competency. The data from this input was summarized. The literature was then reviewed to find those training techniques that are both efficient and effective based on the level of expertise and preferences revealed through the survey of the engineering community.

Population and Selection of the Sample

The population of this study was represented by the October 1, 1995 Engineering Organizational Chart total engineering headcount of 224 persons excluding those individuals who do not have a PC available at their workplace and pilot study participants.

Identification of persons who do not use a PC at work was done by first matching the employee name from the organizational chart with the name and Internet protocol (IP) address in the /var/yp/etc/hosts file located on the UNIX Network Information Service (NIS) server. Then, for employee names that were not on this list, verification was done by personally visiting their workplace.

Next, each PC user was made part of one of four groups: primary trained, primary untrained, secondary trained or secondary untrained. Primary PC users were identified by the machine name associated with the IP address and the user's name on the /var/yp/etc/hosts file. Machine names that begin with the letters /wch represent primary PC users. Those primary PC users who were not listed on this file were identified at the time of the personal visit

mentioned in the previous paragraph. Secondary users were those individuals whose names are associated with the headings, (a) admin-users, (b) eis-users and, (c) mech-users in the /var/yp/etc/netgroup file on the NIS server. For the purpose of this study, trained employees had taken Introduction to Windows in the 1995 Engineering PC Training Program. The names of these PC users were taken from the highlighted names on the sign-up sheets and through phone verification.

Development of the Questionnaires

A review of the literature did not reveal a previously designed instrument appropriate for this particular study. Thus, the questionnaires that were used to gather the data to answer the related research questions have been developed by this researcher. The survey instruments aim specifically to access the status of manager expectations and employee perceptions within the engineering department of a consumer electronics company. Clarity and ease of completion were major design goals.

The managers' questionnaire and the first section of the PC users' questionnaire were identical except for the title and instructions. Managers were asked to identify the skills/knowledge they expected employees to have from a list of 31 competencies. These competencies had been derived from the objectives for an introductory class in Windows v3.1 of a local community college and local computer training center. Five additional competencies

thought to be important to this organization were added by EIS support personnel and two engineering managers. PC users were asked to identify the skills/knowledge they had in the same 36 competencies. Section 2 of the PC user questionnaire asked:

1. Do you use a PC more than once a week at home?
2. Are you willing to teach a PC topic to a co-worker?
3. Do you have a clear understanding of the PC skills and knowledge your manager expects you to have?
4. A forced-choice, How frequently do you use Windows at work
5. A forced-choice. What PC training method do you prefer?

These questions were included to gain additional insight into other influences on PC competency.

Pilot Study

A pilot test was conducted in order to obtain constructive comments and/or possible suggestions for improvement before copies of the questionnaire were distributed to the sample. A cover letter and the pilot survey were distributed and collected through interoffice mail on November 8, 1995 to one engineering manager and 16 of his 17 subordinates. The researcher was excluded. The group contained a mix of primary and secondary PC users. The cover letter introduced the questionnaire, related the fact that it was approved, stated that responses would be confidential, and

specified November 15, 1995 as a deadline for returning the survey. A numbering error and spelling error were pointed out by the respondents and have been corrected. One respondent commented that the mastery of the skill should be stressed. A field experiment type study would be required if this research project were to identify mastery of a skill/knowledge, therefore, this suggestion was not incorporated. The form was also improved by placing Yes and No columns with lines for reply in front of the questions rather than boxes after.

Data Collection

The same form of cover letter (see Appendix B) and survey (see Appendix C) that was used in the pilot study was distributed and collected through interoffice mail in January of 1996 to the sample of engineering managers and PC users. Respondents were requested to return the questionnaire by February 15, 1996. Several techniques were used to encourage responses: (a) to distinguish the cover letter from other office communication, printing was on pastel marbleized patterned paper, (b) the night before the "please return by" date, voice mail was left for every non-respondent stressing the importance of their input, (c) a second follow-up cover letter and questionnaire was sent to remaining non-respondents with a personalized handwritten note emphasizing once more the importance of their contribution, and (d) another voice mail reminder was left for the then

remaining non-respondents. Throughout this exercise it became apparent that few secondary PC users were returning their completed questionnaires. A personal visit revealed that generally, this group had so few PC skills/knowledge that they felt uncomfortable completing the survey. When it was explained that only through understanding the current skill/knowledge level could appropriate future training be planned, these employees returned their completed questionnaires.

Data Analysis

The data gathered from the survey was analyzed, reported, and displayed using various descriptive statistics, percentages, t-test, and chi square statistical tests. Results were divided by managers and PC users. A cluster analysis was used to divide the sample into distinct subgroups predicated on similarities and differences with regard to survey responses.

CHAPTER IV

RESEARCH FINDINGS

Introduction

The purpose of this study was to provide a basis for measuring improvement in PC competency among employees within the engineering department of a consumer electronics company and to suggest effective training methods that were likely to help the engineering community continuously improve their PC skills and knowledge. This chapter reports the actual responses to the questionnaires. The evaluation methods are explained, and the results for each survey statement are described.

The October, 1995 engineering organizational chart encompassed 226 members, representing the population contacted for this study. Excluded were the following groups:

Those who left the company	4
Selected subjects of the Pilot Study	17
Those who do not use a PC at work	13

October was chosen as the month for identifying the population for two reasons.

First, because, due to lack of employee interest, Windows v3.1 Level 1 -

Introductory training classes scheduled for the remainder of 1995 were canceled in October and secondly, because no other PC training classes were offered by

the engineering organization from January through March, 1996. This point is important for research purposes in keeping identifiable groups of: (a) trained-primary, (b) untrained-primary, (c) trained secondary, and (d) untrained secondary PC users.

Response to the Questionnaires

Two surveys (see Appendix C) were used in this study. The Planning Engineering PC Training Manager Questionnaire was distributed to 17 managers and the Planning Engineering PC Training Questionnaire was distributed to 173 non-manager PC users, in February, 1996. Fifteen managers (88%) and 155 PC users (90%) responded.

Managers' Questionnaire

In order for training within an organization to be effective, it was hypothesized that the manager, the instructor, and the trainee must have clear objectives for performance improvement and that these objectives could be determined by asking managers which computer competencies they considered important. Expectation for competency was broken down into 31 skills and knowledge when using Windows v3.1 at an introductory level, and another five basic skills and knowledge that were unique to this organization. Figure 1, Determining Performance Improvement Objectives, illustrates the relationship

between skill/knowledge, competency, and objectives as they relate to improving performance.

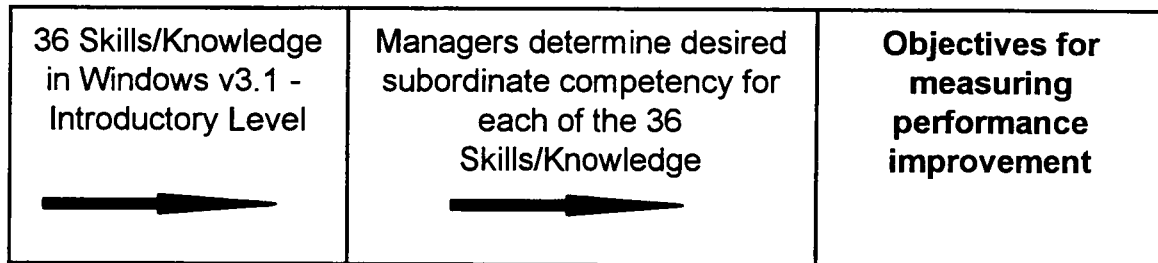


Figure 1 Determining Performance Improvement Objectives

The managers' questionnaire was specifically designed to answer the first question of this study which aimed at determining what computer competencies managers expected from their subordinates. Managers were asked to indicate either yes or no to 36 skills or knowledge statements. Instructions on this questionnaire were as follows:

"You plan to provide an employee with a PC valued at approximately \$2,000. If you want this employee to have a Windows skill or knowledge please check in the Yes column, otherwise check No."

PC Users' Questionnaire

The Planning Engineering PC Training Questionnaire was used to help answer research questions two through seven that focus on PC users' perceived competency level. It was anticipated that this information together with data from

the manager's questionnaire might reveal any gap between current manager expectation and current PC user competency. First, PC users were asked to confirm or negate their perceived ability in the same 36 skills and knowledge that were included in the managers' questionnaire. Then, additional information was requested to help in understanding if other elements significantly influence PC competency.

Results

This section reports, using statistical tests in percentages, chi square, and the t-test, significant results of the attitudinal survey. The first question in this study directly relates to gathering information that could be used to (a) establish a standard for PC competency in Windows v3.1 at the introductory level, (b) measure current employee competencies, and (c) set objectives for future performance improvement.

Managers' expectations

With 88 percent of surveyed managers responding, overall managers replied that they expected PC users to have 85 percent of the competencies listed in the Planning Engineering PC Training - Manager Questionnaire. Figure 2, Managers' Expectations for Competency in Skills/Knowledge 1 - 31, summarizes expectation for competency in 31 skills/knowledge at the introductory level of Windows v3.1. Managers' views on the value of these

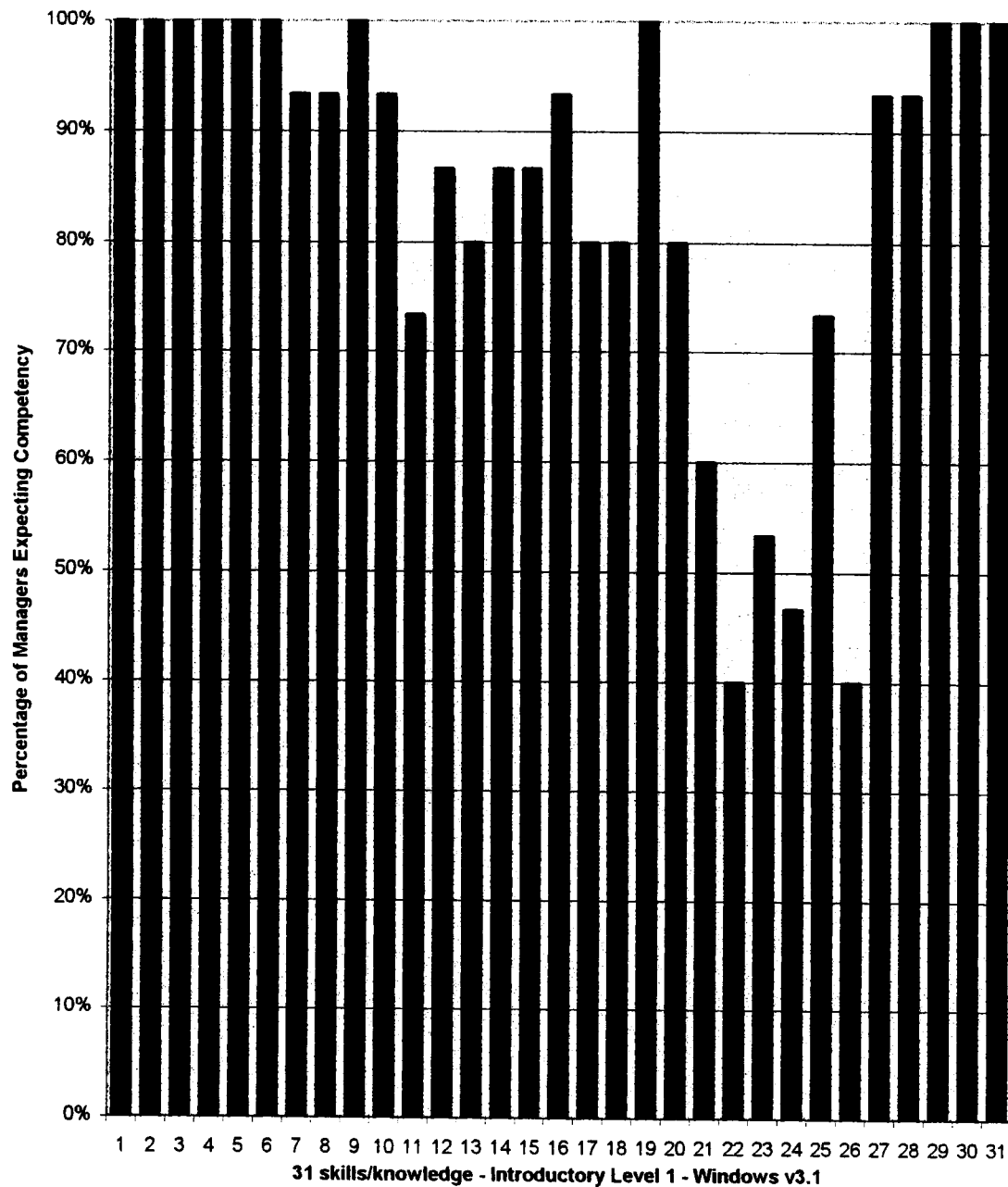


Figure 2 Managers' Expectations for Competency in Skills/Knowledge 1 - 31

competencies ranges from 40 to 100 percent. Total agreement among managers occurs 11 times. The 36 specific competency statements can be found by referring to pages 57 and 58.

All managers want their subordinates to understand Windows terminology (1) and to understand how to start Windows (2). Once in Windows, they also expect a PC user to be able to move, resize and scroll windows (5 & 6), use icons and pull-down menus (4), and use the mouse (3). Managers also unanimously agreed on the importance of being able to use the Print Manager (19) and the value of competence in selecting, copying (29), deleting (30), and moving files (31). Managers were in least agreement regarding the need for subordinates to be able to use Cardfile (40%), Character Map (40%) or User Notepad (47%). Less than one half of all managers saw these competencies as essential.

Figure 3, Managers' Expectations for Competency in Skills/Knowledge 32 - 36 reports findings for skills/knowledge that were included at the request of PC support personnel and two managers responsible for computer support and quality standards respectively within the engineering organization. Surveyed managers' expectations for competency in skills and knowledge 32 - 36 range from 73 to 93 percent.

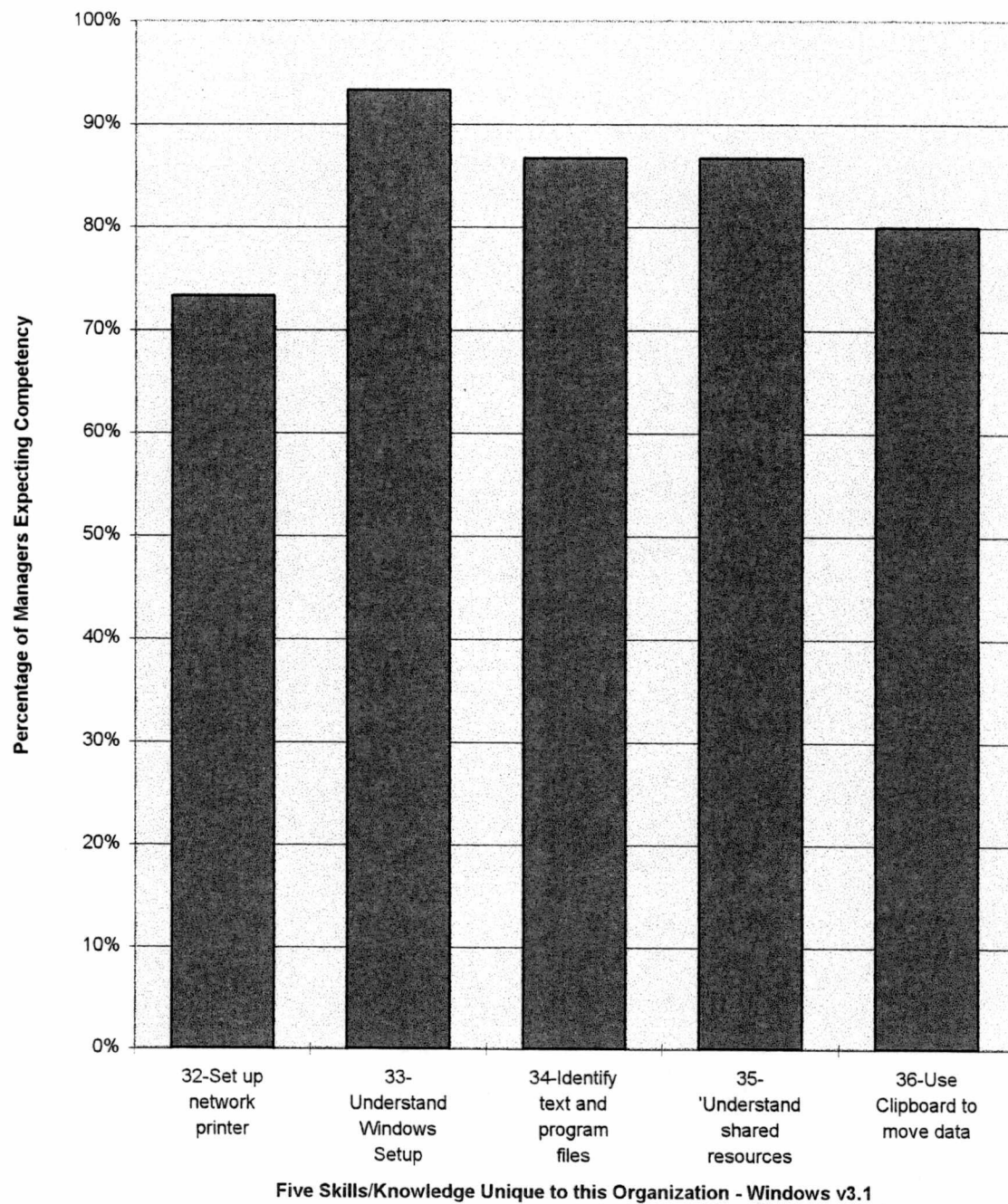


Figure 3 Managers' Expectations for Competency in Skills/Knowledge 32 - 36

Perceived level of competence

With 90 percent of the surveyed PC users responding, perceived competency for the 36 skills and knowledge using Windows v3.1 at the introductory level ranges from a low of 37 percent for "Use the Print Manager" (#19), to a high of 95 percent for "Use the mouse" (#3). Figure 4, PC Users' Perceived Competency Level in Skills/Knowledge 1 - 31, details the percent of the sample's perceived competency on the first 31 items. Competency within engineering for items 32 - 36, that were thought to be important by those who support PC users within this organizations, is illustrated in Figure 5, PC Users' Positive Perception for Competency in Skills/Knowledge 32 - 36. The highest ranked competency (65%) was "Identify text and program files" (#34). Less than half felt they were able to "Set up network printer" (#32) or "Understand Windows Setup" (#33). Overall, survey data revealed that these subordinates, as a group, did not perceive themselves as having the competencies managers' expect.

Table 1, A Comparison of Managers' Expectations and PC Users' Perceived Competency using Windows v3.1 Level 1 - Introductory, shows that there is a gap between managers' expectations and PC users' perceived competency level in all 36 skills/knowledge. The difference ranges from a negative 24 percent, where PC users surpass managers' expectations, to a positive 63 percent, where managers' expectations are higher than subordinates' perceived competency level. PC users exceed managers' expectation six times; five times for objectives under the heading, Desktop Accessories. The data

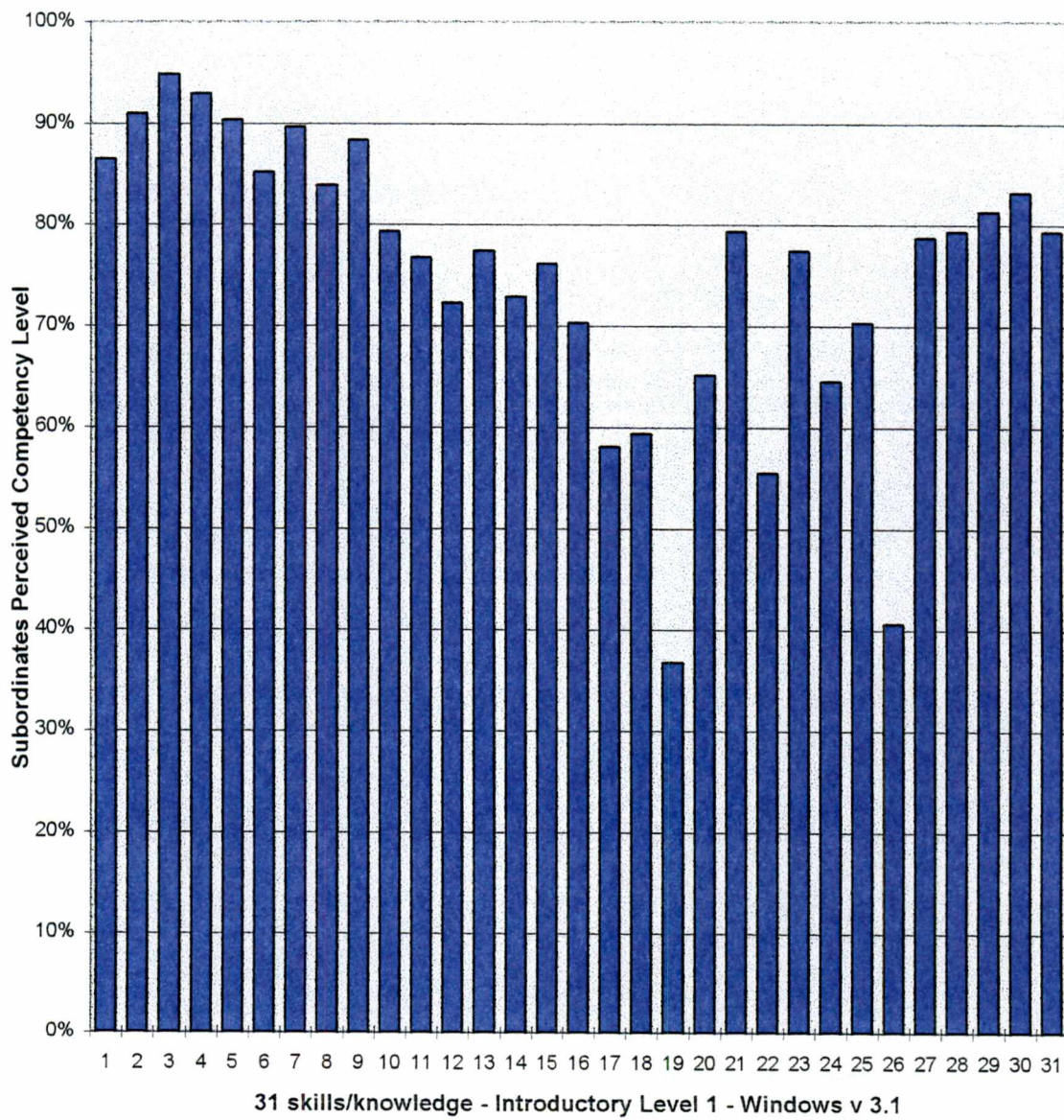


Figure 4 PC Users' Perceived Competency Level in Skills/Knowledge 1 - 31

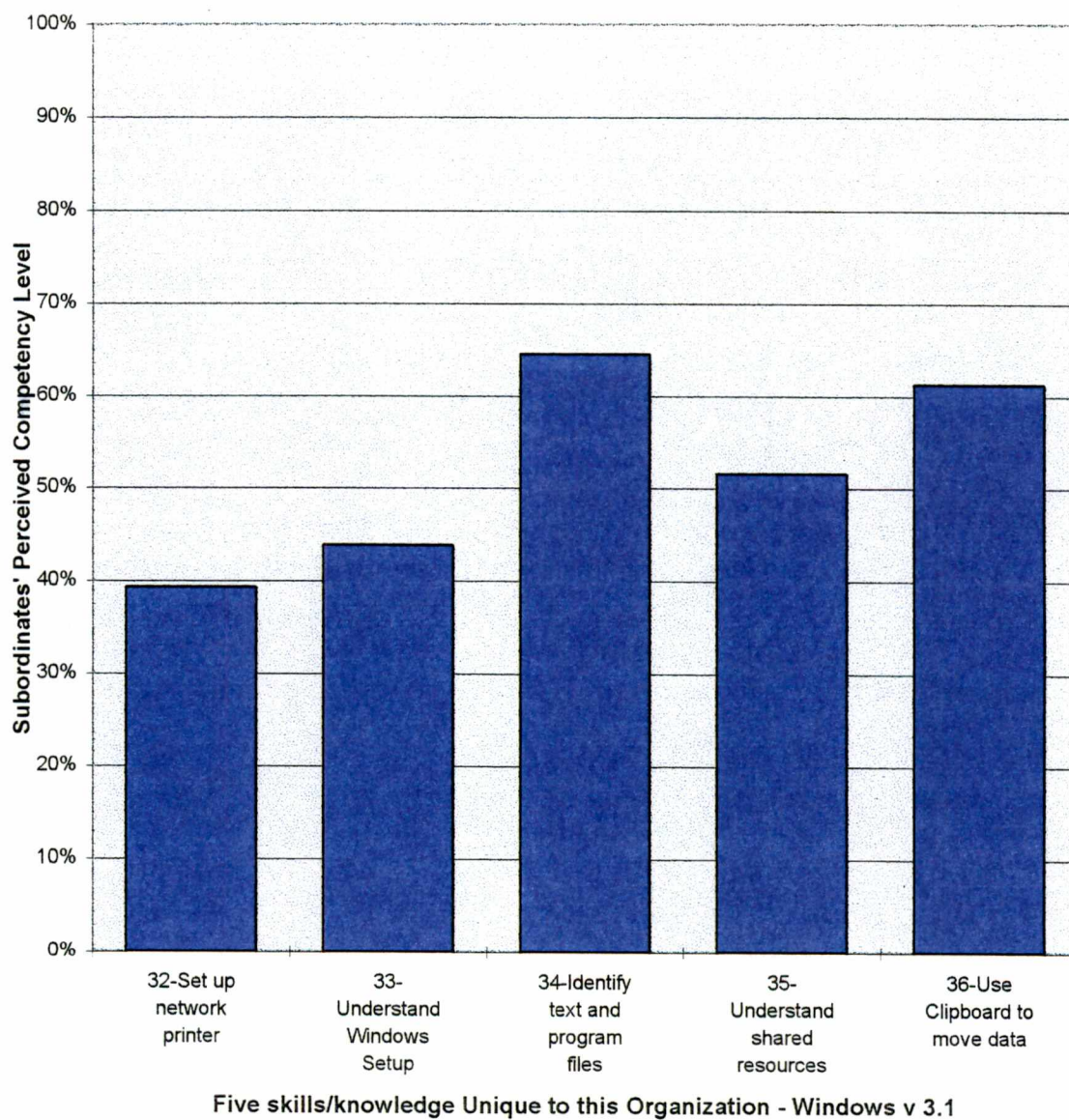


Figure 5 PC Users' Perceived Competency Level in Skill/Knowledge 32 - 36

Table 1

A Comparison of Managers' Expectations and PC Users' Perceived Competencies using Windows v3.1 Level 1 - Introductory

Skill and Knowledge Level					Difference	Chi square Value
		Managers' Expectations (N = 15)	Subordinates' Perceptions (N = 155)			
Using Windows						
1	Understand Windows terminology	100%	86%	14%		
2	Start Windows	100%	91%	9%		
3	Use the mouse	100%	95%	5%		
4	Use Icons and pull-down menus	100%	93%	7%		
5	Move and resize windows	100%	90%	10%		
6	Scroll windows	100%	85%	15%		
7	Minimize and maximize windows	93%	90%	3%		
8	Use the On-Line Help system	93%	84%	9%		
9	Stop Windows	100%	88%	12%		
User Preferences The Control Panel						
10	Scroll windows	93%	79%	14%		n.s
11	Set the colors of the screen	73%	77%	-4%		n.s
12	Change the stored time and day	87%	72%	15%		n.s
13	Adjust the keyboard and mouse speeds	80%	77%	3%		n.s
14	Adjust the desktop options	87%	73%	14%		n.s
15	Adjust the fonts	87%	76%	11%		n.s
Running Applications						
16	Understand the functions of the Prog. Manager	93%	70%	23%		n.s
17	Understand how Program Groups are assigned	80%	58%	22%		n.s
18	Understand how Program Icons are organized	80%	59%	21%		n.s

Table 1., Cont.

A Comparison of Managers' Expectations and PC Users' Perceived Competencies using Windows v3.1 Level 1 - Introductory

		Skill and Knowledge Level		Difference	Chi square Value
		Manager's Expectations (N = 15)	PC User's Perceptions (N = 155)		
Printing					
19	Use the Print Manager	100%	37%	63%	n.s
20	Control print jobs	80%	65%	15%	
Desktop Accessories					
21	Use the Calculator	60%	79%	-19%	n.s
22	Use the Cardfile	40%	55%	-15%	n.s
23	Use the Clock	53%	77%	-24%	4.27*
24	Use the Notepad	47%	65%	-18%	n.s
25	Use the Calendar	73%	70%	3%	n.s
26	Use the Character Map	40%	41%	-1%	n.s
File					
27	Use the File	93%	79%	14%	
28	Format diskettes	93%	79%	14%	
29	Select and copy files	100%	81%	19%	
30	Select and delete files	100%	83%	17%	
31	Select and move files	100%	79%	21%	
PCEC					
32	Set up network printer	73%	39%	34%	6.47*
33	Understand do's & don'ts of Windows Setup	93%	44%	49%	n.s
34	Identify text and program files	87%	65%	22%	
35	Understand the concept of shared resources	87%	52%	35%	6.78*
36	Use Clipboard to move data between applications	80%	61%	19%	n.s

* p<.05

indicate that many PC users have improved their skills and knowledge beyond what managers deem necessary for some items and yet do not have other abilities thought important by most managers. To determine whether these results were actually statistically significant, the following null hypothesis was introduced.

Hypothesis 1.

There is no significant difference in users' perceived ability and managers' expectations for competency in any of the 36 skills or knowledge statements relating to Windows v3.1 - Introductory.

A two-dimensional chi square test was performed using manager and subordinate "yes" and "no" responses for each of the 36 skills/knowledge listed in Table 1; thus, the contingency table had two rows and two columns. To determine whether the differences between observed and expected frequencies were significant, a probability level of .05 and one degree of freedom were used. The null hypothesis was rejected because, as Table 1 shows in bold format, three items were found to be statistically significant. These were:

- 23 Use the Clock
- 32 Set up network printer
- 35 Understand the concept of shared resources

It should be noted that two of the significant differences (32 and 35) are skills and knowledge unique to this organization.

Question 2 was included to help determine if the managers' expectations are reflected in subordinates' competency levels. Because questionnaire results showed that there was a considerable difference between managers' expectations and subordinates' perceived ability and it was found through the chi square tests that some of these differences were significant, a more detailed investigation attempted to disclose the impact, if any, of training and non-training on primary and secondary PC users.

Perceived level of competence of trained primary and secondary users

Of those who were trained in 1995, nine (90%) Primary (those who use PC hardware and software) and nine (90%) Secondary PC users (those who use a PC emulator on a UNIX workstation) responded. The Primary PC users had a perceived competency level of 70 percent and the Secondary PC users 69 percent. It would appear that these two groups have very similar perceptions of their overall ability level.

Perceived level of competence of untrained primary and secondary users

Among those who did not take Introduction to Windows v3.1 training in 1995, the perceived competency level for Primary PC users was 82 percent with 111 (93%) responding. The 26 (100%) Secondary PC users who responded had a 33 percent perceived competency level. Untrained primary PC users have a competency level of almost two and a half times that of untrained secondary PC

users. Figure 6, PC Users Perceived Competency by Platform and Training Participation shows the relationships of skill and knowledge among the four groups just discussed: trained primary, not trained primary, trained secondary, and not trained secondary PC users.

Hypothesis 2.

There is no significant difference in users' perceived competency level between those who use a computer more than once a week at home and those who do not.

A t-test for independent samples was used to determine whether the two means (the perceived competency level of those who use a computer more than once a week at home and those who do not) were significantly different. Table 2., PC Users' Perceived Competency Level Based on Home Computer Use, illustrates findings when using a probability level of .05 and 151 degrees of freedom. The computed t-value was 6.0 and the t-critical value was 1.9. Therefore, the null hypothesis for this question was rejected. There was a significant difference in the perceived competency level of those who used a PC more than once a week at home and those who did not. This evidence confirms what seems reasonable to expect -- those who perceive themselves to be more competent also use their home computer more frequently than those who see themselves as less competent. Frequent use of a PC at home significantly affects a PC user's perceived competency level.

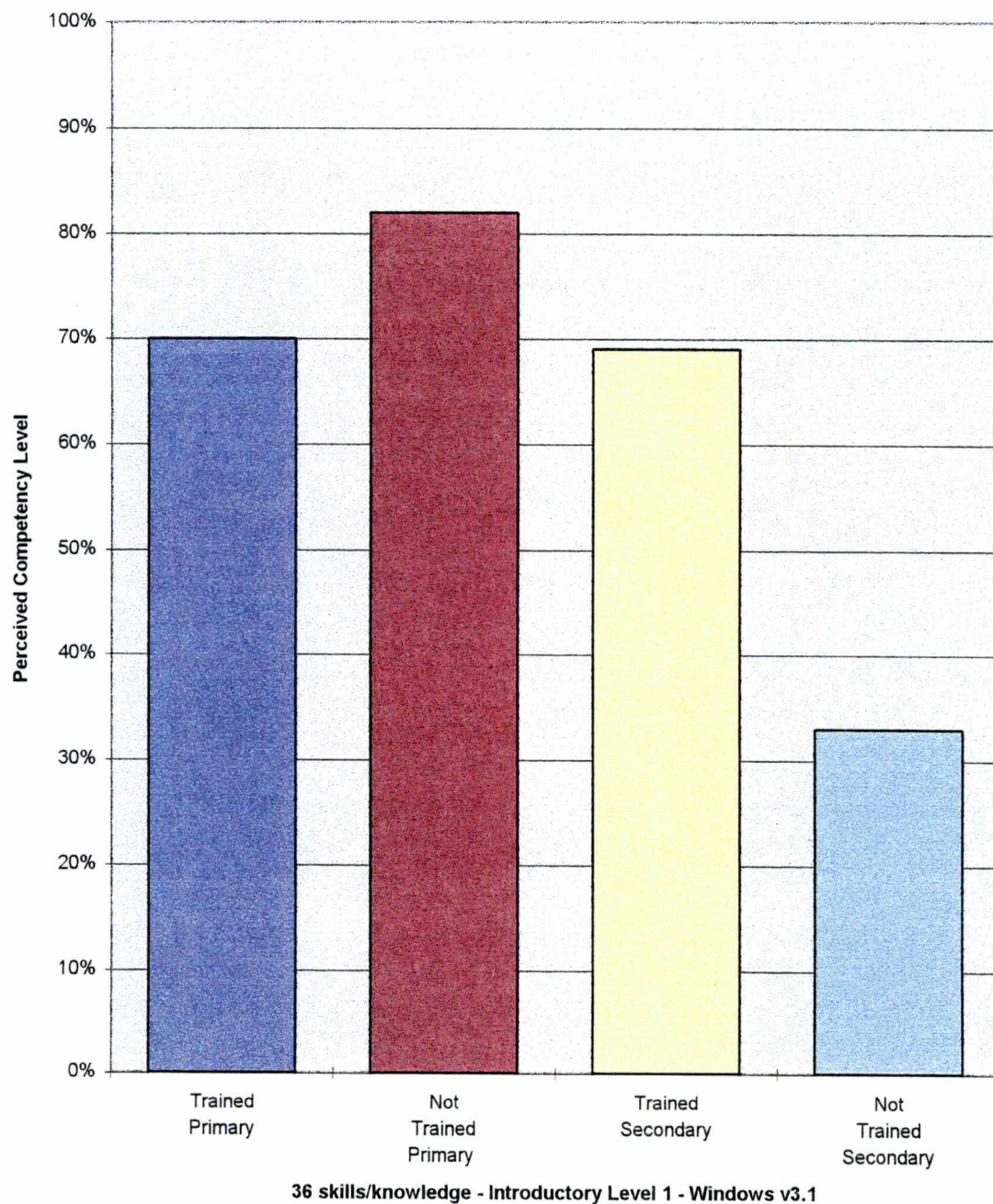


Figure 6 PC Users' Perceived Competency by Platform and Training Participation

Table 2

PC Users' Perceived Competency Level Based on Home Computer Use

	Mean	s.d	t
Use a PC more than once a week at home (n=94)	30.2	7.4	6.0*
Do not use more than once a week at home (n=59)	20.6	12.1	

* p<.05

Volunteer peer group instruction/mentoring

From 155 PC user respondents, 36 (23%) indicated that they would be willing to teach a PC topic to a co-worker. Overall these volunteers' perceived competency level in Windows v3.1 at the introductory level was 93 percent. Nine respondents did not reply to this question and 110 gave a negative response. Those who did not wish to teach a PC topic perceived themselves to have a competency level of 69 percent. Table 3, A Comparison of Perceived Competency Between PC Users Who Volunteered to Teach a PC Topic and Those Who Did Not, shows the difference between those who indicated that they were willing to teach a co-worker and those who did not. In every skill/knowledge volunteers considered themselves more competent than did non-volunteers. To

Table 3

A Comparison of Perceived Competency between PC Users Who Volunteered to Teach a PC Topic and Those Who Did Not

		Skill and Knowledge Level		Difference	Chi square Value
		Volunteer Perceptions (N = 36)	Non-Volunteer Perceptions (N = 110)		
Using Windows					
1	Understand Windows terminology	97%	84%	13%	
2	Start Windows	100%	89%	11%	
3	Use the mouse	100%	95%	5%	n.s
4	Use Icons and pull-down menus	100%	92%	8%	n.s
5	Move and resize windows	100%	89%	11%	
6	Scroll windows	100%	83%	17%	
7	Minimize and maximize windows	100%	87%	13%	
8	Use the On-Line Help system	100%	79%	21%	
9	Stop Windows	100%	85%	15%	
User Preferences The Control Panel					
10	Scroll windows	100%	75%	25%	
11	Set the colors of the screen	97%	70%	27%	
12	Change the stored time and day	92%	66%	26%	8.73*
13	Adjust the keyboard and mouse speeds	94%	72%	22%	
14	Adjust the desktop options	94%	65%	29%	
15	Adjust the fonts	92%	72%	20%	5.98*
Running Applications					
16	Understand the functions of the Prog. Manager	94%	65%	29%	
17	Understand how Program Groups are assigned	86%	51%	35%	13.96*
18	Understand how Program Icons are organized	86%	52%	34%	13.32*

Table 3., Cont.

A Comparison of Perceived Competency between PC Users Who Volunteered to Teach a PC Topic and Those Who Did Not

Skill and Knowledge Level				
	Volunteer Perceptions (N = 36)	Non-Volunteer Perceptions (N = 110)	Difference	Chi square Value
Printing				
19	Use the Print Manager	94%	67%	27%
20	Control print jobs	86%	60%	26%
Desktop Accessories				
21	Use the Calculator	86%	78%	8%
22	Use the Cardfile	67%	54%	13%
23	Use the Clock	92%	75%	17%
24	Use the Notepad	83%	60%	23%
25	Use the Calendar	81%	69%	12%
26	Use the Character Map	61%	35%	26%
File				
27	Use the File	100%	73%	27%
28	Format diskettes	97%	75%	22%
29	Select and copy files	100%	76%	24%
30	Select and delete files	100%	78%	22%
31	Select and move files	100%	74%	26%
PCEC				
32	Set up network printer	58%	35%	23%
33	Understand do's & don'ts of Windows Setup	69%	37%	32%
34	Identify text and program files	86%	59%	27%
35	Understand the concept of shared resources	83%	44%	39%
36	Use Clipboard to move data between applications	86%	55%	31%

* p<.05

determine if there was a statistically significant difference in the perceived ability level of those who volunteered to teach and those who did not, the following null hypothesis was set forth.

Hypothesis 3.

There is no significant difference in the perceived ability of those PC users who were willing to teach a PC topic and those who were not.

A two-dimensional chi square test was performed using volunteer and non-volunteer "yes" and "no" responses for each of the 36 skills/knowledge. A probability level of .05 and one degree of freedom were used to determine whether the differences between observed and expected frequencies were significant. Results indicated that the null hypothesis should be rejected. In Table 3 bold format was used to convey where the chi square test disclosed that volunteers perceived themselves as being significantly more proficient than non-volunteers. No significant difference between volunteers and non-volunteers was found in (a) Use the mouse, (b) Use Icons and pull-down menus, (c) Use the Calculator, (d) Use the Cardfile and (e) Use the Calendar. See Appendix D. for respondents' comments related to what they see as their area of expertise.

Hypothesis 4.

There is no significant difference in users' perceived competency level between those who have a clear understanding of their manager's expectations of their skills and knowledge and those who do not?

Again, a t-test for independent samples was used to determine whether the two means (the perceived competency level of those who believe that they understand their managers' expectations and those who do not) were significantly different. From the 155 respondents to the Planning Engineering PC Training Questionnaire, 12 chose not to answer this question. Table 4, Competency Level With and Without a Clear Understanding of Manager's Expectations, illustrates results when using a probability level of .05 and 141 degrees of freedom (143 respondents less 2 groups). The computed t-value was 9.3 and the t-critical for a two-tailed test was 1.9. Therefore, the null hypothesis for this question was rejected. There was a significant difference in the perceived competency level PC users who had a clear understanding of their manager's expectations for PC competence and those who did not. When managers were clear about their expectations for computer skills or knowledge, there was a significant positive effect on PC users' perceived competency level.

Table 4

Competency Level With and Without a Clear Understanding of Managers' Expectations

	Mean	s.d.	t
PC user with a clear understanding of expectations (n=89)	31.7	6.3	9.3*
PC user without a clear understanding of expectations (n=54)	18.2	10.9	

* $p < .05$

Hypothesis 5.

There is no significant difference in users' perceived competency level between those who use Windows v3.1 almost every day, at least once a week, or less than once a week.

There were 150 responses to this question. The majority, 115, used Windows v3.1 almost every day. Only nine respondents used Windows at least once a week, 26 used Windows less than once a week, and two never used Windows. Because of the imbalance in the number of replies for each category, these data were collapsed into two groups: those who used Windows almost every day (115) and those who used Windows once a week or less (35).

A t-test for independent samples was used to determine whether the two means (using windows almost every day and using Windows once a week or

less) were significantly different. Table 5, Using Windows at Work and Users' Perceived Competency Level, depicts results when using a probability level of .05 and 148 degrees of freedom (150 respondents less 2 groups). The computed t-value is 8.6 and the t-critical was 1.9. Therefore, the null hypothesis for this question was rejected. There was a significant difference in the perceived competency level between PC users who used Windows v3.1 almost every day and those who did not. As one might expect, PC users' considered themselves more competent when they use Windows on a daily basis.

Table 5

Using Windows at Work and Users' Perceived Competency Level

	Mean	s.d.	t
Using Windows at work almost every day (n=115)	30.2	7.0	8.6*
Using Windows at work once a week or less (n=35)	16.4	11.6	

* p<.05

Preferred PC training methods

All PC users' surveyed replied to this question. Training method preferences were as follows: (a) traditional lecture/lab was preferred by 42

percent, (b) one-to-one instruction-tutorial by 31 percent, (c) self-paced computer-based instruction by 22 percent, and (d) video-based instruction by 5 percent of the respondents. Figure 7, Preferred PC Training Methods, illustrates these results.

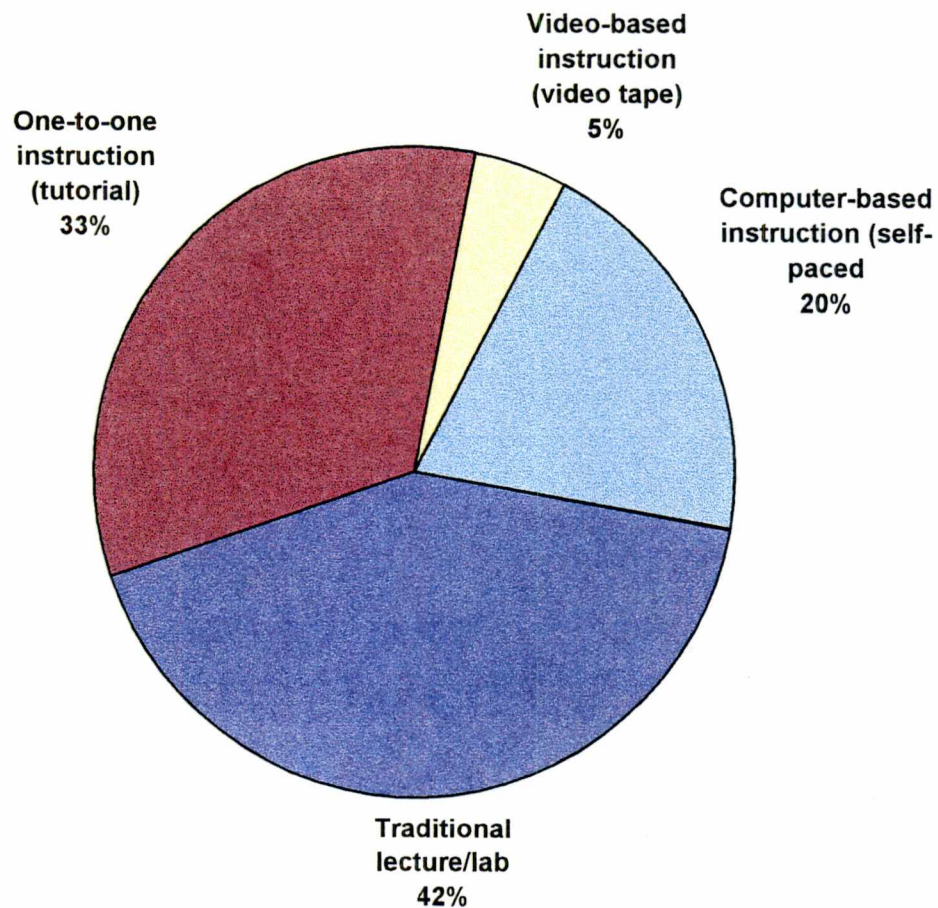


Figure 7 Preferred PC Training Methods

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Introduction

When adults pay in both time and money for a class, it can be expected that the reason is for self-improvement; in an organization where company resources are absorbed for training, the reason behind why training is provided and how training is provided directly affects performance improvement and consequently, the ability to effectively compete. Standards based on organizational objectives are a good way to enable employees to measure their progress toward self-improvement that leads to improved organizational performance.

This study examined a training program where organizational objectives dependent on training were not known, where managers' expectations for PC competency were not known, where a needs analysis was not done, and where participants' competency levels were not known prior to or following training. The purpose of this study was to take a basic ability that is found in most businesses today -- that of using the PC application, Windows v3.1 at a introductory level, and attempt to determine (a) what standards of competence managers expect, (b) the perceived competency level of subordinates, and (c) what other influences might impact subordinate PC competence. To provide

information that was likely to help make training within this organization more effective, the literature was reviewed with emphasis on what other large companies were doing to train computer users and how to enhance the benefits of training by considering the needs of the organization's adult community.

Findings and Conclusions

Managers' and PC users' questionnaire

Managers' expectations and subordinates' perceptions

Managers have a high level of agreement (85%) among themselves on the basic skills and knowledge an employee should have when the organization provides these individuals with a personal computer. Their subordinates currently see themselves as having about 72% of these same competencies. Expectations and perceptions are most closely aligned in categories "Using Windows", "User Preferences- The Control Panel", and "File".

A closer look at results shows that of the 36 skills/knowledge that were considered, all managers agreed that 11 should be required but there was no perfect score for any skill/knowledge on their subordinates' side to match this expectation. Managers are least interested in their employees having competency in "Desktop Accessories" (21-26) yet, surprisingly, only here and for "Set the colors of the screen" (11) do subordinates exceed managers' expectations.

Managers were not in wholehearted agreement that the five skills/knowledge under the heading PCEC were important, and PC users perceived themselves as a group, to be well below what managers do expect. For example, fewer than 40 percent were able to set up a network printer (32). These abilities are not usually a part of an introductory level Windows v3.1 training class, yet they were included in the questionnaire because key managers and computer support personnel considered them important.

Particularly interesting were the findings related to skill/knowledge 19, "Use the Print Manager." Here 100 percent of the managers who were surveyed agreed on its importance, yet only 37 percent of PC users perceived themselves to have this competency; this skill/knowledge had the fewest PC users who saw themselves as competent.

Chi square statistical tests were utilized on the data from questions 1 - 36. Significant differences between managers' expectations and subordinates' perceptions were found in "Use the Clock" (23), "Set up network printer" (32) and "Understand the concept of shared resources" (35). Others appeared to be significant but failed to meet criteria for a chi square statistical test. These were "Use the Print Manager" (19), and "Understand do's & don'ts of Windows Setup" (33).

Perceived competency of trained/untrained - primary/secondary PC users

Analysis of the data received from respondents revealed that the highest perceived competency level was for non-trained primary users (82%) and that the lowest was for non-trained secondary users (33%). Trained primary and secondary PC users as a group had almost identical perceptions of competence, 70 and 69 percent respectively.

Because untrained primary PC users see themselves as more competent than trained primary PC users, it can not be concluded that training for Introductory Level 1 - Windows v3.1 in 1995 benefited this organization. On the other hand, both trained primary and secondary PC users perceived themselves as being almost equally competent and significantly more competent than untrained secondary PC users. This would lead one to believe that training directly affected PC users' perception of competence; however, it is also possible that trained personnel were competent in the skills/knowledge taught prior to training. Without measurement of subordinates' skill and knowledge perceptions before training, the effectiveness of training cannot be determined.

Perceived competency and home computer use

It is not surprising that home computer use has a positive effect on subordinates perception of PC competence. In fact, just using a computer more than one time a week at home significantly affects PC users' perception of their competency level.

Volunteer peer group instruction/mentoring

It was found that proficient PC users within engineering were willing to help co-workers improve their PC competency level. They were not only willing to volunteer, but they saw themselves as having an overall 93 percent perceived competence level. The chi square statistical tests show that in 13 of the 36 skills/knowledge, volunteers perceived themselves to be significantly more competent than non-volunteers. Eighteen other skills/knowledge appeared to be significant, but failed to meet criteria for a chi square statistical test. There were five skills/knowledge areas where there was no significant statistical difference between volunteer and non-volunteer perceptions. Two of these were in tasks, "Use the mouse" (3) and "Use Icons and pull-down menus" (4) where non-volunteers had their highest perception of competence. The other three were "Use the Calculator" (21), "Use the Cardfile" (22), and "Use the Calendar" (25).

Based on these findings it seems reasonable to assume that volunteers have accurately assessed their proficiency. This is not surprising. Rozsnyai-England (1994) reports that research by Somers and Birnbaum indicated that when employees self-rate themselves for performance appraisal purposes the self-ratings were the same as manager ratings, and overall there was no evidence of leniency error.

The "Planning Engineering PC Training Questionnaire", question 38, asked the volunteer to describe the topic s/he would be willing to teach. These

comments (see Appendix D, Subordinate Comments) suggest that help is available for:

DOS	Windows	Windows 95	Excel	Lotus
Word	Powerpoint	Paintbrush	Any Windows	Non-Windows

Perceived competency and understanding managers' expectations

Employees who had a clear understanding of their manager's expectations perceived themselves to be significantly more competent than those who did not. When subordinates believed they knew what was expected they may have allowed more time for activities that their manager considered important. It is also likely that those who report to a manager who views PC competency in Windows as fundamental to satisfactory job performance, will apply themselves to gaining these skills/knowledge.

From a manager's comment (see Appendix D) additional detail about at least one view on giving subordinates measurable performance objectives was disclosed. The comment, "it looks like most of the skills would be required." seems at first glance like a reasonable statement. However, it may be just this subjective opinion of managers and subordinates that leads some subordinates to see themselves as proficient in areas that managers consider unimportant and vice versa -- lacking in competencies that managers felt necessary. This condition warns of the consequence of such confusion: time, money, and effort

expended to improve skills/knowledge areas that were not connected to meeting the organization's business objectives.

Perceived competency and frequency of Windows use

PC users who use Windows on a near daily basis rather than once a week or less perceived themselves to be significantly more competent than those who did not. A respondent's comment (see Appendix D, Subordinates' Comments) to question 40 on the "Planning Engineering PC Training Questionnaire" stated that some employees were still using only DOS applications and not Windows v3.1. It is unclear why the newer Windows technology was not being used by this group. However, one might conclude that lack of proficiency discourages the use of Windows. Moreover, for the first time the company is in a position to identify perceived skill levels of its employees and to target training to those who are failing to use the new technology.

Preferred training methods

There was broad variation in PC users' preference for learning method although traditional lecture/lab (42%) was a clear favorite. In addition to the restricted choices provided in the "Planning Engineering PC Training Questionnaire", employees wrote in comments (see Appendix D, Subordinate Comments) stating a preference for using a book. Tutorial (33%) and computer-based instruction (20%) accounted for over half the responses; it may be of

some significance that only five percent wanted to learn using video-based instruction.

This information points to the need for resources to give employees options other than that of attending formally scheduled training classes. In fact, one comment indicated a preference for learning:

“ . . .at my leisure on the porch in a comfortable chair!”

This approach is likely to be endorsed not only by this user, but by the manager as well.

Effective training

In some organizations, responsibility for PC training “drifts” among the human resources department, the manager, the PC user, and computer support personnel. Under these somewhat loose conditions, the unit that has funds for training probably pays -- with the power of the purse may also come the power of deciding to whom, how, and where training will be provided. Frequently PC training can be generic and conducted in a lecture/lab format by external training specialists. This method may temporarily silence employee complaints regarding training, but at a high price that is unlikely to provide a well defined, coordinated program leading to continuous improvement.

The literature provided information about how to make training more effective. The training technique repeatedly emphasized was to ensure that training supports an organization’s business objectives. Without this foundation,

training may provide continuous improvement in a direction that not only does not support organizational objectives but, because of its drain on resources, such as time and money, could actually have an overall negative impact. With organizational objectives as the focus, standards can be established by which the organization, function, or employee can measure progress. Training is then designed to correct deficiencies in meeting the standard, and training programs are directly beneficial in helping the organization achieve business results. Management should also use caution when investing in training by carefully choosing training that leverages the company's investment in computer technology.

Although there are varying opinions about how training programs should be initiated, there is strong evidence that a democratic culture encourages high performance in an organization. Giving employees training choices appears to encourage personal responsibility for learning outcomes, and is one way to stimulate continuous learning and consequent continuous improvement within an organization. Another technique that is critical to effective training is to ensure that trainees get feedback on their performance after their training is completed.

Effective training includes seeing that PC users have basis skills, such as typing, are trained sequentially, in stages, and with peers. To maximize the benefits of training, employees must understand the importance of training, be involved in the training design and be able to track their own progress. Proficient

PC users should be recognized; they can be an excellent role model and a valuable resource in providing training to others.

Computer-based training (CBT) provides numerous benefits both in time and cost savings. This training method is recommended because it is individualized to such extent that the employee is self sufficient, is trained consistently by a subject matter expert, and can pick a convenient time to train. Training time is shortened using CBT and it is more effective at transferring relevant knowledge to the workplace. A resource center can readily provide material for CBT and can be retrieved by a prospective user when needed. Thus for the 20 percent who identified CBT as their preferred method for receiving training, this becomes a viable option.

Organizations with established networks may want to consider putting training courses on a server for access by PC clients. In this manner, training is easily kept current with the same training being readily available to all PC users at the same time. This method might be considered when a large corporation wants to share information or training with employees in a dispersed environment such as in a global corporation. Some companies are looking to the World Wide Web as a way of providing cost effective and interactive training.

Training and training programs need to be monitored. It may be easy to slip back into the type of training that only meets skill requirements rather than fulfilling a real organizational need. Accurate training records will help an

organization as well as individual employee keep track of where they are and where they want to be.

Characteristics of adult learners

The review of recent literature revealed several characteristics of the adult learner that managers may want to consider when developing training programs. Taking a holistic view is critical to developing an efficient and effective learning environment because there are many factors that influence the adult learner.

For example, age is not likely to affect the employee's intellectual ability to acquire computer skills; however, conveying the importance and the reasons for instruction -- especially to those who have longer tenure -- will help motivate the adult learner to invest the time and effort to acquire computer skills that will be beneficial to the organization. Furthermore, self-esteem is vital to success in learning, and can be enhanced by positive feedback from both the manager and the instructor. Retention of new information is more likely if training is problem centered and directly related to specific job tasks. Handouts or workbooks are critical if skill/knowledge introduced in a classroom are to be transferred to the workplace.

Adult learners will gain more from computer instruction if: (a) the organization and the class have clear learning objectives, (b) employees are permitted to select the instructional method, and (c) the learning environment is relaxed and nonthreatening. When instruction is at the introductory level, a

pedagogical approach is likely to be preferred by older adults. Most adults who are past the introductory level of instruction want control over their own learning and choose to be self-directed. Hence, a readily available resource person with a broad range of learning aids suitable to various learning styles will enable employees to move forward at their own pace and not be as dependent on officially scheduled training classes.

Many studies show that computer-based interactive multimedia training can help employees learn faster and perform better than traditional classroom training methods. Yet other research points to end-users who are more successful using self-study/tutorial, course/seminar, and resident expert training methods. Regardless of the method used, as computer skills are developed, employees will make more use of their computers.

To maximize the benefits from an investment in computers, organizations should ensure that all targeted computer users have the minimum skills required to effectively use this tool. For training programs to be effective, managers should understand the demographics of the community they intend to instruct, and how individuals with these characteristics are likely to respond to a particular training program. Most investors would be very interested if they were told that, by changing strategies their return-on-investment would improve by 20 to 30 percent -- this type of improvement is reasonable to expect if the characteristics of the adult learner are considered when providing training in an organizational context.

Recommendations

The first purpose of this study was to provide a basis for measuring improvement in PC competency. Because Windows v3.1 was being used by the majority of this organization's PC users and because it is an interface to most other applications, a good place to begin measuring competency seemed to be for these skills and knowledge at the introductory level. To find a standard by which to measure PC competency, through a questionnaire managers were asked to indicate their expectations. A subordinates' questionnaire was then used to query PC users about their perceived competencies in the same skills and knowledge areas. The following is a list of recommendations based on the results of these two questionnaires:

- 1.) Managers need to come to agreement on the basic skills/knowledge their employees should have when employees are provided with a PC.
- 2.) This information should be given to each PC or PC emulator user.
- 3.) The employee should then enter into a database whether or not s/he has each skill/knowledge required.

These three steps are necessary to provide a basis for measuring the PC competency level of each employee.

The second purpose of this study was to suggest effective training methods that were likely to help the engineering community continuously improve their PC skills and knowledge. Five questions included in the PC users'

survey aimed at initiating a search for what might help make PC training more effective within this organization. The following are recommendations based on these findings:

- 1.) Encourage home computer use. This could be accomplished by authorizing support personnel to provide a time-slot for questions or problems with an employee's home computer, by establishing an onsite PC users' club, or by giving information on where to find the best value on computer hardware and software purchases.
- 2.) Involve proficient PC users. A pool of available trainer talent (23% of respondents) is ready to be of service. The company should tap this valuable resource.
- 3.) Give frequent and specific feedback. When PC users know what is expected they can use self-study or request training to address deficiencies.
- 4.) Move DOS users wherever possible to a Windows v3.1 environment. Anticipating that most organizations will upgrade from Windows v3.1 to Windows 95 or Windows NT in the near future, it is time to leave DOS behind for the newer technology. Practice in using Windows v3.1 will help make the transition to a new operating system easier and therefore, with less loss in productivity.

From this micro look at the internal organization, the literature review broadened to a macro view of what other companies, educators, and training professions

found to be effective training methods. The following recommendations are derived from this review:

Organization

- 1.) Ensure that a proposed training program supports organizational objectives.
- 2.) Establish standards for measuring performance improvement.
- 3.) Formulate a long range learning strategy -- a curriculum that provides a path to improving individual, functional, and organizational performance.
- 4.) Provide a tracking system for employee training. Link training records with business strategy.
- 5.) Use the infrastructure that is already in place to distribute training from a computer configured as a training server.
- 6.) Investigate ways to use the World Wide Web internally to provide training.
- 7.) Consider training as an investment -- choose training that gives the maximize return on the investment.

Training

- 1.) Ensure that the training program's instructional objectives support organizational objectives.
- 2.) Understand what tasks are to be accomplished that would not be possible without training.
- 3.) Train in stages.

- 4.) Provide computer-based training.
- 5.) Measure trainees on what they know both before and after training.
- 6.) Provide floppy disks, workbooks, and manuals for those who wish to study at home.
- 7.) Provide just-in-time training not just-in-case training.
- 8.) Use feedback to modify training programs.
- 9.) Issue certificates based on increased competency --- not for just participating in a training program (Spitzer, 1995)

Individual

- 1.) Encourage individual responsibility for development -- encourage continuous learning on and off the job.
- 2.) Give training choices, especially at the lowest levels of the organization.
- 3.) Following training, give feedback on performance improvement.
- 4.) Provide a structured opportunity for exemplary performers to train others.
- 5.) Ensure that the trainee has prerequisite skills (such as the ability to type)

Implementation of these recommendations will provide a basis for measuring continuous improvement and help make training within the organization more effective.

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APPENDICES

APPENDIX A
AT&T DOCUMENTS

LI GA10.126

Employee Training Procedures/Record

May 1, 1996

1. General Information*
2. Implementing Forms CICT1 & CICT2*
3. New or Transferred Employees
4. Assess & Provide for Training Needs
5. Implementing Form CICT3*
6. Implementing Form CICT4
7. Exhibits Listing

1. General Information*

- 1.1 This instruction is a guideline for the documentation and recordkeeping requirements for "Employee Job Training." Forms CICT1, CICT2, CICT3 and CICT4 have been designated by the CIC Quality Organization as the acceptable standard format for this purpose (See Exhibits 1,2,3 and 4.)
- 1.2 This procedure will fulfill ISO 9002 requirements for our employee training documentation. All efforts should be made to maintain accurate up-to-date records.
- 1.3 Some positions with the CIC require skills testing. All such tests will be conducted by the Human Resources Department. Once the employee has completed all orientation activities according to the Human Resources procedures, the training specific to the individual's job becomes the responsibility of the supervisor and/or department manager. All training will be documented.
- 1.4 New or transferred employees will be evaluated against the skills and education requirements stated on the formal job posting, or other available job description criteria.
- 1.5 Not all jobs at the CIC require specific training, but simply job instructions on a daily basis. Qualifications of the employee imply possession of skills necessary to complete each task in an efficient manner. Instructions will be provided by the supervisor in accordance with departmental objectives.

- 1.6 Authorized trainers or outside training vendors may include the following : department manager, supervisor, coordinator, methods, engineering, layout operator, or a co-worker who meets the performance criteria set by the Department Manager and Supervisor.
- 1.7 The retention period for all employee records of completed training is six (6) years after termination from the Company. All supervisor's official training records should be forwarded to the Training Department when an employee leaves the Company.*
- 1.8 The retention period for the CICT4 form will be one year from date issued.*

2. Implementing Forms CICT1 and CICT2*

- 2.1 With the initial issue of this local instruction, all supervisors conducted initial interviews with each of their direct reports and document form CICT1 and/or CICT2 (see Exhibits 1 and 2), after determining the skills and equipment that employees are trained for. Binders for maintaining record copies of the completed forms titled, "AT&T - CIC ISO Training and Skills Information" have been provided to each supervisor for this purpose. Each CIC employee's training must be documented.*
- 2.2 After the initial interviews and completion of the CICT1 and/or CICT2 these forms no longer need to be updated. It is the responsibility of the current supervisor to update the employee's training record from this point by submitting a CICT3 form for all training received by the employee.*
- 2.3 A copy of the initial employee training documentation (CICT1 & CICT2) and subsequent training updates (CICT3) shall be forwarded to the Training Department. The supervisor can update the Training Department unofficial file by sending a copy of the updated training record or by updating the official department record personally.*

3. New or Transferred Employees

- 3.1 Each supervisor, in agreement with the department manager will determine the minimum job skills required.
- 3.2 When an employee is transferred to another department, the official training record will be sent to the new supervisor for an evaluation during the employee's orientation process in the new department. All training documentation will be the responsibility of the supervisor, a copy should be forwarded to the Training Department for record.
- 3.3 Historical documentation (grandfathering) of established employee skills will be identified upon the orientation process by the supervisor. Specific job skills for which no pre-

vious documentation exists (grandfathering) will be marked with an asterisk on the appropriate form. This process of grandfathering should only be used upon the initial evaluation of a new or transferred employee. Employees may be asked to provide evidence of acquired skills by demonstrated performance.

4. Assess and Provide for Training Needs

- 4.1 Upon arrival into a specific department the employee will be interviewed by the supervisor and/or department manager, to determine previously acquired skills that may be applicable to the job assignment. The supervisor will evaluate and document whether or not previous training is sufficient to bypass the minimum training standards set by the department. See paragraph 5.0 for specific details.
- 4.2 Each employee who does not possess the minimum skills required for the job will be immediately scheduled to receive such training prior to the acceptance of the job assignment.
- 4.3 Skill requirements that change, whether increasing or decreasing, etc. will be documented by the department. Each employee whose job is affected by such changes will be required to receive additional training as required. When the training has been completed, it will be documented and a copy of the documentation will be forwarded to the location's training coordinator. See paragraph 5.0 for specific details.
- 4.4 Each supervisor will confer with the Training Department to determine scheduling, development, or the delivery of the training for the department, in accordance with the training objectives for the current year. This will be documented with Form CICT3. See paragraph 5.0 for specific details.
- 4.5 Employees have the right to request a refresher course. However, such request may not always be approved, due to the needs of the business and budgetary restraints.
- 4.6 When an employee separates or transfers to another location, the training record will be included with other records associated with employee movement.
- 4.7 When new products and services are introduced, the new project manager is responsible for evaluating any training that is required and engineering assistance that is needed. The evaluation includes analysis of service, equipment, procedure, number of employees, funding and implementation before the project is put into production. A record of the evaluation shall be available from the project manager for audit and other business planning purposes. When any training requirements that have been specified have been met, a CICT3 form should be forwarded to the Training Department to document the training received.

5. Implementing Form CICT3*

- 5.1 Effective with the issue of this local instruction, all supervisors will review individual training/skill levels for each of their direct reports as recorded on Forms CICT1 and CICT2. The purpose of this review will be to determine individual training plans to meet location training objectives. Form CICT3 will be used to document all direct reports' formal/informal training, beginning with 1992. These records will support training progress. (See Exhibit 3)
- 5.2 It will be the responsibility of the employees' current supervisor to document Form CICT3 for each training experience of their direct reports.
- 5.3 A copy of the form CICT3 should be forwarded to the Training Department after individual or group training is completed. Training time shall be rounded to the nearest half-hour. A copy should be kept separately in the supervisor's official department employee training file.
- 5.4 The Training Department will maintain overall unofficial location training status records and update the employee's personnel record using the CICT3.*

6. Implementing Form CICT4 (Request for Seminar)

- 6.1 The form number assigned to the Request for Seminar form is CICT4.
- 6.2 The CICT4 form shall not be used for training verification purposes. The CICT3 form must be submitted upon completion of training in order to update training records.
- 6.3 The Training Department recordkeeper will maintain the CICT4 form. This form will be used for training requests in which the training will take place outside of the facility. The form includes information such as the course title, location, cost and purpose of attendance. Signatures of the employee's Supervisor, Department Manager and CIC Director must be included on the form to verify approval.
- 6.4 It will be the responsibility of the requesting department to provide the Training Coordinator with a completed CICT4 form, including signatures, no later than a week prior to the course start date. The Training Coordinator will then submit the completed form to the CIC Director for approval.

- 6.5 Upon approval by the Director, the Training Coordinator will enroll the employee in the course, then send a written verification of enrollment to the attending employee.

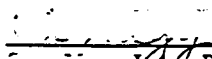
7. Exhibits Listing

- Exhibit 1.....Form CICT1: *Hourly Employee Record of Job Skills and Training (6/92)*
Exhibit 2.....Form CICT2: *Salaried Employee Record of Job Skills and Training (8/92)*
Exhibit 3.....Form CICT3: *Record of Training (12/95)*
Exhibit 4.....Form CICT4: *Request for Seminar (3/94)*

Note: Changes to this L.I. should be made *only* with the express consent of the Training Coordinator. Please direct any questions regarding this L.I. to Pat Walker on Ext. 590.

P. J. Walker Author
Training Coordinator

APPROVAL:



Labor Relations, Billing, Bids & Proposals Manager

6/19/96

Date



Request for Seminar

Name: _____ Social Security #: _____

Job Title: _____ Level: _____

Extension: _____ Org. #: _____

SEMINAR INFORMATION:

Title/Topic: _____ Seminar Date: _____

Cost: _____ Location: _____

Reason for attending: _____

☐ Seminar description attached.

Supervisor's signature

Department Manager's signature

_____, Training Coordinator

_____, CIC Director

Route to:
Supervisor
Department Manager

CIC Training Department 940307



AT&T's Customer Information Center
RECORD OF TRAINING

Name _____		Social Security # _____		
Hourly ☐	Tier ☐	SG ☐	Tech/Pro ☐	Training Hours _____
Organization # _____				Date Started _____
Course # (If applicable) _____				Date Ended _____
Training Type (Check)				
☐ Local Course / Seminar ☐ Group (See Reverse)				
☐ Other Co. Course / Seminar ☐ Individual				
☐ Outside Course / Seminar ☐ (Re)Certification, Special Process Dates: From _____ to _____				
☐ On Job Training				
☐ Other				
Description of Training: Specify Course / Process / Equipment				

Trainer _____ Date _____				
Supervisor Signature _____ Date _____				
Note: This form is back-up to the salaried and hourly employee record of job skills and training (forms CICT1 and CICT2) and permits updating of employee record and progress toward annual objective.				
Training / Human Resources Use ☐ Training Logged Initials / Date _____ ☐ Training Into ASSET Initials / Date _____				
Distribution:				
Original - Supervisor / Dept. File				
Copy: CIC Training Department				

CICT3
Issue 2



Customer Information Center

CIC1
June 1, 1992**HOURLY EMPLOYEE RECORD OF JOB SKILLS AND TRAINING**

The following menu outlines skill and task areas contained in the job classifications and descriptions of CIC hourly employees. The selections marked represent verification that the designated employee has completed all training requirements to operate the equipment (or in the classification) designated.

The data on this record will be updated on a continuous basis as new training requirements are added or completed by the employee.

QUALITY, SAFETY, POWER TRUCK AND OTHER					
EQUIPMENT / SKILL	DATE	TRAINER	EQUIPMENT / SKILL	DATE	TRAINER
Process Q Mngt. & Improve PQMI			Power Walk Truck / Transporter		
Quality In Print (QIP)			Yale Pallet Truck		
Quality Improvement Story			5-High Reach		
Quality Team Leader			C-Balance S& Down		
STOP Safety Training			Crown Selector		
Right To Know			C - Balance Sidemount / Reach		
Hazardous Spill			LOGIC		
Hazardous Materials Training			UNIX		
Lock Out / Tag Out			Harvard Graphics		
CPR			382 / 385 Computer		
First Aid (Mat Team)			Lotus / D Base / MS-DOS		
Inceptient Fire Training			CICIMS - OM / MM / PM		
SCBA Training					
Print Control / Work Order / Specs					
WAREHOUSE					
Expediting			MFCS		
Generic Kitting			Insta-Pack		
Receiving			L-Head Sealers		
Returns			Super DHL Meter		
Releases			Super Fed X Meter		
Packing			Tandata Meter		
Shipping			3 M Matic Case Sealer		
Selecting			Rena Labeler L325		
Put-Away			Mailmatic 90		
Cycle Counting Raw Materials			Lantech T-Wrapper		
Finished Goods			Warehouse Quality Checking		

EMPLOYEE NAME		SUPERVISOR	
* Employee has been grandfathered as trained due to previous experience.		DATE OF FIRST REPORT	

REPROGRAPHICS					
EQUIPMENT / SKILL	DATE	TRAINER	EQUIPMENT / SKILL	DATE	TRAINER
Xerox 5090			Kugler Punch		
Xerox Docutech			Scott Reinforcing Machine		
Kodak 300			Standard Duplo 12/248 Tower		
Kodak 90			Takigen Band Machine		
OCE 7500			Scale Model 8205		
Mini Pack			Sunrise-7000 Thermographer		
Standard Pro-Fold			Sunrise Super-12 Slitter		
Standard Pro-Fold 5000			Multigraphics 1250 T		
Hanagatha HP-10 L Seale			Camera CP-414		
3 Pack Shrink Tunnel			Halm Jet Press		
Buntz 3100 Tying Machine			Kodak Ektaprint 225		
3M-Wide Web Binding Machine			Champion 77 Cutter		
Challenge Drill			Ultrafold 714 Baum Folder		
Bourg Stitcher			Tameran Autoprint 1200-C		
Bourg Stitcher Punch			3M Quantimatic Printer		
Xerox 5100			Printfold For Quantimatic		
Multigraphics 1250 Duplicator			Challenge Paddy Wagon		
Davidson Press			Repro Quality Checking		
Mitsubishi CP-310 Camera			GBC Binding Equipment		
Scott Ten-Thousand Tab Cutter					
PRINT					
Heidelberg GTO 20"			Subby 4000		
Heidelberg MO 25"			Subby Mini-Binder		
Heidelberg 2-Color 40"			Ugler 4-Knife		
Heidelberg 6-Color 40"			Weldotron		
Stahl 30" Buckle Folders			HS1 Shanklin		
Stahl 26" Combination			A26 Shanklin		
Stahl 22" Buckle Folders			Challenge Drill		
Rossback Perforator			Dexter Lawson Drill		
Polar Model 137 Cutters			Interlake Stitcher		
Ehlman			Print Quality Checking		
Gather-All			Densitometer		
Modulen			R.R. Donnelley Interactive Video		
Muller Martini					



Customer Information Center

Exhibit 2
L.I. GA10.125**SALARIED EMPLOYEE RECORD OF JOB SKILLS AND TRAINING**

The following menu outlines skill and task areas contained in the job classifications and descriptions of CIC salaried employees. The selections marked represent verification that the designated employee has completed all training requirements to operate the equipment (or in the classification) designated.

The data on this record will be updated on a continuous basis as new training requirements are added or completed by the employee.

CUSTOMER CONTACT, QUALITY, SAFETY, AND OTHER					
EQUIPMENT / SKILL	DATE	TRAINER	EQUIPMENT / SKILL	DATE	TRAINER
National Sales Academy (1 Course Minimum)			CICIMS - MM / OM / PM		
Conversational Foreign Language - French, Spanish, Other			UNIX		
Effective Customer Service / 800# Operator			Crystal Writer / Samna / MS Word		
Process Q Mngt. & Improve PQMI			B-Tab / Data Entry / Short Hand		
Quality In Print (QIP)			Lotus / D Base / MS DOS		
Quality Improvement Story			LOGIC		
Quality Team Leader			Attra System		
Quality Auditor			Harvard Graphics		
Quality Checker			Apple / Macintosh		
First Aid (Mat Team)			Effective Oral & Written		
Inceipient Fire Training			Sharpened Basic Math		
SCBA Training			3B2 / 3B5 Computer		
STOP Safety Training			AT&T 6300/IBM Compat WGS PC		
Right To Know			Epson / Other Non Laser Printer		
Hazardous Spill			Gretag / Other Densitometer		
Hazardous Materials Training			Print Control / Work Order / Specs		
Lock Out / Tag Out			Light Table		
CPR			New Horizons		
FAX Ref. / Employee Look-Up			COMBS / COBIS / CARMS		
LIBRARY					
6386E WGS Power Box			Printer PC-2210		
Kodak 90			Schaefer 14" Wax Coater		
Kodak 90E			Marathon Paper Jogger		
Kodak 1575			Linotronic 500 Typesetter		
			Pako Film Processor		

EMPLOYEE NAME	SUPERVISOR
* Employee has been grandfathered as trained due to previous experience.	DATE OF FIRST REPORT

CONTROLLED DOCUMENT

CICT2
Issue 2, 8/92

PREPRESS					
EQUIPMENT / SKILL	DATE	TRAINER	EQUIPMENT / SKILL	DATE	TRAINER
Log E 480 Camera			Misomex Plate Imager		
Dest PC 1000 Scanner			3M Plate Processor		
Heidelberg CPC Plate Scanner			Log E Excell 26 Film Processor		
Slidex 400 Waxer			Michael Electronic Stapler		
Bacher Digital Lineup Table			Triumph Paper Cutter		
Olec Light, Integrator, And Open Face Frame			Martin Yale Tabletop Drill		
NuArc Tabletop Vacuum Frame And Olec Light Source			Stripping Theory / Procedures		
Omega Variable Condenser Enlarger			Art, Camera And Plate Basics		
Moutrain Series 7150 Backup Tape Drive			Typesetting And Pasteup		
Jouthitt Proofer			Graphics Arts Photography		
Jouthitt Overhead Platemaker			Screening And Rescreening		
			Enlarging Techniques		
MICROGRAPHICS AND DATA ROOM					
HP 3000			Hollywood Film Processor		
HP 9000			2124 Diazo Duplicator		
Paradyne			HP Label Printer		
Extra 486			9370 Computer System		
VPE Operating System			3505 Card Reader		
MPEXL Operating System			3525 Card Reader / Puncher		
IES 3 Operating System			MK35 Card Collator		
VRJE Software Tool			3M 968 card Duplicator		
Datagraphix XR Computer System			Macbeth TD 502 Densitometer		
FDC Documate II Camera			3M 520 Card Duplicator		
FDC Documate IV Camera			IBM 129 Card Puncher		
10R Allen Processor			Xerox 4050 Laser Printer		
184 Card Sorter			Kodak 16mm Rotary Camera		
PURCHASING, INVENTORY PLANNING, MANUFACTURING PLANNING AND SALES SUPPORT					
Purchasing & Materials Mngt. I			Quoting & Estimating Ability		
Purchasing & Materials Mngt. II			Inventory Planning Basics		
Corp. Purchasing & Trans. Instr.			Printing & Shop Capabilities		
Forecasting & Scheduling			APICS (1 Course Minimum)		

CONTROLLED DOCUMENT

CICI2
Issue 2.000

APPENDIX B

MANAGERS' AND PC USERS' COVER LETTER



PHILIPS

Philips Consumer Electronics Company

To: Engineering Manager

Date: January 30, 1996

From: Susan England

Subject: Planning Engineering PC Training
QUESTIONNAIRE

The heart of the quality improvement process is the ability to show actual improvement; in the highly competitive consumer electronics business this capability is especially important.

The Engineering department's PC training program for 1995 has been completed - the 1996 will begin soon. This is an appropriate time to begin a systematic re-evaluation of PC training needs within engineering. A research project has been approved by management in association with my graduate work at the University of Tennessee. The attached Questionnaire represents one component of the investigation.

Your help is requested in this study. Please complete and return the questionnaire to me by February 15. The information received will remain confidential; individual respondents will *not* be identified. The number on the questionnaire is for follow-up purposes only.

Your reply will help determine the ultimate value of this study. Thank you for your time and participation.



PHILIPS

Philips Consumer Electronics Company

To: Engineering PC Users

Date: January 30, 1996

From: Susan England

Subject: Planning Engineering PC Training
QUESTIONNAIRE

The heart of the quality improvement process is the ability to show actual improvement; in the highly competitive consumer electronics business this capability is especially important.

The Engineering department's PC training program for 1995 has been completed - the 1996 will begin soon. This is an appropriate time to begin a systematic re-evaluation of PC training needs within engineering. A research project has been approved by management in association with my graduate work at the University of Tennessee. The attached Questionnaire represents one component of the investigation.

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Your reply will help determine the ultimate value of this study. Thank you for your time and participation.

APPENDIX C

MANAGERS' AND PC USERS' QUESTIONNAIRE

**SKILL LIST -
Windows v3.1
Level 1 -
Introductory**

Instructions: You plan to provide an employee with a PC valued at approximately \$2,000. If you want this employee to have a Windows skill or knowledge please check in the Yes column, otherwise check No.

		Using Windows		Printing	
Yes	No	1 Understand Windows terminology		19 Use the Print Manager	
		2 Start Windows		20 Control print jobs	
		3 Use the mouse			
		4 Use icons and pull-down menus			
		5 Move and resize windows			
		6 Scroll windows			
		7 Minimize and maximize windows			
		8 Use the On-Line Help system			
		9 Stop Windows			
		User Preferences The Control Panel		Desktop Accessories	
Yes	No	10 Scroll windows		21 Use the Calculator	
		11 Set the colors of the screen		22 Use the Cardfile	
		12 Change the stored time and day		23 Use the Clock	
		13 Adjust the keyboard and mouse speeds		24 Use the Notepad	
		14 Adjust the desktop options		25 Use the Calendar	
		15 Adjust the fonts		26 Use the Character Map	
		File Manager			
Yes	No	27 Use the File Manager			
		28 Format diskettes			
		29 Select and copy files			
		30 Select and delete files			
		31 Select and move files			
		PCEC			
Yes	No	32 Set up network printer			
		33 Understand do's & don'ts of Windows Setup			
		34 Identify text and program files			
		35 Understand the concept of shared resources			
		36 Use Clipboard to move data between applications			

**SKILL LIST -
Windows v3.1
Level 1 -
Introductory**

Section 1.

[illegible]

Section 2.

Instructions for Section 2.: Please answer questions 37, 38 and 39 by checking under either the Yes or No column. Answer questions 40 and 41 by checking the box beside the description that applies to you.

	Yes	No
37 Do you use a PC more than once a week at home?	☐	☐
38 Are you willing to teach a PC topic to a co-worker?	☐	☐
If yes, please describe the topic: _____		
39 Do you have a clear understanding of the PC skills and knowledge your manager expects you to have?	☐	☐

40 How frequently do you use Windows at work? (check one)	☐ Almost every day ☐ At least once a week ☐ Less than once a week
---	--

41 What PC training method do you prefer? (check one)	☐ Traditional lecture/lab ☐ One-to-one instruction (tutorial) ☐ Video-based instruction (video tape) ☐ Computer-based instruction (self-paced)
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APPENDIX D

MANAGERS' AND PC USERS' COMMENTS

Managers' Comments

Few comments were made by the managers that responded to the "Planning Engineering PC Training Manager Questionnaire. They have been documented below:

I am not sure I understand the reasoning behind this questionnaire it looks like most of the skills would be required.
By the way I think our PC training is totally inadequate when we change systems or programs and I have strong opinions on this subject.
I NEED MS WORD MS PROJECT MS EXCEL TRAINING ALSO

PC Users' Comments

The following comments are a replication of the respondents hand-written notes as was possible by this researcher. In Chapter 4, Research Findings, they are summarized and in Chapter 5, Conclusions and Recommendations, they are reflected upon. The number at the beginning of the column corresponds to the question number on the "Planning Engineering PC Training Questionnaire".

38 - If you mean help an individual - anything I know
38 ?
38 circuit simulation programs
38 Designer, CAD, Excel
38 everything
38 I don't care which & 39 clear understanding - this is a trick question!
38 I'm willing to teach/help - I don't have enough information in a formal form + teach a class
38 Informal Q/A if I have time
38 Lotus 123 rev S without macros
38 most any program, windows/none windows
38 Not enough Spare Time
38 Not enough time
38 Office Word, Powerpoint, Windows -
38 only as one on one - not a class
38 paint brush
38 Protel PCB SCH, Word , Excel
38 Sure _If I thought I could help someone
38 Using Windows and applications
38 various
38 win95
38 windows
38 Windows & Win 95 and many applications
38 windows 95 setup/internet access and use
38 Windows or Dos
38 windows-dos
39 I am a Mac user ?
40 -4 - none)
40 Never comment: SUSAN WE DONT USE WINDOWS DOWN HERE.
41 (three of four checked)
41 book
41 book then I can study it at my leasure on the porch in a comfortable chair!
41-none-read the manual!

VITA

Susan Daily Rozsnyai-England was born in Oak Park, Illinois on April 9, 1940. She attended schools in the public system of Oak Park, Illinois and Fortville, Indiana, where she graduated from Fortville High Schools in June, 1958 and subsequently moved to California. While living in various parts of Southern California, over the years she had several work experiences such as, handling escrows for FHA and VA tracks for United Savings and Loan Association in Inglewood, working as a flight attendant for American Airlines while based in Los Angeles, and managing a family owned acoustical consulting company in San Diego. In February, 1979 she received a license from the Department of Real Estate, State of California and worked with property management. She moved to Knoxville, Tennessee in July, 1980 and entered The State Technical Institute of Knoxville (currently Pellissippi State) during August of 1982. In June, 1984 she received the Associate of Science Degree in Computer Accounting with "highest honors". She was employed by East Point Medical, Atlanta, Georgia to do their computerized bookkeeping in this same month. She accepted a position with Philips Consumer Electronics Company in June, 1985 and has since received several hundred hours of professional training in systems administration and management of UNIX based CAD workstations and servers, database management, and PC applications.

While working as a systems analyst, she entered the Bachelor of Science program in Applied Organizational Management at Tusculum College, Knoxville in March, 1993, officially receiving the Bachelor's degree magna cum laude in December, 1994. She entered The University of Tennessee to pursue the Masters of Science in Human Resources Development in August of 1994 and continued to work as a systems analyst. The Master's degree was received August, 1996.

She is presently working as a systems analyst at Philips Consumer Electronics Company in Knoxville, Tennessee.