Training electronic equipment operators: behavior modeling versus text versus trial and error

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Training electronic equipment operators: Behavior modeling versus text versus trial and error

Howard, Carolyn Kay, Ph.D.

Iowa State University, 1992
Training electronic equipment operators:  
Behavior modeling versus text versus trial and error

by

Carolyn Kay Howard

A Dissertation Submitted to the  
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For the Graduate College

Iowa State University  
Ames, Iowa  
1992

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INTRODUCTION

Training History

Formalized training efforts can be traced as far back as 1800 B.C. The Babylonian Code of Hammurabi contained rules for transferring the skills of one generation to another. Early Egyptian and Roman history also recorded the formal passing of craft knowledge from experts to novice craftsmen. This training was accomplished via apprenticeship programs—apprentices (novices) studied with masters to learn a specific craft (Carnevale, Gainer, & Villet, 1990).

A more structured approach to training developed during the Middle Ages (476 A.D. - 1450 A.D.) when trade guilds were formed. Individuals with expertise or interest in a common craft joined and participated in, or progressed through, the three levels of membership: (1) apprentices, who received little or no pay and usually lived with the master; (2) journeymen, a mid-level that was beyond the apprenticeship but not qualified as a master; and, (3) master worker, who directed the work and owned the tools and raw materials (Carnevale et al., 1990).
The next significant change in the training field occurred during the Industrial Revolution of the late eighteenth century. Factories paid wages that attracted unskilled farm workers seeking a new life in a factory town. These unskilled workers needed to be trained for factory work. On-the-job training was common during the early 1800s. By the mid 1800s, some companies had formed "factory schools" as a means of providing formal classroom instruction. Additionally, the education system began preparing individuals for work with "vocational education" programs (Sims, 1990).

The early 1900s brought the assembly line and the need for specialized workers. The Depression, however, left many skilled workers unemployed and their skills decayed. World War II brought an immediate need not only for skilled workers but also for skilled supervisors who could train unskilled workers. The federal government set up the Training Within Industry Service (TWI) to assist the defense industries in training supervisors. By 1945 TWI had prepared 23,000 supervisors as trainers thereby establishing a new profession, that of training director (Carnevale et al., 1990).

The last four decades have been a time of increasing sophistication in the field of training. New methods
(e.g., behavior modeling) and new mediums (e.g., videotape, computers) have contributed to this increase in sophistication. Other contributing factors are a decrease of fads in training, an increase in the number of training methods grounded in training theory, and knowledge and ideas from cognitive and instructional psychology.

Campbell (1971) in the initial formal review of the personnel training and development literature remarked, "one cannot come away from this literature without feeling disheartened. The yield of information is depressingly small" (p. 593). However, by 1988 Campbell concluded, "contrary to my somewhat negative view some eighteen years ago, the field of training and development has entered an exciting age, and promises to become even more intense in the future...the author was born too soon" (p. 208-209).

Training Today

In the United States, estimates of expenditures for training range from $2 billion to $100 billion annually (Rosow & Zager, 1988). The American Society for Training and Development (ASTD) has settled on an annual figure of $30 billion (Conte, 1991, October 22). This $30 billion estimate includes only formal training paid for by private and public employers (except the military). By including
wages for trainees this figure would be inflated by a factor of five. If on-the-job training costs—assuming they could be accurately assessed—were also included, the total cost would increase many times again (Rosow & Zager, 1988).

As for an accurate annual expenditure estimate, Rosow and Zager (1988) say it best:

No one knows with any precision how much employers in the United States, individually or collectively, spend on training....nor does anyone know how much an employer ought to spend on training....most employers do not have reliable information about how much they spend on training, and there is as yet no reliable central source gathering whatever information is available. There is not even general agreement on how to measure costs. (p. 28)

Regardless of the varying estimates, the annual training expenditures in the U.S. are substantial. Why do employers spend such a large amount for training?

Carnevale (1989) says:

The economic history of the modern world shows acquired human skills inexorably replacing natural and machine resources as the basic building blocks
of production and service. In 1890, resources from the earth, including minerals, energy, and food, accounted for 50 percent of the gross national product....human resources now account for more than 80 percent of the nation's total economic output. The acquired skills and abilities of the population have become the pivotal resource....learning systems in the workplace are the first line of defense against economic and technical changes. The ability of the nation's employers and employees to respond expeditiously to such changes largely determine how adaptable and competitive the nation will be. (p. 29-30)

Demographic changes such as the declining quantity and quality of entry-level employees in the workforce of the 90s necessitate a continuing, and possibly increasing, expenditure for training. Additionally, forces such as increased domestic and global competition, rapid technological changes, realignment of corporate structures and strategies due to mergers, acquisitions, and divestitures, and, the present economic climate, all present a challenge for more efficient management of human resources. A challenge that can be met, in part, by well-
designed training programs that are closely aligned with the strategic goals of the employer (Casner-Lotto and Associates, 1988).

One difficulty that plagues the development of effective training programs is susceptibility to "faddism." Faddism occurs when organizations do not take the time to systematically evaluate their training needs. Instead, packaged training programs developed by outside sources such as consulting firms are selected on the basis of word-of-mouth support from other organizations. Unfortunately, an organization's support is usually based on nothing more than their employees' reactions to the program—whether they liked the program and felt it would benefit them. Seldom is any attempt made to determine if the training was needed, or whether the training resulted in a positive change in an employee's behavior on the job (Campbell, 1971; Wexley & Latham, 1981).

As a result, programs or techniques are developed, purchased, supported, and, after a limited time, criticized as not being useful. Then, new programs or techniques are developed and the cycle is repeated. A good example of a training fad is the T-group (sensitivity) training of the 1960s. Managers attended T-group training to enhance their sensitivity to others and
to increase their own self-awareness. By 1980, Goldstein said "there remains the issue of the psychological danger of these experiences" (p. 258). And by 1989 Goldstein and Associates recommended sensitivity training only "as a preparatory stage for intercultural training" (p. 439).

Wexley and Latham (1981) say:

People must learn to systematically identify training needs, build content into programs based upon job information, and evaluate training in terms of the objectives for which it was designed. Only then will the field of training and development cease to be an artform dependent upon the persuasiveness of its advocates, and become a science that is replicable by others. (p. 8)

Training is a complex activity that consists of many different issues. For example, before any actual training takes place, a need for training should be identified, training content developed, and the program designed. Systematic identification of training needs can be accomplished when training issues are treated as a system, i.e., "any set of mutually interdependent elements" (Cohen, Fink, Gadon, and Willits, 1988, cited in Sims, 1990, p. 2).
Before proceeding with the discussion of a training system, the concept of training should be defined. Goldstein and Gilliam (1990) refer to the training process as, "the systematic acquisition of skills, rules, concepts, or attitudes that result in improved performance in the work environment" (p. 134). This definition stems from the viewpoint: "when learning events are planned in a systematic fashion and are focused on the work environment, they are called training programs" (Goldstein & Gilliam, 1990, p. 134).

Landy (1989) defines training as, "a set of planned activities on the part of an organization to increase the job knowledge and skills or to modify the attitudes and social behavior of its members in ways consistent with the goals of the organization and the requirements of the job" (p. 306). Landy differentiates training from learning by pointing out that training is a planned event executed in the presence of a group or individual. Learning is a change that takes place within a person and usually results in a relatively permanent alteration in behavior. Training does not necessarily lead to learning per se, nor is learning always the result of training. Further complicating matters is the issue of performance (observable, measurable behavior). While training can
lead to learning, learning is not a guarantee for satisfactory performance. Furthermore, satisfactory performance is not always dependent upon formal training. However, training should increase the probability of learning and learning should increase the probability of performance (Landy, 1989).

Although recognition of a difference between training and learning offers a more precise view of the actual training process, training and learning are frequently used interchangeably in the training literature. This lack of distinction leaves the implicit assumption that the two terms are equivalent and that training means learning. This, however, is not the case. Thus, researchers and authors should recognize the distinction and use the terms correctly to avoid compounding the confusion. Landy's definition of training will be used henceforth in this document.

The Training System

Addressing training issues from a system perspective may increase the success of training programs. This added success is due to the requirement that issues related to the system be identified and analyzed. A training system does not stand alone but is linked to other organizational units that must be considered in the training process.
Constructing a model, "a generalized, integrated, and conceptual picture of the major steps to plan, design, develop, conduct, and evaluate" (Sims, 1990, p. 2), of the system provides a framework for the discussion of the various system components. The training system model used in this document is presented in Figure 1. It consists of a needs assessment phase that includes organization analysis, task analysis, and person analysis. Following the needs assessment phase, training objectives are determined, training content is specified, and evaluation methodology, including criteria and research design, is developed. Then, the training program is designed and actual training is begun. At the conclusion of the training program, the training is evaluated. Following is a discussion of each component.

Needs Assessment

The needs assessment phase (identifying a need for improvement) is the most important and often the most neglected issue in the training system. There are three components to the needs assessment phase: (1) organizational analysis; (2) task and knowledge-skill/ability analysis; and, (3) person analysis. Each component will be discussed individually.
Needs Assessment:

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Design Training Program

Training

Training Evaluation

Figure 1. A training system
Organizational Analysis. Failure to consider the needs of the entire organization ignores the fact that training programs do not exist in isolation and are merely subsystems of the organization. This failure to examine the organization's needs contributes to the fad approach in training. A lack of understanding of the actual needs of the organization leads those responsible for the training endeavor to adopt the fad approach "based upon a forlorn belief that the next toy they purchase will provide the answers to their training problems" (Goldstein & Buxton, 1982, p. 165). Hence, training programs are unrelated to the needs of the organization and, as such, are frequently judged to be a failure. Linking training to the strategic plan of an organization leads to more focused training programs that more closely support the goals of the organization whether they be assuming a leadership position in an industry or establishing a stable operating environment (Casner-Lotto & Associates, 1988).

Connecting training to a goal-directed strategic plan is only one of the facets of organizational analysis. Trainers must also consider many other aspects of the organization. One such aspect is resources—financial, physical, and human. This analysis will provide answers
to questions like: Are funds available and/or necessary for training? Are facilities available and adequate? How many employees need to be trained?

Another facet to be analyzed is the organizational environment, both external and internal. For example: How does the external environment (fast-changing or stable) affect the organization? Are outside constraints such as state environmental and/or safety requirements applicable? As for the internal environment, both the formal (written rules) and informal (leadership, working conditions, group norms) climates of the organization must be considered. The absence of support from managers, or co-workers who assert the training is deficient, can effectively negate any gains associated with training.

While organization analysis is the first and most important phase in any needs assessment, "there is virtually no information available on the procedures necessary to accomplish this task" (Goldstein & Buxton, 1982, p. 147). Wexley (1984) is "appalled at the paucity of research on organization analysis...training researchers have either intentionally or unintentionally chosen to ignore the influence of organizational variables on the training function" (p. 521). Hence, though acknowledged as important to any training process,
organizational analysis procedures are not well developed. Thus, this phase may continue to be ignored thereby contributing to the failure of the training effort.

**Person Analysis.** The second step in the needs assessment phase is person analysis. This stage answers the question, "Who should be trained?" Issues to be considered include: Will job incumbents be trained or will the trainees be new hires? What skills and/or knowledge and/or abilities have already been acquired by the intended trainees? Is the training group composed primarily of minorities, women, or older individuals? Determining the characteristics of the group to be trained will provide direction for selection of the training methods and medium.

**Task Analysis.** Task analysis is the last process in the needs assessment phase. This process is begun after a need for training has been established and the job to be performed by the trainees upon completion of the training program has been identified. Task analysis answers the question, "What must a trainee be taught in order to perform a job effectively?" (Wexley & Latham, 1981, p. 8). In other words, what are the job duties and what knowledge, skill, ability, or attitude is necessary for successful performance of the job duties?
Task analysis does not suffer from the procedural problems associated with organization analysis and, "methodological sophistication in task analysis has continued to increase in recent years" (Wexley, 1984, p. 522). The task analysis should always begin with a thorough job analysis. There are many job analysis procedures available. For example, the Functional Job Analysis (FJA) (Fine & Wiley, 1971) is a work-oriented job analysis method with a focus on work activities. In contrast, a worker-oriented job analysis focuses on what knowledge, skill, and ability an individual must possess in order to perform the job. A good example of a worker-oriented job analysis is the Position Analysis Questionnaire (PAQ) (McCormick, Jeanneret, & Mecham, 1972).

While the worker-oriented method was used with the greatest frequency in the past, present day researchers recognize the utility of collecting both types of information. This has led to the development of multimethod approaches such as the Integrated Job Analysis (Buckly, 1986). Regardless of the method used, job analysis is essential for determining training needs and ensures that the training program is job-relevant (Sims, 1990).
The second step in the task analysis is task specification. Here, the importance of each task is determined by looking at: (1) how often the task is performed; (2) potential consequences (negative/neutral) of the inability to perform the task; and, (3) how difficult it would be for the worker to learn to perform the task. This step identifies those tasks that, although performed infrequently, are critical to the job and those relatively unimportant frequently-performed tasks. Since it is unrealistic to expect that all trainees will be trained in every task associated with a particular job, identifying tasks in this manner allows for more efficient allocation of resources by specifying which tasks are most important (Goldstein & Buxton, 1982; Sims, 1990).

Task specification also allows the training specialist to select the jobs for which formal training is most useful and practical. Some training is more appropriately conducted on the job. In addition, task analysis may reveal that performance deficiency is not due to a lack of skill and knowledge but to other factors such as deficient equipment or poor organizational climate. In this case, management should look for non-training solutions such as changing working conditions (Robinson & Gaines, 1980).
In summary, the needs assessment phase of the training process determines whether or not there is a need for training, where the training should be focused (which job or attitude), and who is to be trained. These analyses enable organizations to identify the goals and/or objectives for the training program and provides a hint to the trainers about where to begin.

Three components of the training system model flow logically from the task analysis. They are training objectives, training content, and evaluation methodology. These three components, although distinct, are interconnected.

Training Objectives

Training (behavioral) objectives provide direct input for the design of the training program as well as specifying the completion point of the program. In other words, "What skills, behaviors, knowledges, or attitudes would you like the trainee to have after training that she did not have before training?" (Landy, 1989, p. 316). Training objectives also aid in the development of the criterion measures that will be used for performance evaluation (Goldstein, 1986; Goldstein & Buxton, 1982).

Behavioral objectives are stated in concrete, observable terms, and they include some indication
of the conditions under which the individual should be able to perform them and the level of proficiency the individual should be able to exhibit. This is the very heart of training design. If the behavioral objectives cannot be specified, that implies that the trainer...cannot be clear about what to teach. (Campbell, 1988, p. 194)

Sims (1990) states this more succinctly by saying "if we don't know where we're going, we can't tell if we got there. Nor can we tell if it's where we wanted to be" (p. 93). Vaguely worded objectives are imprecise and lead to failure in specifying training content and in selecting valid evaluation criteria. In addition, the trainees will not have a clear picture of what performance is expected from them at the conclusion of the training program. Because the behavioral objectives dictate the content of the training program, they must be an accurate reflection of task characteristics.

Training Content

Training content "is composed of the knowledges and skills that the trainee must master to be able to perform the objectives" (Campbell, 1988, p. 196). So, even though behavioral objectives dictate training content, there is a
difference between the two. Behavioral objectives reflect job content (Campbell, 1988).

Obviously, training content (the material to be covered and the presentation sequence) should match the behavioral objectives (job content) as closely as possible, indicating content validity. Greater content validity would mean more efficient, effective, and transferable training. Additionally, content validity is a legal requirement under Title VII of the Civil Rights Act and the Uniform Guidelines on Employee Selection Procedures if training is a prerequisite to job selection or assignment (Sims, 1990).

Because the knowledge, skills, abilities, and attitudes required for successful task performance would be determined during the task analysis, and used to state behavioral objectives and design training content, it follows that criterion development and research design decisions should be an integral part of this process.

Evaluation Methodology

Even though the training evaluation is conducted after the actual training has taken place, the evaluation should be planned before the training program is designed. Evaluation planning focuses on two interacting concerns. The first is establishing measures of success (criteria).
The second is determining the research design that provides the most information about what changes occurred during the training program (Goldstein & Buxton, 1982; Goldstein & Gilliam, 1990).

**Criteria.** One way to determine the success of a training program is to develop criteria (measures of success) that indicate whether the trainees possess knowledge, skills, and abilities necessary for successful job performance. Having a measure, however, does not mean that it is reliable or valid. Developing an appropriate measure can be exceedingly difficult. Very often in industry, criteria are chosen only because they can ostensibly be measured. Wherry (1957) believes this is the same as saying, "we don't know what we are doing, but we are doing it very carefully, and hope you are pleased with our unintelligent diligence" (pp. 1-2). Goldstein (1986) concurs with this belief and says, "little understanding can be gained by carefully measuring the wrong thing...the most carefully designed study, employing all the sophisticated methodology that can be mustered, will stand or fall on the basis of the adequacy of the criteria chosen" (pp. 113-114).

One measure of criterion worth is relevance. The degree to which criteria are judged to be relevant depends
on whether the knowledge, skills, and abilities required for success in the training program are the same as those required for success on task performance. Goldstein (1986) believes relevance is, "the fundamental requirement that transcends all other considerations related to criterion development" (p. 115).

Two related concepts are criterion deficiency and criterion contamination. Criterion deficiency refers to the degree to which tasks identified as needing training are not present in the actual criteria. Criterion contamination refers to extraneous elements present in the criteria (Muchinsky, 1990). A study by Eden and Ravid (1982) reveals an interesting example of criterion contamination. Instructors of military trainees were informed at the beginning of a 7-week course that a number (random quarter) of their trainees had high success potential. "Learning performance as measured by both weekly instructor ratings and weekly written examinations was significantly higher in...high expectancy groups than in controls, confirming the Pygmalion hypothesis" (p. 351).¹

¹The Pygmalion hypothesis states that "an increase in performance...results from raising managers' expectations about subordinate performance" (Eden & Kinnar, 1991, p. 770).
In addition to being relevant, criteria must also reliably measure performance. In other words, the performance scores should remain consistent over time. Several factors (e.g., size of trainee group, trainees' range of ability, ambiguous instructions) can affect the reliability of criterion measures. For example, a narrow range of ability can produce a narrow range of scores thus decreasing variability and lowering the correlation coefficient. These factors must be considered when reliability coefficients are interpreted.

Because reliability can be measured statistically, it is often emphasized at the cost of relevance. Relevance, however, must take precedence over reliability as, "there is no utility in carefully measuring the wrong indicant of success" (Goldstein, 1986, p. 121).

The complexity of human behavior and the complexity of the training process argue strongly for multiple criteria. Kirkpatrick (1976) developed a training evaluation model with four levels of criteria—reaction, learning, behavior, and results. Reaction criteria are measures of trainees' impressions and include what trainees think about the training program and whether or not they like the program. Reaction measures allow trainers to assess the program, provide input for future programs, and help ensure organization support if the reactions are positive.
Learning criteria are measures of how much was learned. The training objectives should determine the choice of an appropriate measure. Learning measures must be quantifiable and objective indicants of the learning that has taken place in the training program. Learning criteria are not measures of job performance. That is left to the behavior criteria.

Behavior criteria measure the extent to which trainees apply what they learned in training to their job (transfer of training). Training performance measures can often be used to measure job performance. Bearing in mind Landy's (1989) caution that training does not always lead to learning and learning does not always lead to performance, makes this measure particularly important and will answer the question of whether or not there has been a change in on-the-job performance.

Kirkpatrick's (1976) fourth level of criteria is results. Results criteria should be related to the organization objectives identified in the strategic plan. Thus, reducing turnover or increasing the level of morale might be results to be considered.

Kirkpatrick's (1976) model of training evaluation has been in use for over three decades. The power of the model, "is its simplicity and its ability to help people
think about training evaluation criteria" (Alliger & Janak, 1989, p. 331). However, Alliger and Janak say there are three assumptions (never explicitly stated by Kirkpatrick) that appear to be associated with the model that are problematic. The first is that the levels of criteria are arranged in ascending order of information provided. The second assumption is that the levels are causally linked. And, the third is that the levels are positively intercorrelated. Evidence gathered by Alliger and Janak from a review of the literature reveals that each assumption can be questioned. Thus, even though multiple criteria are most desirable, Kirkpatrick's levels appear to be independent and can be used alone.

Reaction, learning, behavior, and results criteria should not be the sole considerations in the evaluation process. These criteria are outcome measures. An important aspect that is overlooked in most training programs is a process measure. This measure seeks to assess what actually occurs during a training program. Perhaps a trainer's attitude affects the trainee performance. For example, two trainers may have very different views about a training program. One may have developed the program, thus having a vested interest, while the second may be participating under duress. The
program developer might spend extra time with the trainees while the second trainer covers the material in a careless, uninterested manner. This could lead to an erroneous conclusion when looking solely at the outcome measures. If the training process has not been monitored, success or failure of the training program would be incorrectly attributed to the training method while the correct attribution would be a trainer effect—one trainer correctly conducted the program; one did not. Developing a process measure could ameliorate this confound.

"The basic issue in the design of training research is whether differences in criterion behavior are indeed the result of training" (Muchinsky, 1990, p. 221). One way to assess any differences in criterion behavior is through the use of preexperimental, experimental, or quasi-experimental research designs. In the experimental design illustrations, X represents the training program, T represents measure administration, and R represents random selection of subjects. The following are examples of two preexperimental designs:

1. The one-group posttest only design

   \[ X \quad T_2 \]

2. The one-group pretest/posttest design

   \[ T_1 \quad X \quad T_2 \]
The one-group posttest only design does not allow any assessment of change due to training. It can provide valuable information to use as input for future training programs, however, so it must not be totally discounted by trainers as an acceptable research design. The one-group pretest/posttest design allows for the assessment of change due to training but it cannot rule out an uncontrolled third variable such as intervening events or the mere passage of time (internal validity threats) (Cascio, 1987).

Experimental designs that use random selection as a way to ensure equivalent groups provide more control for threats to validity and they allow for stronger, more confident conclusions. Two examples of experimental designs are:

1. Pretest/posttest control-group design

<table>
<thead>
<tr>
<th>Group</th>
<th>T₀</th>
<th>X</th>
<th>T₁</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Experimental Group</strong></td>
<td>T₀</td>
<td>X</td>
<td>T₁</td>
</tr>
<tr>
<td><strong>Control Group</strong></td>
<td>T₀</td>
<td>T₀</td>
<td>T₀</td>
</tr>
</tbody>
</table>

2. Solomon four-group design

<table>
<thead>
<tr>
<th>Group</th>
<th>T₀</th>
<th>X</th>
<th>T₁</th>
<th>T₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (R)</td>
<td></td>
<td></td>
<td>X</td>
<td>T₁</td>
</tr>
<tr>
<td>2 (R)</td>
<td></td>
<td></td>
<td>T₁</td>
<td>T₂</td>
</tr>
<tr>
<td>3 (R)</td>
<td>X</td>
<td></td>
<td></td>
<td>T₂</td>
</tr>
<tr>
<td>4 (R)</td>
<td></td>
<td></td>
<td>T₂</td>
<td></td>
</tr>
</tbody>
</table>
The pretest/posttest control-group design minimizes many of the internal validity threats by the addition of a second group that receives no training. However, threats to external validity (effect of pretest) still present a problem. The Solomon design monitors external validity by adding two groups who are not pretested. Thus, the effects of the pretest can be evaluated independently of the effects of the training. Even though the Solomon design "probably represents the ultimate in experimental elegance and control" (Landy, 1989, p. 345), it is a complicated design that is not always feasible for use in a field training environment due to the requirement for random assignment and a large number of subjects (Cascio, 1987).

Other designs that might be used to assess a training program include a nonequivalent control-group design:

<table>
<thead>
<tr>
<th>Experiment Group</th>
<th>( T_1 \times T_2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Group</td>
<td>( T_1 \times T_2 )</td>
</tr>
</tbody>
</table>

Trainee groups are not randomly selected and are both subjected to pretesting. Therefore, internal and external validity factors must be considered. Regardless of which research design is used as many of the threats to internal and external validity, as described by Campbell and Stanley (1963) and Cook and Campbell (1976), as possible
should be controlled (Cascio, 1987). While this will probably be a difficult undertaking, Sims (1990) says, "poor evaluations do not provide firm data for improving and controlling the quality of the training system" (p. 192).

After training objectives have been specified, training content determined, and evaluation methodology developed, the design of the training program can begin.

**Designing the Training Program**

In the past, designing a training program consisted of three distinct steps: (1) selecting a training method most compatible with the training content (e.g., lecture, role-playing); (2) selecting a medium (e.g., videotape); and (3) incorporating learning principles (e.g., overlearning). Training methods or techniques are usually classified into two broad categories—on-site and off-site (Muchinsky, 1990). On-site or on-the-job training (OJT) takes place in the workplace, while an employee is actually working. The methods used include apprenticeships, job rotation, and committee assignments. Off-site or off-the-job training takes place away from the trainees' work area. Methods used include information presentation techniques such as lectures, correspondence
courses, reading lists, and behavior modeling. Training media include computers, videotape, and overhead transparencies.

Today, however, with increased technological sophistication and the influence of instructional and cognitive psychology, the boundaries of the three above-mentioned steps have become blurred. Clark (1985) argues that medium has become confounded with methods. For example, changes in student learning contributed to computer based education (CBE) might be due to the "uncontrolled effects of different instructional methods, content and/or novelty" (p. 137). Kulik, Kulik, and Bangert-Drowns (1985) disagree saying there is evidence that "most CBE programs have had positive effects on student learning" (p. 385).

Respected training researchers often classify lectures as both media (Campbell, 1988) and method (Goldstein, 1986). Computer-assisted instruction has also been identified as media (Campbell, 1988) and method (Goldstein, 1986). It is not surprising that Campbell (1988) concludes "the state of the art as regards the selection or design of teaching methods does not yield great precision" (p. 199).
As for learning principles, Goldstein (1986) says, it seems that traditional learning principles applied to modern training or instructional settings would be effective...however, the assumption is invalid. There is a wide gulf separating learning theories and principles from what is actually needed to improve performance.

(p. 64)

Goldstein and Gilliam (1990) echo this by saying, "a definitive list of learning principles that could be adapted to the training setting has not been completely specified for adult learners in work environments" (p. 136).

Despite all this negativity, the fields of cognitive and instructional psychology are making strides in the area of training design principles. Gagne and Briggs (1979), from the field of instructional psychology, developed a theory of instruction that relates five learning outcomes (i.e., intellectual skills, verbal information, cognitive strategies, motor skills, and attitudes) to a series of external instructional events (e.g., gaining attention, presenting material, providing feedback) designed to support the internal processes of learning.
Table 1 (Gagne and Briggs, 1979, cited in Campbell, 1988, p. 200) details how each instructional event should be applied to a specific type of capability. For example, if a motor skill (golf swing) is the capability of interest, presenting the stimulus material would involve providing external stimuli (a golf club) for performance. One caveat when using a table like this—there may be more than one capability involved in performing a task, thus requiring a combination of the instructional events specified for each capability. Gagne and Dick (1983) say that this prescriptive instructional model makes it possible to deal with instruction of many forms in a wide variety of settings principally because,

"it is based upon identified aspects of information-processing theories of learning...including the human modeling concept of Bandura (1969)...it attempts to include all of the kinds of learning outcomes to which instruction is usually addressed...provides a rational basis for instruction as a set of events which interact with internal learning processes, and also with previously acquired contents retrieved from the learner's long-term memory. (p. 266)"
Table 1. Instructional events and the conditions of learning they imply for five types of learned capabilities

<table>
<thead>
<tr>
<th>Instructional Event</th>
<th>Intellectual Skill</th>
<th>Cognitive Strategy</th>
<th>Information</th>
<th>Attitude</th>
<th>Motor Skill</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gainning attention</td>
<td>Provide description and example of the performance to be expected</td>
<td>Clarify the general nature of the solution expected</td>
<td>Introduce stimulus change; variations in sensory mode</td>
<td>Provide a demonstration of the performance to be expected</td>
<td></td>
</tr>
<tr>
<td>2. INforming learner of objective</td>
<td>Stimulate recall of subordinate concepts and rules</td>
<td>Stimulate recall of context of organized information</td>
<td>Stimulate recall of relevant information, skills, and human model identification</td>
<td>Stimulate recall of executive subroutine and part-skills</td>
<td></td>
</tr>
<tr>
<td>3. Stimulating recall of prerequisites</td>
<td>Present exemplars of concept or rule</td>
<td>Present novel problem in propositional form</td>
<td>Present human model, demonstrating choice of personal action</td>
<td>Provide practice with feedback of performance achievement</td>
<td></td>
</tr>
<tr>
<td>4. Presenting the stimulus material</td>
<td>Provide verbal cues to proper combining sequence</td>
<td>Provide prompts and hints to novel solution</td>
<td>Provide verbal links to a larger meaningful context</td>
<td>Provide practice with feedback of performance achievement</td>
<td></td>
</tr>
<tr>
<td>5. Providing learning guidance</td>
<td>Ask learner to apply rule or concept to new examples</td>
<td>Ask for problem solution</td>
<td>Ask for information in paraphrase, or in learner's own words</td>
<td>Provide feedback on degree of accuracy and timing of performance</td>
<td></td>
</tr>
<tr>
<td>6. Eliciting the performance</td>
<td>Confirm correctness of rule or concept application</td>
<td>Confirm originality of problem solution</td>
<td>Confirm correctness of statement of information</td>
<td>Learner executes performance of total skill</td>
<td></td>
</tr>
<tr>
<td>7. Providing feedback</td>
<td>Learner demonstrates application of concept or rule</td>
<td>Learner originates a novel solution</td>
<td>Learner restates information in paraphrased form</td>
<td>Learner makes desired choice of personal action in real or simulated situation</td>
<td></td>
</tr>
<tr>
<td>8. Assessing performance</td>
<td>Provide spaced reviews including a variety of examples</td>
<td>Provide occasions for a variety of novel problem solutions</td>
<td>Provide verbal links to additional complexes of information</td>
<td>Learner continues skill practice</td>
<td></td>
</tr>
<tr>
<td>9. Enhancing retention and transfer</td>
<td>Provide external stimuli for personal action, including tools or implements</td>
<td>Provide feedback on degree of accuracy and timing of performance</td>
<td>Provide feedback on degree of accuracy and timing of performance</td>
<td>Learner executes performance of total skill</td>
<td></td>
</tr>
</tbody>
</table>

Source: Gagne & Briggs, 1979, cited in Campbell, 1988, p. 200
Despite Goldstein and Buxton's (1982) lament, "there is little taxonomic information available to help the thoughtful training analyst choose the appropriate training methodology" (p. 173), just using the guidelines that are presently available would contribute significantly to the training process (Campbell, 1988).

**Training**

Although the foregoing considerations will not guarantee a successful training program, they will ameliorate many of the problems frequently associated with them and will serve as a solid foundation for the actual training. Examples of issues to be considered at this point include selecting the trainers, deciding on the facilities, developing an agenda, locating equipment, and securing supplies. Once such training has been conducted, there is still one important question to be addressed, Was the training effective? This question may be answered through an evaluation of the training program.

**Training Evaluation**

Because training evaluation attempts to answer the question, Are trainees proficient on the behavioral objectives?, training evaluation should not be expected to yield an absolute judgement concerning "all good" or "all bad." Training evaluation must be considered an
information-gathering process--feedback for the whole training system. This feedback is then used to effect changes in the training system, if necessary.

The results of any statistical analysis (e.g., reliability, validity, analysis of co-variance) are only one element of the evaluation process; perhaps an objective is worded ambiguously, or a task specification is incorrect, or one of the trainers conducted additional training sessions as a means of raising trainees' performance scores. Each step in the training process must be examined with the insight provided by statistical analysis and the experience of the trainers. Identifying and correcting deficiencies improves the training program, thus leading to improved performance and accomplishment of strategic goals.

In summary, the training process must be viewed as a system that interacts with various segments of the organization as well as the external environment. Attempting to develop a training program independent of these concerns will probably lead to failure.

Social Cognitive Theory

An early criticism of the training literature stated it was "nontheoretical" (Campbell, 1971, p. 565). By
1980, however, Goldstein found "substantial development...of...quality of articles...which develop important conceptual and theoretical material" (p. 231). One of the theories being used to develop effective training methods was Bandura's (1974, 1977b, 1986) social learning theory (renamed social cognitive theory in 1986 to more closely reflect the contents of the theory).

Bandura (1974) took the behaviorists to task by saying:

To ignore the influential role of covert self-reinforcement in the regulation of behavior is to disavow a uniquely human capacity of man....need to broaden the scope of research into the reinforcement processes regulating human behavior. Much the same might be said for the ways in which human learning is conceptualized and investigated. Our theories have been incredibly slow in acknowledging that man can learn by observation as well as by direct experience. This is another example of how steadfast adherence to orthodox paradigms makes it difficult to transcend the confines of conceptual commitment. (p. 863)

Bandura (1977b) believes that man uses symbols (visual and verbal) as the vehicles of thought. Symbols can represent
events, cognitive operations, and relationships. Therefore, man has the capacity to symbolically represent modeled activities, thus acquiring new behaviors observationally. Observational learning is an adaptive process that is vital for both development and survival. Modeling can decrease inappropriate responses. If individuals rely solely on the effects of their own actions to inform them about what to do, chances of survival would be slim.

Observational learning is governed by four subprocesses: attentional, retention, production, and motivation. Selective attention determines what is observed and what information is extracted from modeled events. Some of the factors affecting attentional processes are salience, discriminability, complexity, and the attractiveness of the model.

Retention processes involve remembering modeled information by representing it in symbolic form in permanent memory. This involves actively transforming and restructuring information about events. Symbolic transformations permit the storing of a great deal of information in an easily remembered form.

Information may be coded in images or verbal symbols in the form of conceptions, rules, and
propositions. Symbolic codes may be reductive ones, which distill events to concise form, or they may include elaborative linguistic and imaginal constructions. Moreover, they may be structurally isomorphic with the modeled behavior, or they may be rules that capture the underlying conceptual structure but bear little resemblance to the details of the exemplars. (Bandura, 1986, p. 56)

Production processes involve translating the abstract representations and rules of action into actual behavior. Actual behavior can be faulty if the internal conception is inadequate and/or there are deficits in needed motor skills. Feedback can be used to correct faulty actions if the type of feedback is matched to the faulty performance. For example, informative feedback for correcting a golf swing would include identification of troublesome segments coupled with viewing a skilled performance of those segments.

Motivational processes are included because individuals do not enact everything they learn. "Performance of observationally learned behavior is influenced by three sources of incentives—direct, vicarious, and self-produced" (Bandura, 1986, p. 68).
Modeled behavior that results in a valued outcome provides a direct incentive and will elicit performance; modeled behavior that results in unrewarding or punishing effects will not. Modeled behavior that appears to be effective for others provides a vicarious incentive and will be favored over behavior that produces negative consequences. Self-produced incentives influence performance of observationally learned behavior because people generate evaluative reactions to their own behavior. These reactions regulate which behaviors an individual will choose to perform. Behavior that is self-satisfying is expressed; behavior that is disapproved will be rejected.

The foregoing processes govern observational learning. Are there also processes that govern an individual's subsequent actions? Bandura (1977a, 1982, 1986, 1989) believes there are cognitive mediators of such action. One such mediator is the self-percepts of efficacy. **Self-Efficacy**

Perceived self-efficacy is defined as people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances. It is concerned not with the skills one has but with judgments of what one can do with whatever skills one possesses. (Bandura, 1986, p. 391)
So, efficacy involves a generative capability rather than a fixed act or merely knowing what to do. Individuals must be able to organize their cognitive, social, and behavioral subskills into actions to serve many purposes.

According to Bandura (1977a), there are four principal sources of information upon which individuals base their self-knowledge about efficacy: performance accomplishments (enactive attainment), vicarious experience, verbal persuasion, and physiological state (emotional arousal). Individual successes or failures are the most influential sources of information because they are based on personal experiences. Because performance levels can be affected by factors other than ability, the appraisal of self-efficacy is an inferential process that weights the relative contribution of ability and nonability factors. People who regard themselves as efficacious persist in their efforts when performance goals are not attained and usually attribute their failures to lack of effort or adverse conditions such as incomplete instructions or faulty equipment. People who see themselves as inefficacious readily give up when faced with a difficult task and attribute their failure to lack of ability; success is often attributed to external factors such as "luck."
The second source of information for efficacy self-knowledge is vicarious experience. Seeing a similar individual successfully perform a task leads an observer to the conclusion that they too possess the capabilities to master comparable tasks, thus raising self-percepts of efficacy. The reverse can also be true. Seeing a similar individual continually fail, despite perceived high efforts, can lower perceived self-efficacy. Modeling tends to have a larger effect when individuals have little prior experience on which to base personal evaluations. This lack of factual evidence for performance adequacy leads to a greater reliance on modeled indicators, be they positive or negative.

Verbal persuasion is a third source of information for self-knowledge about one's efficacy. Verbal persuasion has limited power to effect lasting increases in self-efficacy; however, individuals who have been persuaded of their inefficacy either avoid challenging activities or quickly give up when faced with difficulties. "By restricting choice behavior and undermining effort, self-disbeliefs can create their own validation" (Bandura, 1986, p. 401).

The final, though somewhat limited, source of information for efficacy self-knowledge is the
individual's physiological state. People who are tense and viscerally agitated probably will not perform up to their capabilities since high arousal usually debilitates performance; thus, percepts of efficacy are lowered. Individuals that do not experience aversive arousal are more inclined to expect success, thereby increasing perceptions of self-efficacy.

Efficacy expectations can vary on several dimensions. They can differ in strength--individuals with strong expectations of goal attainment will persist in their actions despite disconfirming experiences while weak expectations are easily eroded. Expectations can also vary in magnitude--if a series of related tasks are hierarchically ordered, some individual's efficacy expectations will be limited to the simple tasks while others will include the most difficult task. Efficacy expectations can also differ in generality--some experiences inculcate a generalized sense of efficacy (e.g., I can whip the world) while others instill a limited sense of efficacy (e.g., I can drive a car across town).

Because self-efficacy is concerned with judgments individuals make relative to their capabilities to perform a task, it follows that there should be a relationship
between self-efficacy and task performance. Such a relationship has been found in several studies. Locke, Frederick, Lee, and Bobko (1984) designed a study to examine the effects of self-efficacy and task strategies on performance on a task that consisted of listing uses for common objects. They reported that "ability, self-efficacy, goals, and task strategies were all related to task performance" (p. 241). Path analysis supported self-efficacy as a key causal variable in performance (Bandura, 1982) and indicated its effects were indirect as well as direct. Locke et al. (1984) state that "the most unexpected finding...was the very powerful effect of self-efficacy even with ability and past performance controlled" (p. 247).

A similar study was conducted by Gist (1986). Participants, randomly assigned to either an experimental group that received a training intervention designed to increase self-efficacy or a control group, were asked to generate ideas for improving organization quality and customer service. Significantly higher post-test self-efficacy perceptions for the experimental group indicated that increasing self-efficacy contributed to the increase in raw scores for idea generation. The experimental group recorded a 73% increase versus a 44% increase for the control group.
Tannenbaum, Mathieu, Salas, and Cannon-Bowers (1991), conducted a study that examined the development of organizational commitment, academic and physical self-efficacy, and motivation in a U.S. Naval Training Command (N=666). Physical self-efficacy at pretraining and at posttraining correlated -.15 and -.12 with posttraining performance on academic tests. Academic self-efficacy, pretraining and posttraining, correlated .20 and .32 with academic test performance at posttraining. All coefficients were significant at p<.01, again providing support for a positive relationship between self-efficacy and task performance.

A study by Gist, Schwoerer, and Rosen (1989) investigated the effects of two training methods, behavior modeling and tutorial, on the software self-efficacy of university managers and administrators. These managers and administrators scored either high, moderate, or low on a computer self-efficacy measure administered prior to training in the use of a microcomputer spreadsheet software package. Participants who received the behavior modeling training scored significantly higher on the performance test administered at the close of the training session than did participants in the tutorial condition, regardless of their computer self-efficacy score.
Subjects in the behavior modeling condition also recorded a significantly higher level of software self-efficacy (measured half way through the training session) than did subjects who received the tutorial training. Additionally, software self-efficacy correlated .80 and .42 with performance for the behavior modeling and tutorial trainees, respectively.

In summary, the foregoing research illustrates that perceived self-efficacy may be a significant determinant of performance. The Gist, Schwoerer, and Rosen (1989) study provides evidence for a positive effect of training method, specifically behavior modeling, on self-efficacy.

Behavior Modeling

Goldstein and Sorcher (1974) developed a training method based on Bandura's (1969) human learning theory that uses modeling as one of the principal components. This training method, Applied Learning, was first employed in industry to train supervisory personnel in the use of interpersonal skills. Applied Learning continued to evolve and, today, is known as behavior modeling. Behavior modeling is consistently shown to be an effective training method in business and industry (Burke & Day, 1986; Latham, 1988).
Although modeling is a key component of behavior modeling, additional elements are necessary for successful training. Goldstein and Sorcher (1974) originally listed four components: modeling, role-playing, and social reinforcement, all of which contribute to the fourth element, transfer of training. Recently, as a result of research conducted principally by Decker (1980, 1982, 1984), a fifth component, retention processes, has been added (Decker & Nathan, 1985).

The first component, modeling, consists of presenting a model, either live or on film, who correctly displays the desirable behavior the trainee is to learn (e.g., interpersonal skill, operation of equipment). Modeling provides a standard for performance.

Modeling is facilitated when the modeling display depicts the behaviors to be modeled: 1) in a vivid and detailed manner, 2) in order from least to most difficult behaviors, 3) with sufficient frequency and repetitiveness to make learning probable, 4) with a minimum of irrelevant details, 5) when several different models rather than a single model are utilized, 6) when a live or video-tape acted model is used, and 7) when a positive modeling display is shown (with or
without a negative modeling display) rather than a model only depicting what not to do. (Decker & Nathan, 1985, p. 44)

As previously stated, modeling alone is not sufficient for successful training (McFall & Twentyman, 1973; Stone & Vance, 1976). Decker's studies (1980, 1982, 1984) provide evidence that behavior modeling training can be enhanced if the learning points originally used by Goldstein and Sorcher (1974) in their Applied Learning technique are formalized and treated as aids to retention.

Thus, the second component of behavior modeling, retention processes, consists of providing trainees with "learning points." Learning points are written descriptions of "specific key behaviors" (Goldstein & Sorcher, 1974, p. 29) such as "set a specific date for a follow-up meeting" (Latham & Saari, 1979, p. 241). There are three types of learning points (Decker, 1984):

1. behavioral--"element-by-element description of the model's behaviors" (p. 712)
2. summary label--"labels for the essential elements of the key behaviors" (p. 712)
3. rule-oriented--"principles underlying the model's performance" (p. 712).
Behavioral and summary label learning points are more effective if the modeled behavior is to be reproduced. If the goal of the training is to generalize the modeled behavior to other settings and situations, summary label and rule-oriented learning points are more effective than behavioral learning points. The learning points can be used by individuals to symbolically code observed behaviors, thus aiding retention. In other words, the various modeled elements can be organized and reduced by an individual into a pattern of images or verbal symbols "that can be easily stored, retained intact over time, quickly retrieved, and used to guide performance" (Decker, 1980, p. 628).

Behavioral rehearsal is the third component of behavioral modeling. This was originally limited to role-playing (Goldstein & Sorcher, 1974), however, the term has since been broadened to incorporate trainees playing their own role. "Behavior rehearsal is reality practice and action planning. It involves realistic behavior under unrealistic conditions allowing a person to take on the person's own role and practice new behavior in an artificial situation" (Decker & Nathan, 1985, p. 61). Research showed, however, that providing practice without feedback does not seem to be effective (Decker & Nathan,
Consequently, a fourth component, feedback and social reinforcement, is included in the behavior modeling technique.

Feedback (or knowledge of results) is crucial for both learning and motivation. Feedback serves three functions: (1) it conveys information regarding correctness of performance; (2) it makes the learning process more interesting, thus increasing motivation to learn; and, (3) it facilitates the setting of goals which can be used to maintain or improve performance (Wexley & Latham, 1981).

While feedback is simply knowledge of results, reinforcement is a consequence of behavior, is contingent upon behavior, and will either increase or decrease the frequency of that behavior. There are several forms of reinforcement. Social reinforcement can be demonstrated by praise such as "that's correct." Self-reinforcement comes from the individual upon successful completion of a task. Vicarious reinforcement results from watching other individuals being rewarded or punished for their behavior. Once again, even though feedback and reinforcement are effective in changing behavior, they are not sufficient for behavioral change in the behavior modeling technique and must be coupled with the other three components.
The final component of behavioral modeling, transfer of training, follows from and is a result of the previous four components. Transfer of training simply means that the skill, knowledge, or attitude learned during the formal training program is used on the job. This is the primary goal of the training process. The behavior modeling technique recognizes that modeling, retention processes, behavioral rehearsal, and feedback and social reinforcement all facilitate transfer of training. "Studies examining all components of behavior modeling have shown that all of the components must be present to have the most effect on learning new skills" (Decker & Nathan, 1985, pp. 65-66).

Although it is important for behavior to be transferred, it is just as important for behavior to be maintained. Lack of support in the transfer context, either from insufficient or nonexistent reinforcement, or competing behaviors are the primary reasons for the absence of behavior maintenance.

Why is behavior modeling an effective training method? Much of the method's success is due to its strong theoretical foundations. Figure 2 illustrates the relationship between the basic components of the modeling process (Bandura, 1977b) and the components of behavior modeling.
<table>
<thead>
<tr>
<th>Modeling Process</th>
<th>Behavior Modeling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attention</td>
<td>Modeling</td>
</tr>
<tr>
<td>Retention</td>
<td>Retention Processes</td>
</tr>
<tr>
<td>Motor Reproduction</td>
<td>Behavioral Rehearsal</td>
</tr>
<tr>
<td>Motivational</td>
<td>Feedback and social reinforcement</td>
</tr>
<tr>
<td></td>
<td>Transfer of Training</td>
</tr>
</tbody>
</table>

Figure 2. Relationships between Bandura's (1977b) modeling process and the behavior modeling training components

Behavior modeling training also addresses all four of Bandura's (1986) efficacy expectations. Personal performance is included in behavioral rehearsal which, in turn, should reduce the emotional arousal that typically accompanies new situations. Vicarious learning is provided by the model and verbal persuasion is used to present the key behaviors.

In addition, because the Gagne-Briggs (1979) prescriptive instructional model is also based on Bandura (1977b), behavior modeling incorporates most of the
instructional events (i.e., gaining attention, informing learner of objective, presenting the stimulus material, providing learning guidance, eliciting the performance, providing feedback, assessing performance, and enhancing retention and transfer) specified for learning.

Even though behavior modeling is touted as a successful training method, the research literature on its efficacy is relatively sparse. Goldstein and Sorcher introduced the method in 1974 in their book Changing Supervisor Behavior. Sorcher successfully used behavior modeling techniques at General Electric in the early 1970s to train first-line supervisors and the hard-core unemployed in interpersonal relations and effective communication. The idea was to reduce turnover. The trained group achieved a 72 percent retention rate versus 28 percent for the untrained group. This positive result led to an expanded training program in supervisor-employee interactions for all first-line supervisors at GE. Units supervised by trained employees recorded an increase in production when compared to units supervised by untrained employees (Goldstein & Sorcher, 1974).

Burnaska (1976) has reported on interpersonal skills training for managers of professional employees at the same firm. Trained judges evaluated the managers in a
role-play situation one month and four months after the training and found a higher performance level for trained managers versus untrained managers. The managers' subordinates, however, reported only a slight improvement in the managers' overall interpersonal skills. Burnaska (1976) attributed this apparent lack of improvement to inadequate time lapse between training and subordinate reports, as well as the deficiency of the questionnaire administered to the subordinates (i.e., measured "good guy" rather than improved ability to interact).

Moses and Ritchie (1976) developed a training program to aid first-line supervisors in more effective interactions with their subordinates. In an assessment center setting two months after participating in the training program, trained supervisors were rated significantly more proficient than untrained supervisors when role-playing problem discussions. A similar study conducted by Byham, Adams, and Kiggins (1976) revealed that accounting operations supervisors were perceived by their subordinates as using the "correct" steps to handle various supervisor-subordinate interactions approximately 20 percent more frequently after behavior modeling training.
Smith (1976) used behavior modeling to improve employee morale. Trained branch managers outperformed untrained managers when rated on effectiveness of communication while conducting meetings. This rating was obtained from company employees via an opinion survey. Ratings by employees of overall satisfaction also improved significantly in the branches supervised by trained managers. In a second study, Smith (1976) used three different types of training—traditional (lecture), behavior modeling, and behavior modeling plus team building, in an effort to improve branch managers' communications skills, customer satisfaction with the branch, and the branches' sales performance. Significant improvement in communication skill was achieved by the two behavior modeling training groups. Surveys conducted four and ten months after training showed no significant differences in customer satisfaction. Sales performance improved for only the Team Building group. Although these studies are sometimes criticized because of a lack of internal validity (McGehee and Tullar, 1978), the positive results support the use of behavior modeling as an effective training method.
One study that used behavior modeling for training and is consistently cited as being of high quality (Decker & Nathan, 1985; Goldstein, 1986; Goldstein and Associates, 1989; Landy, 1989) is that of Latham and Saari (1979). The training goal was to improve the interpersonal skills of supervisors when dealing with subordinates. Twenty first-line supervisors were randomly assigned to the training group and 20 supervisors were assigned to a control group. The control group was unaware of this designation having been informed that due to logistical constraints they would be trained at a later date.

Latham and Saari (1979) utilized all four of Kirkpatrick's (1976) criterion measures—reaction, learning, behavioral, and performance—in their training program. Supervisors' reactions to the training were positive both immediately after the training and again eight months later. Trained supervisors scored significantly higher than the control group on the learning measure (questions asked how a supervisor would handle a variety of situations) and on the behavioral measure (supervisors role-played resolution of various problems) administered after the training sessions.

Superintendents evaluated the supervisor's job performance one month before training and a year after the
training. Evaluations for the trained supervisors were significantly better than the control group. An especially interesting aspect of this study involved the control group. This group, trained one year after the preliminary program, achieved the same scores on the four criterion measures after training as did the initial group of trainees.

Although this study was conducted in a field setting, it does not suffer from the methodological problems associated with the earlier behavioral modeling studies. Thus, it provides solid evidence for the effectiveness of the behavior modeling training method.

In a study using behavior modeling to present methods for increasing their sales to retail sales representatives, Meyer and Raich (1983) found that trained sales representatives' per-hour commissions increased about 7% in the following six months. The untrained control group reported a 3% decline during the same period. Though unpredicted, the behavior modeling training may also have had a positive effect on turnover and promotion rates. One year after the training, 86% of the sales associates receiving the behavior modeling training were still on the job, 7% had been promoted, and 7% left the company. Of the employees in the control
group, 77% remained as sales associates, 22% left the
company, and 1% received a promotion.

Russell, Wexley, and Hunter (1984) designed a study
that used behavior modeling as a means to improve
supervisors' interactions with their subordinates. The
training was conducted in a large industrial plant owned
by a Fortune 500 company. The behavior modeling training
produced favorable trainee reactions and a significant
gain in learning. Job behavior ratings completed by both
the supervisor and their managers and performance ratings
completed by co-workers, however, indicated the
supervisors' job behavior did not change and their
performance did not improve. Russell, Wexley, and Hunter
(1984) explained that the lack of job behavior change and
performance improvement, compared to studies showing
positive changes, may be due to "a difference in the
nature of the post training environments....trainees were
encouraged to use the new skills, but no formal evaluation
was made and no sanctions were levied on those who failed
to comply" (p. 477).

Although this could, in fact, be a reasonable
explanation, and, in many cases is justified, there may be
an alternative explanation for their findings. Due to
layoffs, the company was "operating with high seniority
people in both their management and hourly ranks" (p. 468). The supervisors participating in the behavior modeling training classes and serving as controls had a mean of almost 20 years of plant seniority with 10 years of managerial experience. They averaged 48 years of age. Because the study does not mention any pre-training needs assessment, the alternative explanation could be that training was not needed--performance and job behavior were already adequate.

As previously reported, the Gist, Schwoerer, and Rosen (1989) study also supports behavior modeling as an effective training method. Participants that received behavior modeling training scored significantly higher on the end-of-session performance test when compared to individuals participating in the tutorial condition.

**The Present Study**

Taken together, the foregoing review supports the use of behavior modeling as a reasonably effective training method. One deficiency in the studies reviewed is the lack of diversity in the skills being trained. The majority of studies (80%) deal with training in interpersonal skills. Two studies were concerned with increasing sales performance, which is related to
interpersonal skill training. Only one study involved training in a different setting—computer software. The effectiveness of behavior modeling training should ideally be investigated in a variety of settings. One setting where this training technique might be useful is training operators of electronic equipment, specifically, photocopiers.

Recent research completed by the Human Factors Research Group (1991) revealed that individuals using photocopiers on the job were often unaware of all the functions (e.g., automatic duplex, editing) available on their photocopiers. This lack of awareness often results in inefficient use of the photocopier and the employee's time. Demographic data collected from a variety of studies completed by this same research group over a three-year period revealed that 70% of the participants, both inexperienced and experienced photocopier users, preferred a demonstration to an instruction manual or trial and error method of training for photocopier use.

Given this preference, it seems that a demonstration-based method would be an effective approach for training photocopier operators and could ameliorate the lack of awareness of available functions. Hence, the present
research seeks to answer two questions: (1) Is behavior modeling an effective training method for photocopier operators? and, (2) Is behavior modeling as effective, or more effective, than text (instruction manual) training, or trial and error learning?
METHOD

The Training System

As suggested, developing an effective training program requires consideration of multiple components comprising the training system.

Organizational Analysis

Photocopiers have become standard equipment in most businesses today. Untrained personnel waste supplies and time. Improperly operated equipment could result in extensive downtime and/or expensive repairs. Therefore, any business utilizing a photocopier should have at least a limited training program for potential photocopier operators.

Person Analysis

Who needs to be trained? Obviously, frequent copier operators should be trained extensively. In addition, limited training would be of benefit to the infrequent users who might find themselves in a situation needing just one very important copy. A recent survey of a random sample of business firms in Iowa revealed that photocopier operators ranged from mail clerks to company presidents (Human Factors Research Group, 1991). This indicates that basic photocopier training would be of benefit to all employees.
Task Analysis

Results of this same study indicate that copying single-side 8 1/2" x 11" originals, duplexing (two-side copies), and reducing an image are frequently performed photocopying jobs. Hence, four basic tasks were chosen for the present training program. They are:

1. Load a stack of paper into the 11" x 8 1/2" cassette.
2. Make one copy of a single-side original.
3. Make one 2-side (duplex) copy of two 1-side originals.
4. Reduce two 8 1/2" x 11" originals so they fit on one side of an 8 1/2" x 11" copy.

Training Objectives

The training objectives followed directly from, and were identical to, the training tasks.

Training Content

Here again, the training content was a direct reflection of the tasks identified in the task analysis. Training content was limited to the four basic tasks previously identified.

Evaluation Methodology

Criteria. The training program's success was measured by recording trainee's time to complete each of the four
basic training tasks previously listed. Each trainee was also timed as they completed an additional, transfer, task. The transfer task (Task 5), reducing four 8 1/2" x 11" originals so they fit on the front and back of one 8 1/2" x 11" copy, was a combination of the original training Tasks 3 and 4. Successful completion provided evidence of the generalizability of the training (i.e., transfer of training). Tasks 1 through 5 fulfilled the criterion relevance requirement. Additionally, Tasks 1 through 4 fit Kirkpatrick's (1976) learning criteria and Task 5 served as a behavior criterion. A training evaluation (reaction) questionnaire was also administered. Thus, multiple criteria were employed in this research.

Experimental Design. Random assignment of subjects to groups to receive one of the training methods (independent variable) being evaluated or to serve as controls assured equivalent groups and minimized most threats to validity. The experimental design used in this research is detailed in Figure 3. For efficiency in illustrating the experimental design, R represents the random selection of subjects, T represents the measure administration, and X represents the training program.
Training Method (Ind. Variable) | Session I Training | Session II Perform. Test (Dep. Var.) (1 week later)
--- | --- | ---

Behavior Modeling:

**In-Person Demonstration (R)\(^a\)**
- Trainer 1 \(n=10\)  
  \(T_1 \times T_2 \quad T_3 \quad T_4\)
- Trainer 2 \(n=10\)  
  \(T_1 \times T_2 \quad T_3 \quad T_4\)

**Video Demonstration (R)\(^b\)**
- Trainer 1 \(n=10\)  
  \(T_1 \times T_2 \quad T_3 \quad T_4\)
- Trainer 2 \(n=10\)  
  \(T_1 \times T_2 \quad T_3 \quad T_4\)

**Instruction Manual (R)\(^b\)**
- \(n=20\)  
  \(T_1 \times T_2 \quad T_3 \quad T_4\)

**Trial and Error (control) (R)\(^b\)**
- \(n=20\)  
  \(T_1 \quad T_2 \quad T_3 \quad T_4\)

---

\(^a\)The trainers will conduct all of Session I. The experimenter will conduct Session II.

\(^b\)The experimenter will conduct Session I and Session II.

Figure 3. Present study experimental design
Because general cognitive ability and self-efficacy are thought to predict performance (Hunter, 1986; Ree & Earles, 1991; Thorndike, 1985, 1986; Bouffard-Bouchard, 1990; Gist, Stevens, & Bavetta, 1991; Tannenbaum & Yukl, 1992), these two variables were assessed at T₁ (the first 20 minutes of Session I). Detailed descriptions of the vocabulary test and the self-efficacy questionnaire are included in the Measures section of this paper.

Time for the training portion (X) of Session I was derived by timing training sessions for pilot in-person demonstrations that covered the four basic tasks used in this research. These training sessions averaged 17 minutes. To equate training time across all conditions (assuming that the behavior modeling condition would continue to average 17 minutes), participants in the instruction manual and trial and error conditions were allowed a total of 20 minutes to complete the four basic training tasks (individual tasks were not timed). Because a person's level of self-efficacy is partially dependent on performance accomplishments, self-efficacy can vary if task performance is successful or unsuccessful. Therefore, self-efficacy was again assessed at the close of the training session, T₂.
One week after the training session, subjects returned for the Session II performance test (dependent variable). Participants had a total of 20 minutes, $T_5$, to complete the four basic training tasks plus the fifth, transfer, task. This figure was derived by timing trial and error subjects during the pilot phase of this research. Without prior exposure to the five tasks, these subjects averaged 25 minutes for completion. At the conclusion of the performance test, subjects again completed the self-efficacy measure and the training evaluation (reaction) questionnaire, $T_4$. Assessing self-efficacy over time is an added feature of this study that allows the researcher to determine whether self-efficacy varies with training method and performance time.

**Designing the Training Program**

Two training methods were investigated. The first was behavior modeling. The second was text (instruction manual). A trial and error condition was used for a control group as no actual training was given to these subjects.

The behavior modeling and instruction manual methods are compatible with the training content (task performance on a photocopier). Behavior modeling is versatile in that it can be accomplished using either an in-person or a
video demonstration. Both mediums were used to ascertain whether or not they were equally effective.

Scripts, prepared to ensure as much consistency as possible across all the training conditions, were used during the training sessions. Copies of the scripts can be found in Appendix A. In developing the script for the behavior modeling conditions, all five of the components of the training method were included. The first component, modeling, was covered by the in-person or video demonstrations. Retention processes, the second component, were covered through the use of the summary learning points developed for each task (Appendix B). After each task was demonstrated, the subject was handed an 8 1/2" x 11" sheet containing the learning points and was asked to read them aloud before completing the task.

The third component, behavioral rehearsal, was included when the subject was given time to complete the demonstrated task. Feedback and social reinforcement, the fourth component, was provided when the subject successfully finished the task (self-reinforcement) and when the trainer/experimenter said, "That's a correct copy" (social reinforcement).

The final component, transfer of training, was demonstrated during the Session II performance test.
Because there was no actual job performance associated with this experiment, performance on the fifth, transfer, task (a combination of Tasks 3 and 4), can be used as evidence for training transfer. Subjects must be able to recall, expand, and generalize from the initial training tasks to a task that is more complex (i.e., requires two paper placements and the presses of two keys as compared to one each for the basic training tasks). Thus, the ability to successfully complete the transfer task provides evidence that learning has occurred.

Because this research is not concerned with improving an instruction manual, the original document prepared by the photocopier manufacturer was adapted and reproduced for subject use. Significant changes consisted of exclusion of the more sophisticated photocopier functions and inclusion of the descriptions for the control panel used in the behavior modeling script. These changes equated the information available for each training method. A copy of the instruction manual can be found in Appendix C.

Folders containing task instructions, the original training documents to be copied, and a sample of the output expected were prepared for each task. This assured consistency of task presentation. Copies of these documents can be found in Appendix D.
Training

Two potential confounds, a trainer effect and a trainer gender effect, were considered when selecting the behavior modeling trainer. To add generalizability and to avoid any idiosyncratic effect that might be associated with a given trainer, two trainers were used for the in-person and video demonstrations. To avoid a trainer gender confound, both trainers were the same gender. Logistical considerations dictated the selection of female trainers. Because research evidence (Bandura, 1986) suggests that model similarity has a positive effect on trainees, and the participants were students enrolled in undergraduate classes, two undergraduates were selected as trainers. Each trainer individually conducted ten in-person demonstration training sessions. Each trainer also appeared in ten of the videotape demonstrations.

Because professional trainers were not used for this research, a professional filmmaker was not used to film the video demonstrations. Maintaining uniformity across conditions allowed for a more accurate determination of method efficacy. Procedures for the training sessions are detailed later in this document.
Training Evaluation

All testing sessions were videotaped so the timing of the performance of each task (dependent variable) could be completed independently by two raters (one blind to condition). The separate task times were added for a total performance time. The raters used a stopwatch to time each task, starting when the experimenter removed the task folder from camera view and stopping when the experimenter said, "That's a correct copy." Raters entered each task performance time on coding sheets (Appendix E). Although these sheets were designed to collect a variety of human factors data, only the "Time for completion of task" segment was used for this experiment. The interrater reliability for performance time for this study was $r = .996$, $p < .001$.

Data Collection

Apparatus

A Ricoh 6620 photocopier equipped with an optional automatic document feed and an optional sorter was used in this experiment. The 6620 is capable of performing the more advanced photocopier functions such as automatic reduction and enlargement, save or delete a specified area of an original, and automatic margin shift. The present
study, however, involved relatively inexperienced photocopier operators; thus, only the more basic functions were used.

A Realistic MovieCorder, Model 126, videotaped the training and the performance test sessions. The camcorder was mounted on a tripod in the experimental room. It focused on the keyboard of the photocopier to allow collection of beginning and end of task time data. The camcorder was equipped with two lapel microphones, one for the subject and one for the experimenter. This ensured accurate voice recordings. VHS T120 videocassettes were used to record the training and testing sessions.

Subjects

Eighty students (40 male, 40 female) enrolled in undergraduate psychology classes at a large state university were recruited through sign-up sheets posted on the Department of Psychology's experiment board (this research was approved by the Iowa State University Human Subjects Review Committee). Volunteers received extra credit points for participation. Because undergraduates presently use photocopiers and are likely to continue to use photocopiers in their chosen careers, they are a legitimate target group for photocopier training. A recent survey of business firms in Iowa showed that males
as well as females operate photocopiers. It also revealed a range of experience with photocopier operation in the business environment (Human Factors Research Group, 1991). Consequently, no limitations were placed on subject gender, experience with photocopiers, or nationality.

Measures

**Informed Consent.** The Informed Consent document details the information needed by the subject to make a decision to continue participation in the experiment (Appendix F).

**Demographic Data.** The Demographic Data form gathered information on variables thought to be associated with task performance on photocopiers (e.g., college major, experience with photocopiers, and functions available to the user on their most frequently used photocopier). Complete sample and group demographic data and a blank form can be found in Appendix G.

**Self-Efficacy Questionnaire (SEQ).** The Self-Efficacy Questionnaire (Appendix H) is a two-part instrument. Part I is a general self-efficacy measure developed by Sherer et al., (1982). This is a 17-item scale scored 1 = strongly disagree to 10 = strongly agree. The items are constructed so that both ends of the scale would be used. For instance, the positive "I am a self-reliant
person" would elicit a response toward the "strongly agree" end of the scale from an individual with high self-efficacy. Conversely, the negative "I give up easily" would elicit a response toward the "strongly disagree" end of the scale by that same individual. The negative items (11) are reverse scored so possible scores range from 17 to 170. High scores indicate high self-efficacy.

Internal consistency reliabilities (coefficient alpha) for this measure at Time 1, Time 2, and Time 3 were .83, .88, and .89, respectively.

Five additional items (numbered 5, 8, 12, 17, and 22) constructed by the experimenter were designed to assess electronic equipment self-efficacy and were integrated into the 17-item Sherer et al. (1982) scale. These items are also scored 1 = strongly disagree to 10 = strongly agree with a possible score range from 5 to 50. Two of the items were reverse-scored. Coefficient alphas for this scale were .86, .91, and .87 at Time 1, Time 2, and Time 3, respectively. For purposes of this study, two scores were calculated--an electronic equipment self-efficacy score and a general self-efficacy score.

Following the suggestion of Bandura (1977a) and Locke and Latham (1990), Part II of the SEQ was developed by the experimenter to target specific behaviors related to
operating photocopiers. The five tasks used in this experiment were listed in order from simple to more difficult to avoid biasing self-efficacy judgments (Bandura, 1989). This instrument measured both magnitude (number of "yes" answers) and strength (confidence ratings if magnitude answer was "yes") of specific self-efficacy. In other words, measuring what tasks subjects "judge they can do and their degree of certainty that they can execute them" (Bandura, 1986, p. 422). Both magnitude and strength scores were calculated. A ceiling effect for the magnitude scores restricted the amount of information available from that scale; therefore, only the strength scores were used for data analysis. Internal consistency reliabilities (coefficient alpha) for the photocopier self-efficacy strength scales at Time 1, Time 2, and Time 3 were .88, .80, and .79, respectively. Although this research is concerned with photocopiers, questions about VCRs, camcorders, and automatic teller machines were added to serve as distractors.

**Vocabulary Test.** General cognitive ability has been identified as a predictor of performance for such diverse domains as high school grades, on-the-job performance ratings, and training success for mechanical jobs in the military (Hunter, 1986; Ree & Earles, 1991; Thorndike,
One measure of general cognitive ability is a test of word knowledge, or vocabulary test (Sattler, 1990). The vocabulary test used to assess general cognitive ability is an advanced vocabulary test consisting of 36 items first published in 1962 by Educational Testing Service (ETS) as a research tool (Appendix I). The test is included in a 1976 test manual as "unchanged or minor change" (p. 18) from the 1962 version. The ETS (1976) manual describes this test as "a 5-choice synonym test consisting mainly of difficult items...suitable for grades 11-16" (p. 164).

Although the instructions indicate a time limit of four minutes for each of the two parts of the test, preliminary research revealed subjects were uncomfortable with the perceived difficulty of this measure. Consequently, subjects were given a total of ten minutes to complete the test and were instructed not to stop between the two parts. Internal consistency reliability (coefficient alpha) for this measure was .57. This result compares "favorably with the alpha value of .6 recommended by Nunnally (1978) for scales to be used in basic research" (Sherer et al., 1982, p. 665).

Training Program Evaluation. The training evaluation (reaction) questionnaire (Appendix J) was designed to
determine if the subject believed the training: (1) had future value; (2) adequately covered the basic photocopier functions; (3) was conducted in a professional manner; and (4) added to their knowledge, skill, and ability with regard to photocopiers. A fifth question asked if the subject would recommend participation in the training program to others. These five items were rated on a 1 to 5 scale with 1 = strongly disagree and 5 = strongly agree, with a possible score range from 5 to 25. An additional question asked subjects to indicate which of three training methods—trial and error, instruction book, or demonstration—they would prefer if given a choice. The final question was open-ended and asked for suggestions for improving the training program. Internal consistency reliability (coefficient alpha) for this measure was .63.

**Process.** All training sessions were videotaped. The videotapes served as a process measure to ensure the training sessions were conducted in a consistent manner.

**Procedure**

**Session I.** Before the subject arrived, the experimenter prepared the training room and equipment by proceeding through the checklist provided at the beginning of each script (Appendix A).
Subjects were randomly assigned to one of the six training conditions when they arrived. At the beginning of the session, each subject completed the Informed Consent form, the Demographic Data form, the Self-Efficacy (SEQ) measure, and the vocabulary test. The vocabulary test was administered last to enable more accurate timing of the test.

After completing the forms, the subject was asked to move to the photocopier. One microphone was attached to the subject, one to the experimenter, and the camera was turned on. The trainer or experimenter then began the training script. For the trial and error and instruction manual conditions, the four tasks were given to the subject one at a time beginning with Task 1. Subjects in these conditions were given a total of 20 minutes to complete the four tasks. For the in-person behavior modeling conditions, the trainer began the demonstration. For the videotape demonstration behavior modeling conditions, the experimenter turned on the videotape.

At the conclusion of the training time, the microphone was removed, the camera turned off, and the subject was again asked to complete the SEQ. Part I and Part II were reversed in an attempt to alleviate order effects due to the close administration of the same measure.
The subject was then reminded this was a two-part experiment and they should return the same day and time the following week. Subjects were advised the experimenter would call and remind them if they thought it was necessary. The subject was then given an extra-credit sheet and dismissed.

**Session II.** A script (Appendix K) was also developed for Session II to ensure consistency; all subjects, regardless of condition, received the same instructions. The microphones were attached, the camera turned on, and the subject was asked to complete the training tasks from the previous week plus one additional, transfer, task (Task 5). As in Session I, the tasks were given in order, one at a time beginning with Task 1. The subject was given a total of 20 minutes to complete all five tasks. At the end of the performance test time, the subject again completed the Self-Efficacy measure as well as the Training Program Evaluation form. When the forms were completed, the subject was debriefed following the script in Appendix L. Subjects who did not correctly complete a task were shown the most efficient method for accomplishing that task. The subject was then given the extra-credit sheet and dismissed.
RESULTS

Performance Times

The means and standard deviations for performance times can be found in Table 2. Planned orthogonal contrasts (Table 3) were used to test for differences in average total performance time between the six groups. Because the overall F was significant, $F(5,74) = 2.79$, $p<.05$, (the analysis of variance [ANOVA] summary can be found in Table 4), the Duncan a posteriori multiple comparison procedure was used to further explore the data. Results indicate that Groups 1 (M = 461.50) and 2 (M = 449.80) completed the performance test in significantly less time than did Groups 4 (M = 803.10), 5 (M = 760.45), or 6 (M = 731.40), $p<.05$. Figure 4 illustrates the relationship among group means for total performance time.

Contrast 2 compared the means of Group 5 (instruction manual) and Group 6 (trial and error). These two means were not significantly different. Contrast 3, tested for a difference between Groups 1 and 2 (in-person demonstration), and Groups 3 (M = 617.80) and 4 (video demonstration). The mean times for Groups 1 and 2 were significantly lower than the means for Groups 3 and 4, $t(74) = -2.58$, $p<.01$. 
Table 2. Means and (standard deviations) for performance times, vocabulary test, and training evaluation measure

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>Group 4</th>
<th>Group 5</th>
<th>Group 6</th>
<th>Combined Group 5</th>
<th>Combined Group 6</th>
<th>Combined Total Sample</th>
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<tbody>
<tr>
<td></td>
<td>In-person Demo. (n=10)</td>
<td>In-person Demo. (n=10)</td>
<td>Video Demo. (n=10)</td>
<td>Video Demo. (n=10)</td>
<td>Instruction Manual (n=20)</td>
<td>Trial and Error (n=20)</td>
<td>In-person Combined (n=20)</td>
<td>Video Combined (n=20)</td>
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<td>Performance Time (seconds):</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 1</td>
<td>24.80 (11.56)</td>
<td>31.60 (16.77)</td>
<td>30.90 (16.33)</td>
<td>24.50 (7.63)</td>
<td>30.05 (11.26)</td>
<td>30.30 (13.93)</td>
<td>28.20 (14.44)</td>
<td>27.70 (12.83)</td>
<td>29.06 (12.97)</td>
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<td>Task 2</td>
<td>20.00 (4.42)</td>
<td>26.80 (8.70)</td>
<td>34.00 (19.83)</td>
<td>26.00 (32.39)</td>
<td>56.45 (71.66)</td>
<td>37.15 (41.96)</td>
<td>23.40 (26.16)</td>
<td>35.00 (44.49)</td>
<td>38.00 (44.49)</td>
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<td>Task 3</td>
<td>91.10 (89.24)</td>
<td>117.60 (95.01)</td>
<td>77.70 (63.74)</td>
<td>247.30 (247.25)</td>
<td>95.50 (79.17)</td>
<td>90.00 (57.77)</td>
<td>104.35 (90.73)</td>
<td>162.50 (196.09)</td>
<td>113.09 (119.95)</td>
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<td>Task 4</td>
<td>178.70 (306.27)</td>
<td>83.50 (48.31)</td>
<td>105.10 (128.70)</td>
<td>268.40 (406.03)</td>
<td>376.45 (357.94)</td>
<td>334.60 (349.47)</td>
<td>131.10 (216.91)</td>
<td>186.75 (304.89)</td>
<td>257.23 (325.90)</td>
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<td>Task 5</td>
<td>163.22 (98.15)</td>
<td>190.30 (153.15)</td>
<td>370.10 (247.82)</td>
<td>283.63 (273.74)</td>
<td>252.50 (177.31)</td>
<td>281.59 (206.04)</td>
<td>177.47 (115.50)</td>
<td>331.67 (255.59)</td>
<td>259.56 (198.99)</td>
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<td>Total</td>
<td>461.60 (269.03)</td>
<td>449.80 (169.62)</td>
<td>617.80 (236.78)</td>
<td>803.10 (362.05)</td>
<td>760.45 (351.32)</td>
<td>731.40 (345.06)</td>
<td>455.65 (219.43)</td>
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<td>Vocabulary Test</td>
<td>14.80 (4.05)</td>
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<td>14.80 (5.29)</td>
<td>16.10 (3.81)</td>
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<td>Training Evaluation</td>
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<td>21.90 (1.60)</td>
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<td>23.70 (1.57)</td>
<td>22.15 (2.72)</td>
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<td>25.75 (1.83)</td>
<td>23.55 (1.43)</td>
<td>22.78 (2.10)</td>
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Table 3. Planned orthogonal contrasts

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<tr>
<th>Group</th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
<th>C5</th>
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</thead>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 1 in-person demonstration (n=10)</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
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<td>Group 6 trial and error (n=20)</td>
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Table 4. Analysis of variance summary for total performance time

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<th>MS</th>
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<th>p</th>
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<td>Residual</td>
<td>7205826.35</td>
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<td>97376.03</td>
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Figure 4. Groups 1 through 6 means for total performance time.
Contrast 4 compared the means of the two in-person demonstration groups (1 and 2). The difference was not significant. Contrast 5 compared the mean performance times of the two video demonstration groups (3 and 4). Again, the difference was not significant.

Because there was a significant difference between the behavior modeling in-person and video demonstration groups but not within like groups, the two in-person groups were collapsed to form Group A and the two video demonstration groups were collapsed to form Group B (composite means and standard deviations can be found in Table 2). For comparison purposes the instruction manual and trial and error groups will now be designated Group C and D, respectively.

A one-way analysis of variance procedure with nonorthogonal contrasts (Table 5) was used to test for differences between the means for total performance and Task 5 (transfer task) completion times. The overall $F$ for total performance time was significant, $F(3,76) = 4.08$, $p<.01$. The Duncan multiple comparison procedure indicated that Groups B ($M = 710.45$), C ($M = 760.45$), and D ($M = 731.40$) recorded significantly greater performance
Table 5. Nonorthogonal contrasts for four groups

<table>
<thead>
<tr>
<th>Group</th>
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<th>C2</th>
<th>C3</th>
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<tr>
<td>Group A in-person demonstration</td>
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<td>1</td>
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<tr>
<td>Group B video demonstration</td>
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<tr>
<td>Group C instruction manual</td>
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<td>0</td>
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<tr>
<td>Group D trial and error</td>
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times than did Group A (M = 455.65), p<.05. The procedure also indicated that Groups B, C, and D were not significantly different from each other. Figure 5 presents a graph of the mean total performance times for the four groups.

Mean differences for Task 5 performance time were not significant overall; however, contrast 3, testing for differences between Groups A (M = 177.47) and B (M = 331.67) showed that Group A completed the task in significantly less time than did Group B, t(66) = -2.41, p<.05.
Figure 5. Groups A through D means for total performance time
In summary, these analyses show that the behavior modeling in-person demonstration group performed with greater efficiency (less total time) than the behavior modeling video demonstration group, the instruction manual group, and the trial and error group. For Task 5 performance time, however, the instruction manual and trial and error groups performed with equal efficiency to the in-person demonstration group. The video demonstration group performed less efficiently (greater total time) when compared to the in-person demonstration group.

As shown in Table 6, Pearson product moment correlation coefficients computed for the total sample revealed a relationship between time to complete Tasks 4 ($r = .77, p < .001$) and 5 ($r = .69, p < .001$) and total performance time. As can be seen in Table 2, time for Task 4 ($M = 257.23$) and Task 5 ($M = 259.56$) contributed substantially to total performance time ($M = 664.49$).

Task 4 time was negatively related to electronic equipment self-efficacy at Time 2 ($r = -.22, p < .05$) and Time 3 ($r = -.31, p < .01$). Task 4 time was also negatively related to photocopier self-efficacy at Time 1 ($r = -.22, p < .05$), at Time 2 ($r = -.56, p < .001$) and Time 3 ($r = -.58, p < .001$). Likewise, there was a negative
Table 6. Correlation coefficients for performance times (N=80)

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<td>.69***</td>
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<td>-.09</td>
<td>.20</td>
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<td>-.44***</td>
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<td>-.09</td>
<td>.02</td>
<td>-.58***</td>
<td>-.15</td>
<td>-.48***</td>
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</table>

*Significant at .05 level
**Significant at .01 level
***Significant at .001 level
relationship between total performance time and photocopier self-efficacy at Time 1 ($r = -.25$, $p<.05$), at Time 2 ($r = -.44$, $p<.001$) and Time 3 ($r = -.48$, $p<.001$). In summary, as predicted by the self-efficacy literature (e.g., Bandura, 1989), specific (photocopier) self-efficacy has a stronger relationship to task performance than does less specific (electronic equipment, general) self-efficacy.

Completers/Noncompleters

As a result of limiting the performance test time to 20 minutes, 13 subjects were unable to complete all five tasks. Noncompleters are distributed as follows: in-person demonstration = 1, video demonstration = 2, instruction manual = 6, and trial and error = 4. Of the 13 noncompleters, 10 exceeded the time limit while trying to complete Task 4 and were unable to attempt the transfer task. These 10 are distributed as follows: in-person demonstration = 1, video demonstration = 2, instruction manual = 4, and trial and error = 3. Tests for significance of difference between two proportions revealed no significant differences between the groups for number of noncompleters. Results of t-tests (Table 7) for differences between completers and noncompleters showed a difference only for electronic equipment self-efficacy
Table 7. T-tests for task completers (n=67)/non-completers (n=13) on selected variables

<table>
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<th>Noncompleters Mean (SD)</th>
<th>t-value</th>
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<tr>
<td>General - Time 2</td>
<td>133.13 (16.23)</td>
<td>128.23 (21.63)</td>
<td>- .94</td>
</tr>
<tr>
<td>General - Time 3</td>
<td>135.57 (16.30)</td>
<td>128.38 (21.16)</td>
<td>-1.38</td>
</tr>
<tr>
<td>Elec. Equip - Time 1</td>
<td>38.00 (7.94)</td>
<td>37.69 (7.36)</td>
<td>- .13</td>
</tr>
<tr>
<td>Elec. Equip - Time 2</td>
<td>40.13 (7.37)</td>
<td>37.23 (8.34)</td>
<td>-1.27</td>
</tr>
<tr>
<td>Elec. Equip - Time 3</td>
<td>41.19 (6.16)</td>
<td>36.15 (10.39)</td>
<td>-2.38*</td>
</tr>
<tr>
<td>Photocopier - Time 1</td>
<td>28.58 (11.65)</td>
<td>22.92 (14.40)</td>
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<tr>
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<td>43.57 (6.22)</td>
<td>33.46 (12.92)</td>
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</tr>
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<td>Photocopier - Time 3</td>
<td>47.31 (3.76)</td>
<td>38.00 (7.56)</td>
<td>-6.74***</td>
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<td>Training Evaluation</td>
<td>22.67 (2.10)</td>
<td>23.31 (2.14)</td>
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*Significant difference at .05 level

**Significant difference at .001 level
at Time 3, $t(78) = -2.38$, $p<.05$, and for photocopier self-efficacy at Time 2, $t(78) = -4.36$, $p<.001$, and Time 3, $t(78) = -6.74$, $p<.001$.

Self-Efficacy

The means and standard deviations for the self-efficacy measures can be found in Table 8. As illustrated in Figure 6, there were no significant differences between the group means at Time 1 for general self-efficacy. By Time 2, however, Group B (video demonstration), $M = 141.15$, recorded a significantly higher score than did Groups A (in-person demonstration), $M = 129.70$, C (instruction manual), $M = 128.50$, and D (trial and error), $M = 130.00$. This significant difference did not hold for Time 3.

As depicted in Figure 7, the means for electronic equipment self-efficacy at Time 1, were significantly different, $F(3,76) = 3.45$, $p<.05$. The Duncan multiple comparison procedure indicated that means for Groups A ($M = 35.50$) and D ($M = 35.80$) were significantly lower than Group B ($M = 42.20$), $p<.05$. At Time 2, the overall $F$ was again significant, $F(3,76) = 5.75$, $p<.001$. Duncan's procedure showed that the averages for Groups A ($M = 37.80$), C ($M = 39.30$), and D ($M = 36.55$) were significantly lower than Group B ($M = 45.00$), $p<.05$. 
Table 8. Means and (standard deviations) for self-efficacy measures

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<tr>
<td>General-Time 1</td>
<td>126.80 (17.11)</td>
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<td>139.00 (11.31)</td>
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<td>126.65 (18.14)</td>
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<td>131.00 (22.67)</td>
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<tr>
<td>Elec. Equip-Time 1</td>
<td>36.80 (5.49)</td>
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<td>40.45 (5.48)</td>
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<td>26.65 (12.16)</td>
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<td>41.90 (6.57)</td>
<td>47.00 (2.26)</td>
<td>45.50 (4.50)</td>
<td>38.80 (9.20)</td>
<td>39.95 (11.21)</td>
<td>42.70 (6.39)</td>
<td>46.25 (3.55)</td>
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<td>Photocopier-Time 3</td>
<td>45.20 (5.38)</td>
<td>46.50 (3.44)</td>
<td>49.80 (1.42)</td>
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</table>
Figure 6. Group means for general self-efficacy across time
Figure 7. Group means for electronic equipment self-efficacy across time
Time 3 overall F was also significant, F(3, 76) = 3.36, p<.05, and the Duncan procedure indicated that the means for Groups A (in-person demonstration), M = 38.85, and D (trial and error), M = 37.90, were significantly lower than the mean for Group B (video demonstration), M = 44.30, p<.05.

As illustrated in Figure 8, results for photocopier self-efficacy at Time 1 showed no significant differences in the group means. The results at Time 2 and Time 3 show the overall Fs were significant with F(3, 76) = 3.33, p<.05 and F(3, 76) = 2.68, p<.05, respectively. The Duncan procedure revealed the means for Groups C (instruction manual), M = 38.80, and D (trial and error), M = 39.95, were significantly lower than Group B (video demonstration), M = 46.25, at Time 2, p<.05. Time 3 average scores for Groups C (M = 43.65) and D (M = 45.20) were also significantly lower than Group B (M = 48.50), p<.05. In summary, across all three self-efficacy measures, the behavior modeling video demonstration group displayed a higher level of self-efficacy than did the in-person demonstration group, the instruction manual group, or the trial and error group.

Repeated measures analysis of variance was used to test for differences in means within each group for the three self-efficacy measures. For general self-efficacy,
Figure 8. Group means for photocopier self-efficacy across time
the repeated measures ANOVA indicated a significant difference between the means of Group A (in-person demonstration), $F(2,38) = 5.73, p<.01$, between the means of Group B (video demonstration), $F(2,38) = 10.20, p<.001$, and between the means of Group C (instruction manual), $F(2,38) = 5.08, p<.01$, but not for Group D (trial and error).

Similarly, for electronic equipment self-efficacy the means within Group A and Group B were significantly different at $F(2,38) = 4.49, p<.05$, and $F(2,38) = 6.92, p<.01$, respectively. The difference in the means was not significant within Group C or Group D.

Results for photocopier self-efficacy showed within group means were significantly different at $p<.001$ for all four groups—$F(2,38) = 43.04, F(2,38) = 61.48, F(2,38) = 25.04, F(2,38) = 43.60$ for Groups A, B, C, and D, respectively.

In summary, within group means for the self-efficacy measures showed that the behavior modeling in-person and video demonstration groups increased on all three measures across all three times. The instruction manual group significantly increased both general and photocopier self-efficacy mean scores while the trial and error group increased only the average score for photocopier self-efficacy.
Table 9 presents the intercorrelations for the self-efficacy measures. There were significant relationships between general self-efficacy at Time 1 and Time 2 ($r = .88$, $p<.001$), at Time 1 and 3 ($r = .81$, $p<.001$), and at Time 2 and 3 ($r = .87$, $p<.001$). Likewise, electronic equipment self-efficacy was significantly related at Time 1 with Time 2 ($r = .87$, $p<.001$), Time 1 with 3 ($r = .76$, $p<.001$), and Time 2 with 3 ($r = .82$, $p<.001$). Similarly, there were significant relationships between photocopier self-efficacy Time 1 and Time 2 ($r = .62$, $p<.001$), Time 1 and 3 ($r = .33$, $p<.01$), and Time 2 and 3 ($r = .69$, $p<.001$). These significant coefficients reflect the relative stability of subject standing across time. The significant relationships recorded between general self-efficacy Time 1 through 3 and electronic equipment self-efficacy Time 1 through 3 indicated construct validity as do the significant correlations between electronic equipment self-efficacy Time 1 through 3 and photocopier self-efficacy Time 1 through 3.

Vocabulary Test

The one-way analysis of variance indicated no significant differences between the groups means (Table 2) for the vocabulary test. As shown in Table 10, the
Table 9. Correlation coefficients for self-efficacy measures (N=80)

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<td>.19</td>
<td>.21</td>
<td>.28*</td>
<td>.37***</td>
<td>.49***</td>
<td>.51***</td>
<td>.62***</td>
<td></td>
</tr>
<tr>
<td>Photocopier-Time 3</td>
<td>.26*</td>
<td>.33**</td>
<td>.45***</td>
<td>.37***</td>
<td>.47***</td>
<td>.59***</td>
<td>.33**</td>
<td>.69***</td>
</tr>
</tbody>
</table>

*Significant at .05 level

**Significant at .01 level

***Significant at .001 level
<table>
<thead>
<tr>
<th>Performance Time (seconds):</th>
<th>Vocabulary</th>
<th>Training Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task 1</td>
<td>.04</td>
<td>-.06</td>
</tr>
<tr>
<td>Task 2</td>
<td>.12</td>
<td>-.01</td>
</tr>
<tr>
<td>Task 3</td>
<td>.03</td>
<td>-.08</td>
</tr>
<tr>
<td>Task 4</td>
<td>-.12</td>
<td>.11</td>
</tr>
<tr>
<td>Task 5</td>
<td>-.16</td>
<td>-.04</td>
</tr>
<tr>
<td>Total</td>
<td>-.16</td>
<td>.04</td>
</tr>
</tbody>
</table>

Self-Efficacy:

<table>
<thead>
<tr>
<th></th>
<th>Vocabulary</th>
<th>Training Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>General-Time 1</td>
<td>.13</td>
<td>.05</td>
</tr>
<tr>
<td>General-Time 2</td>
<td>.10</td>
<td>.09</td>
</tr>
<tr>
<td>General-Time 3</td>
<td>.16</td>
<td>.12</td>
</tr>
<tr>
<td>Elec. Equip.-Time 1</td>
<td>.06</td>
<td>-.07</td>
</tr>
<tr>
<td>Elec. Equip.-Time 2</td>
<td>.18</td>
<td>-.04</td>
</tr>
<tr>
<td>Elec. Equip.-Time 3</td>
<td>.19</td>
<td>.02</td>
</tr>
<tr>
<td>Photocopier-Time 1</td>
<td>.16</td>
<td>-.06</td>
</tr>
<tr>
<td>Photocopier-Time 2</td>
<td>.21</td>
<td>.04</td>
</tr>
<tr>
<td>Photocopier-Time 3</td>
<td>.10</td>
<td>.18</td>
</tr>
<tr>
<td>Training Evaluation</td>
<td></td>
<td>-.13</td>
</tr>
</tbody>
</table>
vocabulary test was not significantly correlated with performance time, the three self-efficacy measures at three times, or the training evaluation scores. The largest coefficient, \( r = .21 \), with photocopier self-efficacy Time 2, however, approaches the .05 level of significance.

Training Evaluation

Like the vocabulary test, a one-way ANOVA revealed no significant differences between the group means (Table 2) for the training evaluation measure. None of the correlation coefficients between training evaluation scores and performance times or the self-efficacy measures were significant (Table 10).

Responses to the question on the training program evaluation measure concerning choice of a training method can be found in Table 11. The behavior modeling demonstration groups preferred demonstration (85% and 90%), 50% of the instruction manual group selected demonstration, and 40% of the trial and error group preferred demonstration. Thirty percent of the instruction manual group selected instruction book and 50% of the trial and error group selected trial and error.

Comments made in reply to, "What suggestions do you have for improving the training program?" ranged from no
Table 11. Responses to choice of training method item (percent selecting)

<table>
<thead>
<tr>
<th>Group</th>
<th>Trial and Error</th>
<th>Instruction Book</th>
<th>Demonstration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavior Modeling:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group A in-person demonstration</td>
<td>0</td>
<td>15%</td>
<td>85%</td>
</tr>
<tr>
<td>Group B video demonstration</td>
<td>5%</td>
<td>5%</td>
<td>90%</td>
</tr>
<tr>
<td>Group C instruction manual</td>
<td>20%</td>
<td>30%</td>
<td>50%</td>
</tr>
<tr>
<td>Group D trial and error</td>
<td>50%</td>
<td>10%</td>
<td>40%</td>
</tr>
</tbody>
</table>

comment or "none" (n=32) to "Make the presentation or person talking on the videotape more interesting" to "Maybe the trainer could be asked questions after a set number of tries." A complete list of question responses can be found in Appendix M.

Female-Male Differences

Total sample female-male differences in performance time, self-efficacy, and vocabulary were assessed via t-tests. Results can be found in Table 12. A significant difference was found for electronic equipment self-efficacy at Time 1, t(78) = -1.98, p<.05.
Table 12. T-tests for female (n=40)/male (n=40) differences on selected variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Female Mean (SD)</th>
<th>Male Mean (SD)</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Performance Time (seconds):</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 5</td>
<td>252.28 (128.58)</td>
<td>267.26 (255.22)</td>
<td>- .31</td>
</tr>
<tr>
<td></td>
<td>(n=36)</td>
<td>(n=34)</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>624.68 (315.46)</td>
<td>704.30 (341.88)</td>
<td>-1.08</td>
</tr>
<tr>
<td><strong>Self-Efficacy:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General - Time 1</td>
<td>129.48 (15.35)</td>
<td>126.43 (16.31)</td>
<td>.86</td>
</tr>
<tr>
<td></td>
<td>(n=36)</td>
<td>(n=34)</td>
<td></td>
</tr>
<tr>
<td>General - Time 2</td>
<td>133.65 (16.28)</td>
<td>131.03 (18.11)</td>
<td>.68</td>
</tr>
<tr>
<td></td>
<td>(n=36)</td>
<td>(n=34)</td>
<td></td>
</tr>
<tr>
<td>General - Time 3</td>
<td>136.33 (17.94)</td>
<td>132.47 (16.50)</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>(n=36)</td>
<td>(n=34)</td>
<td></td>
</tr>
<tr>
<td>Elec.Equip-Time 1</td>
<td>36.25 (8.47)</td>
<td>39.65 (6.77)</td>
<td>-1.98*</td>
</tr>
<tr>
<td></td>
<td>(n=36)</td>
<td>(n=34)</td>
<td></td>
</tr>
<tr>
<td>Elec.Equip-Time 2</td>
<td>38.28 (7.37)</td>
<td>41.05 (7.58)</td>
<td>-1.66</td>
</tr>
<tr>
<td></td>
<td>(n=36)</td>
<td>(n=34)</td>
<td></td>
</tr>
<tr>
<td>Elec.Equip-Time 3</td>
<td>39.75 (6.88)</td>
<td>41.00 (7.52)</td>
<td>- .78</td>
</tr>
<tr>
<td></td>
<td>(n=36)</td>
<td>(n=34)</td>
<td></td>
</tr>
<tr>
<td>Photocopier-Time 1</td>
<td>29.13 (11.78)</td>
<td>26.20 (12.63)</td>
<td>1.07</td>
</tr>
<tr>
<td></td>
<td>(n=36)</td>
<td>(n=34)</td>
<td></td>
</tr>
<tr>
<td>Photocopier-Time 2</td>
<td>42.03 (7.11)</td>
<td>41.83 (9.74)</td>
<td>.10</td>
</tr>
<tr>
<td></td>
<td>(n=36)</td>
<td>(n=34)</td>
<td></td>
</tr>
<tr>
<td>Photocopier-Time 3</td>
<td>45.98 (5.04)</td>
<td>45.63 (6.35)</td>
<td>.27</td>
</tr>
<tr>
<td></td>
<td>(n=36)</td>
<td>(n=34)</td>
<td></td>
</tr>
<tr>
<td>Vocabulary</td>
<td>15.45 (4.67)</td>
<td>14.80 (5.13)</td>
<td>.59</td>
</tr>
</tbody>
</table>

*Significant difference at .05 level
This experiment was designed to answer two primary questions: (1) Is behavior modeling an effective training method for photocopier operators? and, (2) Is behavior modeling as effective, or more effective, than text (instruction manual) training, or trial and error learning?

Given the results of this research, the first question can be answered with a qualified "yes." In this particular situation, behavior modeling proved to be an effective training method provided the demonstration medium was in-person. The second question also has a qualified "yes" answer--behavior modeling was more effective provided the demonstration segment was in-person.

Performance Times

The means for total performance time clearly show that subjects in the two in-person demonstration conditions were not significantly different from each other but were significantly different from the video demonstration groups, the instruction manual group, and the trial and error group. Subjects in the in-person demonstration groups were able to complete the performance tasks in less
time and there were fewer noncompleters than in the other groups.

This result, however, did not hold for the behavior modeling condition using a videotape demonstration. Although this finding was unexpected, given that the literature indicates the two mediums should be equally effective, there are plausible explanations for this lack of effect.

The first concerns the modeling display. Although the modeling display literature is relatively sparse, with researchers needing to catch up to practice, Zemke (1982) maintains there are six points that need to be considered when developing a modeling display:

1. The behavior to be learned must be shown clearly, positively and directly.
2. Trainees must be able to identify with the person shown doing the behavior to be learned.
3. Distractors—technically, stimuli which could distract trainees from attending to the key learning points and critical behaviors—should be shunned.
4. The behavior must be presented in careful steps; it should be 'programmed' from simple to complex situations and from easier to more difficult-to-handle problems.
5. Modeling displays should not be confused with information or entertainment films.

6. Trainees expect high-quality video, comparable to broadcast-quality; low-quality displays distract. (Zemke, 1982, p. 23)

Point 3 and Point 6 are pertinent to this research.

There were distractors involved in the presentation of the video demonstration. The television monitor was positioned at such an angle and away from the photocopier that subjects had to visually shift from the monitor to the photocopier and back again during the training demonstration. Thus, two of the processes involved in vicarious learning, attention and retention, may have been disrupted and, thus, learning was limited.

Point 6 involves the quality of the videotape. Decker and Nathan (1985) argue with the point by saying, there is no evidence that suggests one needs to develop broadcast quality modeling displays to be effective in a behavior modeling program, particularly when effectiveness is determined in a relative sense against other kinds of training. Broadcast quality would be preferable if one could develop such films, however, the inability to
produce such displays should not deter the potential behavior modeler from beginning.

(p. 111)

As a rule, novice filmmakers produce videotape that cannot be considered broadcast quality, and that was the situation in this research. This being the case, this study may provide some evidence suggesting a difference in behavior modeling effectiveness depending on the quality of the videotape.

The second possible explanation comes from the self-efficacy literature. Although individuals with high self-efficacy "approach difficult tasks as challenges....such...orientation fosters interest and engrossing involvement in activities" (Bandura, 1989, p. 731), there is evidence that "supreme self assurance may render activities unchallenging and thus uninteresting" (Bandura, 1982, p. 135). There may be a threshold associated with self-efficacy that determines whether an activity is perceived as interesting and whether attentional processes are activated. For this study, the video demonstration groups exhibited greater general and electronic equipment self-efficacy than did the in-person, the instruction manual, or the trial and error group. Despite an equal level of photocopier self-
efficacy at Time 1, compared to the other groups, this high level of general self-assurance may have contributed to a lack of attention, and therefore retention, during the training program. "If observers do not selectively attend to the critical features of the modeled display, they will not extract the necessary information to construct an adequate representation of what they have seen" (Carroll & Bandura, 1982, p. 165). For whatever reason the behavior modeling video demonstration proved ineffective, these two groups did display other characteristics of high self-efficacious individuals—they persisted, at length and despite repeated failures, and for the most part, completed the five tasks.

The replies to the question concerning training program improvements (Appendix M) by people in the video demonstration group do not provide further insight into the differences nor did perusal of the demographic data. Future research might investigate the effect of videotape quality, equipment placement, and the role of self-efficacy, high or low, in learning moderately complex tasks.

Another important aspect of this research was the inclusion of the transfer task (Task 5) that was used to infer generalizability of the training. Although the in-
person behavior modeling groups completed the task in less
time than the comparison groups the difference was not
statistically significant. Because generalizability of
training is an important goal, possible explanations for
this need to be examined. In a recent paper, Schmidt and
Bjork (1992) provided considerable insight regarding the
above finding. They contend that "typical training
procedures are far from optimal" (p. 207). Individuals
responsible for the training endeavor need to realize that
maximizing performance in a training environment can
impair future performance; reducing acquisition speed can
improve future performance. Schmidt and Bjork believe
that researchers operate with the faulty notion that
conditions that speed performance acquisition are the same
conditions that enhance learning. According to Schmidt
and Bjork, "there are two related problems with this view
of the learning process" (p. 288). The first is that
acquisition performance is not a perfect indicator of
learning. The second is that acquiring and retaining
information are not separate processes.

"Researchers have lost track of a critical distinction
between the momentary strength or accessibility of a
response and the underlying habit strength of that
response" (p. 208). Learning can be concealed during
training because of the confound with temporary performance effects. For this reason it is important to judge learning by two criteria--posttraining performance and generalization. Thus, there should be a retention phase (time interval) after training in order to dispel any temporary effects. Then, correct performance on a training task will infer that learning occurred. Correct performance on a similar skill or the same skill in a different environment would serve as evidence of generalization.

What practice conditions produce learning? Schmidt and Bjork provide evidence that random practice (same task not practiced on succeeding trials), reduced feedback, and variable practice (tasks not given at a preset equal interval) "all degrade performance during practice relative to more 'ideal' conditions in acquisition, yet all can be argued to exercise information processing activities that are critical for performance at the test" (p. 215).

It could be that individuals in the trial and error and instruction manual condition learned more about the photocopier functions during the training session due to the amount of information they needed to process to complete each task. Because they were not shown how to
operate the photocopier, they were forced to try various keys and then "discover" what output that key produced. Incorrect key presses produced incorrect output and the individual was forced to experiment with other keys. As a consequence, they sometimes stumbled onto the correct solution for the transfer task when they were trying to complete the training tasks. So, for the present study, degraded acquisition in the instruction manual and trial and error groups produced slower overall performance times but provided the practice opportunity needed to generalize the information gained during training.

Another issue that needs to be addressed concerns the task completers and noncompleters. Although the difference in proportions was not statistically significant, an argument can be made that the difference is practically significant. The trial and error conditions produced twice the number of noncompleters than the behavior modeling groups and the instruction manual group produced three times the number. Overall, the success ratio for behavior modeling was 93% versus 75% for the instruction manual and trial and error groups combined. Again, this provides evidence for the effectiveness of behavior modeling training.
The t-tests between task completers and noncompleters showed no significant differences for the vocabulary, the training evaluation, or the general self-efficacy measures. Significant differences did appear for electronic equipment self-efficacy at Time 3 with the noncompleters averaging five points (50 possible) lower than the completers on the scale. Differences for photocopier self-efficacy at Time 2 and Time 3 were also significant with the completers averaging ten points (50 possible) above the noncompleters. This is not surprising given that the majority of noncompleters knew they had not successfully completed the tasks during the training session and all noncompleters were aware of their performance deficiencies by Time 3.

**Self-Efficacy**

The results recorded for the self-efficacy measures across time clearly support Bandura's conceptualization. General and electronic equipment self-efficacy both seem to be more global and less affected than photocopier self-efficacy by these specific training conditions. Condition-specific self-efficacy can be dramatically altered by circumstances as demonstrated by the significant increase in photocopier self-efficacy for all
groups from Time 1 to Time 2 (Figure 8). These subjects all successfully completed the first three tasks, thus gaining confidence in their ability to operate this photocopier. Also, photocopier self-efficacy was significantly correlated (negatively) with Task 4 and total performance time—higher self-efficacy is related to lower performance times. This result corresponds to those obtained by Locke et al. (1984) who found that strength (certainty) ratings were the best performance predictors.

It was originally thought that self-efficacy would decline as trainees in the instruction manual and trial and error conditions struggled to complete the tasks during the training phase of the study. Of the 40 subjects in these conditions, 17 did not complete the fourth task during the initial session. Despite the inability to complete all the tasks, photocopier self-efficacy increased significantly from Time 1 to Time 2. Perhaps this is a reflection of their relatively high initial level of general and electronic equipment self-efficacy. These individuals perceive themselves as efficacious and thus persist in their efforts when performance goals are not attained. A comment by one subject illustrates this point, "I'm going to start over. I know I can get this." Failure to complete the training
task may have been attributed to lack of instruction. Additionally, prior tasks were completed and performance accomplishment (enactive attainment) is a principal source of information for efficacy self-knowledge.

Although high self-efficacy levels can serve as performance enhancers, from this study, it also appears that high levels may serve as a performance limiter. As previously discussed, this is one plausible explanation for the lack of behavior modeling training effectiveness in the video demonstration group.

Because general self-efficacy is not always related to more specific self-efficacy, as manifested by the nonsignificant correlations between general and photocopier self-efficacy at Time 1 and Time 2 (Table 9), might there be an intermediate form of self-efficacy that would be related to both general and specific self-efficacy? The electronic equipment self-efficacy measure was developed to address this issue. As shown by the significant correlation coefficients between general self-efficacy and electronic equipment self-efficacy at Time 1, 2, and 3, and between electronic equipment self-efficacy and photocopier self-efficacy at Time 1, 2, and 3, there is support for an intermediate level of self-efficacy. This intermediate level could serve as a bridge between
specific and general self-efficacy. Additionally, the significant coefficients between these three measures supports convergent construct validity.

Vocabulary Test

One interesting finding for this research was the lack of significant correlations between general mental ability, as measured by a vocabulary test, and time for task completion. General mental ability does predict performance in a variety of situations (Hunter, 1986). This, however, was not the case for this training experiment although the coefficient of $r = .21$ with photocopier self-efficacy at Time 2 is very close to significance at .05 ($r = .22$). This finding should be encouraging to trainers because it suggests that learning (assessed one week after training) to operate a photocopier is not significantly dependent on the general level of mental ability.

Training Evaluation

Nonsignificant correlations were also recorded for the training evaluation (reaction) measure. The sample mean of $22.78 / 25$ (means across the groups are similar) reflected the overall satisfaction of the
trainees. This result is not unusual for a training situation but does reflect a caution that must be used when evaluating training programs solely on the basis of a reaction measure; satisfaction with the training program is not a good indicator of program success as evidenced by the nonsignificant difference on the t-test between completers and noncompleters.

As stated in The Present Study section of this document, data collected for a variety of human-machine interface studies by the Iowa State University Human Factors Research Group indicated that 70 percent of the subjects preferred a demonstration method of training. The remaining 30% were split approximately 20% instruction manual and 10% trial and error. Given this consistent rate of preference, the findings in this study are intriguing. Of the individuals in the demonstration conditions, 85% of the in-person and 90% of the video participants preferred a demonstration method of training. Only 50% of the instruction manual group and 40% of the trial and error group preferred demonstration. Because this preference information was collected at the close of the second session, it seems reasonable to speculate that cognitive dissonance rides again (Festinger, 1957). With the exception of the instruction manual group, these
subjects clearly preferred the method by which they had been trained. In light of the fact that 50% of the trial and error group did not complete Task 4 during the training session, one can only wonder whether selecting that method of training is an attempt to justify the amount of effort expended and frustration encountered in repeated unsuccessful attempts at completing the tasks.

Another interesting finding was revealed when testing for differences between females and males participating in this study. The only significant difference was for electronic equipment self-efficacy at Time 1, as may have been anticipated by "gender role" stereotyping. This difference was not repeated at Time 2 or Time 3.

One final issue that should be discussed with regard to this study is the use of college students as subjects. Although there has been criticism of this practice (Gordon, Slade, & Schmitt, 1986), as stated previously, selecting college students as participants in this particular study was reasonable because they presently use photocopiers and will probably continue to do so in their respective employment situations. These subjects are representative of the population of occasional photocopier users, encountered by the Human Factors Research Group (1991) during extensive man/machine interface studies,
that would benefit from the amount of information available in a brief behavior modeling training session.

Conclusions

Even though the answers to the questions asked in this research must be qualified, the results do show that behavior modeling is an effective training method in an electronic equipment environment. Add this to the evidence available from studies involving interpersonal skills, e.g., Latham and Saari (1979), and, recently, studies involving computer software, e.g., Gist et al., (1989), and you have a training technique that is effective and versatile.
REFERENCES


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First, my grateful appreciation to Dr. Tetsuro Motoyama and The Ricoh Corporation for providing the opportunity and equipment for the human factors research that paved the way for this study. Second, equal appreciation to my committee co-chairs, Drs. Muchinsky and O'Boyle. They will understand when I say, sometimes two "wrongs" do make a "right." I am extremely fortunate that these two very capable individuals graciously consented to accept me as their student. Dr. Muchinsky, my I/O pillar, is a friend that I could always count on for support. Dr. O'Boyle expended great effort exploring new territory with me as this research progressed and maintained his superb sense of humor during the course of this journey. He possesses an uncanny knack for saying the right things at the worst of times, lightening burdens.

My committee members, Drs. Andre, Brown, and Lorenz, also provided guidance and support during the long term of this project. Dr. Andre arranged schedules so that I would have access to the training facilities. Dr. Brown provided measurement expertise and excellent general guidelines for managing this study. Dr. Lorenz is the reason I at least have a speaking acquaintance with statistics.
My undergraduate research assistants, Micheal Beaver, Lisa Keith, and Renee Trum happened on the research through two terms of ups and downs. They contributed valuable insights that made a constructive contribution to this project.

To "The Horde," Rich (office buddy), Kathi (next-door neighbor and fellow graduate student sufferer), Kate (confidant), and Minh (protector), thanks for the caring. Good friends make life worth living!

To my family—my sister, Peg, endured all the late night phone calls and never once requested that the expletives be deleted. My sons, Mark and Eric, and daughters-in-law, Robin and Toni, once again provided unconditional love and support. And, once again, never doubted for a moment that I could also climb this mountain. One more time, thank you for being my friends.

Finally, to me, for having the guts to try.
APPENDIX A. TRAINING SCRIPTS
Script for In-Person Demonstration Training

BEFORE SUBJECT ARRIVES

1. Post signs
2. Remove subject file, task files, and video tape from cabinet
3. Plug key into copier
4. Check electrical connections on camera
5. Turn camera on
6. Insert tape
7. Turn monitor on and check camera angle
8. Move wastebasket
9. Close cover on advanced function keys
10. Check paper cassettes

AFTER SUBJECT ARRIVES

Before we begin, I would like for you to complete a series of forms—an Informed Consent, a Demographic form, a vocabulary test, and an attitude measure.

(Have subject complete vocab last so you can time)

If you have any questions, please ask.

AFTER SUBJECT HAS COMPLETED ALL THE FORMS, PLACE THEM IMMEDIATELY INTO THE SUBJECT FOLDER WITHOUT LOOKING AT THEM.

1. Put microphones on
2. Turn microphones on
3. Turn camera on (BE SURE RED LIGHT ON FRONT OF CAMERA IS LIT)

Welcome to Training Session I. In this session you will be introduced to the basic functions available on this Ricoh 6620 photocopier. Since there is a limited amount of time, only four basic tasks will be used for training. These tasks are all relatively simple and can be completed using the features available on this machine. Our objective is to introduce you to the basic functions so that you will feel comfortable using this copier.

The first task will be to load a supply of paper in the 11" x 8 1/2" paper cassette. The second task will be to make one copy of a one-side original. The third task will be to make one two-side copy of two one-side originals. The fourth task will be to reduce two 8 1/2" x 11" originals so they fit on one 8 1/2" x 11" copy.
I will give you a brief description of the machine functions. Then, I will show you how to do each task. You will then be allowed time to do the task yourself. When you complete a task, please hand the original and copy back to me. Because of the nature of this training, I will not be able to answer any questions while you are completing the tasks. However, if the machine jams for any reason I will clear it.

Now I will begin by going over the basic features of this machine beginning with selected keys on the operation panel.

Beginning on the right side of the panel:

1. This is the Timer Key. It is only used to operate the copier after it has been turned off by the weekly timer or automatic shut-off timer.

2. This is the Clear Modes Key. This key should be pressed to clear the copier of previously entered settings. Even though the copier has an automatic reset to default settings after one minute of no activity, it's important that you remember to press this key after completing each task to avoid incorrect copies. (DEMONSTRATE).

3. This is the Program Key. It stores frequently used copy job settings in memory.

4. This is the Interrupt Key. It is a toggle key—push once for on and push again for off. It can be pressed to interrupt a multicopy job in order to copy a few originals. (DEMONSTRATE).

5. This is the Start Key. If the "Ready" light is displayed on the indicator screen, this key can be pressed to start copying. If the "Please Wait" light is displayed, the machine is not ready to copy.

6. This is the Guidance Key. It is also an on/off toggle key. When you need information about keys, you can press the Guidance Key, then the key you want information about. This information is then displayed at the top of the indicator screen. (DEMONSTRATE)

7. These are the Number Keys and are used to input numerical information such as the number of copies desired. The default setting for this copier is one copy. The number is displayed here in the Copy Count Indicator. (DEMONSTRATE)

8. This is the Clear/Stop Key. Press to cancel the copy number entered or to stop copying. (DEMONSTRATE)
9. This is the Enter Key. It is used for the more complex functions of this machine and will not be used during this training session.

10. This is the Auto Image Density Key. This is the default setting for this copier. In this mode, the copier determines the lightness or darkness of the copy. When the mode is on, Auto Image Density is displayed in the lower right corner of the indicator screen. (POINT OUT)

11. These are the Manual Image Density Keys. They can be used if you wish to manually lighten or darken a copy. When either of the keys are pressed, an indicator lights on the Indicator Screen just above the keys so that you can select a setting. (DEMONSTRATE)

12. This is the Auto Paper Select Key. This is the default mode for this copier and is displayed on the Indicator Screen when it is on. In this mode, the copier scans the original and selects the appropriate paper tray. For instance, even though the copier is currently set on 11" x 8 1/2", it would automatically select the 8 1/2" x 14" paper for an 8 1/2" x 14" original.

13. This is the Select Cassette Key. This key turns off the Auto Paper Select and allows you to select the paper size you want. For example, if you have a book that opens to 11" x 17" and you only want a copy of one page, you can select the 11" x 8 1/2" paper. Otherwise, the copier scans the original, sees 11" x 17" and gives you an 11" x 17" copy. Each press of the key selects a different paper size—8 1/2" x 11", 8 1/2" x 14", 11" x 17", and back to 11" x 8 1/2". (DEMONSTRATE)

14. This is the Full Size Key and is the default mode for the copier. Full Size is displayed on the Indicator Screen when the mode is on. Press this key to make copies the same size as the original.

15. This is the Enlarge Key. Repeated presses of this key lets you choose either a 121%, 129%, or 155% enlargement of the original image. The size conversions such as 5 1/2" x 8 1/2" to 8 1/2" x 14" are displayed across the top of the Indicator Panel and the magnification ratio is displayed on the left side of the Indicator panel. (DEMONSTRATE)

16. This is the Reduce Key. Repeated presses of this key lets you choose 93%, 85%, 77%, 74%, or 65% reductions in the original image. Again, the size conversions and the magnification ratio are displayed on the Indicator Panel. (DEMONSTRATE)
17. The keys beneath this panel are used for the more advanced copier functions and would be covered in a more advanced training session.

18. This is the Duplex Key. Duplex is the term used to refer to both sides of an original or a copy. Pressing this button once allows you to make a two-side copy from two single originals. Pressing the button twice allows you to make a two-side copy from a two-side original. Pressing the button three times allows you to make a two-side copy of two facing pages in a bound document. (DEMONSTRATE)

19. The last key is the Sorter key. This copier is equipped with the optional Sorter attachment. By pressing this key once you select the Sort option which assembles sets of copies in sequential order. Each set would have pages 1, 2, 3, 4, and so on, forming a collated document. Pressing the key twice selects the Stack option which puts all copies of the first original in the top bin, copies of the second original in the second bin, etc. (DEMONSTRATE)

This photocopier has four paper trays. The two located on the right side of the machine hold 8 1/2” x 11” paper but in different orientations—the top tray holds 11” x 8 1/2” and the bottom holds 8 1/2” x 11”. (DEMONSTRATE)

The two remaining trays are located behind the front doors and contain 8 1/2” x 14” and 11” x 17” paper. These two trays will not be used in this training session.

This photocopier is also equipped with an Automatic Document Feed located on the top of the machine. Originals should be placed face down with the last page of any stack on top, in either the 11” x 8 1/2” or 8 1/2” x 11” orientation. The 11” x 8 1/2” is the optimal placement especially when making duplex copies. Insert the originals into the document feed until the arrow on the document feed indicator screen is turned off. (DEMONSTRATE)

The original guides should be adjusted so they contact both sides of the originals. (DEMONSTRATE)

When the Start Key is pressed, the Feed Belt pulls the original onto the glass and the image is copied. The original is then pulled into the Exit Unit and is ejected onto the top of the cover. The copy is ejected into the top sorter bin. (DEMONSTRATE) (REMOVE ORIGINAL AND COPY)

While this copier is equipped with an automatic document feed, there will be occasions to use the glass. The lid latch is located approximately in the center of the cover. (LIFT LID)
Originals are placed along the left edge of the glass. The silver bar you see is part of the copying mechanism and will not interfere with the copy. There are size markings to indicate the placement of the original. For example, place an 11" x 8 1/2" between the two 11" markings. Align the original as close as possible to the measurement guide. (DEMONSTRATE)

Be sure to lower the cover before making a copy.

(RAISE LID. RETRIEVE PAPER. LEAVE LID UP)

Now we will begin the actual training tasks. The first task will be loading paper into a cassette. In a normal copying environment, the Load Paper indicator light would be displayed and a complete package of paper would be added. For training purposes, we will load only a small amount of paper.

1. Lift and take out the cassette.
2. Remove the cover and raise the guide arms.
3. Load paper into the cassette. Do not stack the paper above the load limit marks inside the cassette.
4. Lower the guide arms and replace the cover.
5. Reinsert the cassette.

OR

the top cassette can be loaded simply by pushing down on this lever, lifting the cover, inserting the paper, lowering the cover, and lifting the lever.

Here are the summary learning points for this task. They are only a SUMMARY of the task requirements so please read all of them aloud before completing the task.

The second task is to make one copy of a single-side original.

1. Press the Clear Modes key.
2. Insert the original face down, in the 11" x 8 1/2" orientation, in the entrance of the document feeder.
3. Adjust the original guides so they contact both sides of the original.
4. Press the Start key.
5. The copy is ejected into the Sorter. The original is ejected onto the cover.

PRESS CLEAR MODES

Here are the summary learning points for this task. Please read all of them aloud before completing the task.

The third task is to make one two-side (duplexed) copy from two one-side originals.
1. Press the Clear Modes key.
2. Square the stack of originals and insert it face down in the entrance of the document feeder. The last page should be on top.
3. Adjust the original guides so they contact both sides of the stack.
4. Press the Duplex Key once.
5. Press Start.
6. The top sheet of the stack of originals is copied and delivered to the duplex tray. The next page is copied onto the reverse side. The duplex copy is delivered to the top bin of the Sorter. The originals are ejected and stacked right-side-up on the cover.

PRESS CLEAR MODES

Here are the summary learning points for this task. Please read them aloud and then complete the task.

The final task will be to reduce two 8 1/2" x 11" originals so they will fit on one side of an 8 1/2" x 11" copy.

1. Press the Clear Modes key.
2. Lift the photocopier lid.
3. Place the two originals side by side face down on the glass. Page 1 is placed to the right and Page 2 is placed on the left because the copier produces a mirror image of the originals.
4. Close the cover.
5. Press the reduce button five times so that 65% is displayed on the left side of the indicator panel and 11" x 17" -> 8 1/2" x 11" is displayed across the top of the panel.
6. Press Start. The copier will automatically select the 8 1/2" x 11" paper size.
7. The copy will be delivered to the top Sorter bin. Lift the cover to remove originals from the glass.

PRESS CLEAR MODES

Here are the summary learning points for this task. Please read them aloud and then complete the task.

WHEN THE SUBJECT COMPLETES A TASK SUCCESSFULLY SAY "That's a correct copy."

AT THE END OF THE TRAINING TIME, have subject complete the SEQ. Then, say "Remember this is a two-part experiment so please come back on (day)__________, (date)__________, at (time)_______. If you want to leave your name and number I will call you the day before to remind you."
4. Sign and date extra credit form and give to subject.

AFTER SUBJECT LEAVES

1. Turn microphones off
2. Turn camera off
3. Turn monitor off
4. Collect error copies and put in subject file
5. Write subject number, date, and time on video tape and subject file
6. Remove key from copier
7. Return files to cabinet
BEFORE SUBJECT ARRIVES

1. Post signs
2. Remove subject file, task files, and video tape from cabinet
3. Plug key into copier
4. Check electrical connections on camera
5. Turn camera on
6. Insert tape
7. Turn monitor on and check camera angle
8. Move wastebasket
9. Close cover on advanced function keys
10. Check paper cassettes
11. Load training video in VCR

AFTER SUBJECT ARRIVES

Before we begin, I would like for you to complete a series of forms—an Informed Consent, a Demographic form, a vocabulary test, and an attitude measure.

(Have subject complete vocab last so you can time)

If you have any questions, please ask.

AFTER SUBJECT HAS COMPLETED ALL THE FORMS, PLACE THEM IMMEDIATELY INTO THE SUBJECT FOLDER WITHOUT LOOKING AT THEM.

1. Put microphone on (NOT on subject due to moving around)
2. Turn microphones on
3. Turn camera on (BE SURE RED LIGHT ON FRONT OF CAMERA IS LIT)

This experiment is designed to give you an opportunity for training in the use of a photocopy machine. You will be viewing a video demonstration on the use of this photocopy machine. The trainer will give you a brief description of the machine functions. She will then do each of the training tasks. After the trainer completes each task, you will be allowed time to do the task yourself. I will give you the original(s) you need. When you complete a task, please hand the originals and copies to me. Because of the nature of this training, I will not be able to answer any questions during the completion of the tasks. However, if the machine jams for any reason I will clear it.
TURN ON VIDEO. STOP THE VIDEO AFTER EACH TASK IS DEMONSTRATED. HAND SUBJECT THE SUMMARY LEARNING POINTS AND ASK THEM TO READ THEM ALOUD BEFORE COMPLETING THE TASK.

WHEN THE SUBJECT COMPLETES A TASK SUCCESSFULLY SAY "That's a correct copy."

AT THE END OF THE TRAINING TIME, have subject complete the SEQ. Then, say "Remember this is a two-part experiment so please come back on (day)_____________, (date)_____________, at (time)_____________. If you want to leave your name and number I will call you the day before to remind you."

4. Sign and date extra credit form and give to subject.

AFTER SUBJECT LEAVES

1. Turn microphones off
2. Turn camera off
3. Turn monitor off
4. Collect error copies and put in subject file
5. Write subject number, date, and time on video tape and subject file
6. Remove key from copier
7. Return files to cabinet
8. Rewind training video and remove from VCR
Script for Instruction Manual Training

BEFORE SUBJECT ARRIVES

1. Post signs
2. Remove subject file, task files, and video tape from cabinet
3. Plug key into copier
4. Check electrical connections on camera
5. Turn camera on
6. Insert tape
7. Turn monitor on and check camera angle.
8. Move wastebasket
9. Close cover on advanced function keys
10. Check paper cassettes

AFTER SUBJECT ARRIVES

Before we begin, I would like for you to complete a series of forms—an Informed Consent, a demographic form, a vocabulary test, and an attitude measure.

(Have subject complete vocab last so you can time)

If you have any questions, please ask.

AFTER SUBJECT HAS COMPLETED ALL THE FORMS, PLACE THEM IMMEDIATELY INTO THE SUBJECT FOLDER WITHOUT LOOKING AT THEM.

1. Put microphones on
2. Turn microphones on
3. Turn camera on (BE SURE RED LIGHT ON FRONT OF CAMERA IS LIT)

This experiment is designed to give you an opportunity for training in the use of a photocopy machine. Since there is a limited amount of time, only four basic tasks will be used for training. These tasks are all relatively simple and can be completed using the features available on this machine.

The first task will be to load a supply of paper in the 11" x 8 1/2" paper cassette. The second task will be to make one copy of a one-side original. The third task will be to make one two-side copy of two one-side originals. The fourth task will be to reduce two 8 1/2" x 11" originals so they fit on one 8 1/2" x 11" copy. You will be allowed a total of 20 minutes to complete these tasks.

Here is the instruction manual for the photocopier for you to use. I will read the instructions for each task, give you the
original, and show you the expected output. When you complete the
task, please hand all the copies to me. I will then give you the next
task.

Because of the nature of this training, I will not be able to
answer any questions during the completion of the tasks. However, if
the machine jams for any reason I will clear it. I will also tell you
that this machine has an automatic reset feature. You will need to
watch to be sure all the buttons you press are still activated before
pressing the Start key to complete a task.

READ INSTRUCTIONS FOR FIRST TASK. BEGIN TIMING.

WHEN THE SUBJECT COMPLETES A TASK SUCCESSFULLY SAY "That's a
correct copy."

AT THE END OF THE TRAINING TIME, have subject complete the SEQ.
Then, say "Remember this is a two-part experiment so please come
back on (day)__________,
(date)__________________, at (time)____________. If
you want to leave your name and number I will call you the day
before to remind you.

4. Sign and date extra credit form and give to subject.

AFTER SUBJECT LEAVES

1. Turn microphones off
2. Turn camera off
3. Turn monitor off
4. Collect error copies and put in subject file
5. Write subject number, date, and time on video tape and subject
   file
6. Remove key from copier
7. Return files to cabinet
BEFORE SUBJECT ARRIVES

1. Post signs
2. Remove subject file, task files, and video tape from cabinet
3. Plug key into copier
4. Check electrical connections on camera
5. Turn camera on
6. Insert tape
7. Turn monitor on and check camera angle
8. Move wastebasket
9. Close cover on advanced function keys
10. Check paper cassettes

AFTER SUBJECT ARRIVES

Before we begin, I would like for you to complete a series of forms—an Informed Consent, a demographic form, a vocabulary test, and an attitude measure.

(Have subject complete vocab last so you can time)

If you have any questions, please ask.

AFTER SUBJECT HAS COMPLETED ALL THE FORMS, PLACE THEM IMMEDIATELY INTO THE SUBJECT FOLDER WITHOUT LOOKING AT THEM.

1. Put microphones on
2. Turn microphones on
3. Turn camera on (BE SURE RED LIGHT ON FRONT OF CAMERA IS LIT)

This experiment is designed to give you an opportunity for training in the use of a photocopy machine. Since there is a limited amount of time, only four basic tasks will be used for training. These tasks are all relatively simple and can be completed using the features available on this machine.

The first task will be to load a supply of paper in the 11" x 8 1/2" paper cassette. The second task will be to make one copy of a one-side original. The third task will be to make one two-side copy of two one-side originals. The fourth task will be to reduce two 8 1/2" x 11" originals so they fit on one 8 1/2" x 11" copy. You will be allowed a total of 20 minutes to complete these tasks.

I will read the instructions for each task, give you the original, and show you the expected output. When you complete the
task, please hand all the copies to me. I will then give you the next task.

Because of the nature of this training, I will not be able to answer any questions during the completion of the tasks. However, if the machine jams for any reason I will clear it. I will also tell you that this machine has an automatic reset feature. You will need to watch to be sure all the buttons you press are still activated before pressing the Start key to complete a task.

READ INSTRUCTIONS FOR FIRST TASK. BEGIN TIMING.

WHEN THE SUBJECT COMPLETES A TASK SUCCESSFULLY SAY "That's a correct copy."

AT THE END OF THE TRAINING TIME, have subject complete the SEQ. Then, say "Remember this is a two-part experiment so please come back on (day)_____________.
(date)______________, at (time)____________. If you want to leave your name and number I will call you the day before to remind you."

4. Sign and date extra credit form and give to subject.

AFTER SUBJECT LEAVES

1. Turn microphones off
2. Turn camera off
3. Turn monitor off
4. Collect error copies and put in subject file
5. Write subject number, date, and time on video tape and subject file
6. Remove key from copier
7. Return files to cabinet
Task 1 Learning Points

1. Remove cassette
2. Load paper
3. Replace cassette

OR

1. Use Lever
Task 2 Learning Points

1. Press Clear Modes

2. Place original in autofeed tray

3. Press Start
Task 3 Learning Points

1. Press Clear Modes
2. Place originals in autofeed tray
3. Press Duplex
4. Press Start
Task 4 Learning Points

1. Press Clear Modes

2. Place originals on glass, page 1 on right, page 2 on left

3. Press Reduce to 65%

4. Press Start
PLEASE NOTE

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APPENDIX D. SPECIFIC TASK INSTRUCTIONS WITH ORIGINAL DOCUMENTS AND EXPECTED OUTPUT SAMPLES
APPENDIX E. DATA CODING SHEETS
199

Task 1 - Load Paper

Subject #__________

1. Consult Operator's Guide:   Yes_____  No______  
                                  Help_____  No help____

2. Locate correct cassette:   1st try____  2nd try____  
                          3rd try____  More than 3 tries____

3. Any keys pressed?________________________________________

4. Time for completion of task:______________________________
Task 2 - One-side Original

Subject #_________

   Help______ No help______

2. Placement of Original:
   Glass - center left____ center rt.____
   lower left____ lower rt.____
   upper left____ upper rt.____
   other (describe)____________________

   Autofeed__________________________
   Vertical (11)_____________ Horizontal (8.5)________
   Face down_____________ Face up_____________

3. Key(s) Pressed:
   Start________
   Other (specify)___________________________

Total number of keystrokes________

4. Total number of errors (incorrect copies):________

5. Time for completion of task:________________________
Task 3 - 2 Single Originals to 2-side copy

Subject #________

   Help_______ No help_______

2. Placement of Original:
   Glass - center left____ lower left____ upper left____
   center rt.____ lower rt.____ upper rt.____
   other (describe)__________________________

   Autofeed_____________________
   Vertical (11)__________ Horizontal (8.5)__________
   Face down______________ Face up________________

3. Key(s) Pressed:
   Duplex (once)_________
   Other (specify)_____________________

Start_________

Total number of keystrokes________

4. Total number of errors (incorrect copies):__________

5. Time for completion of task:____________________
Task 4 - Reduce
(Two 8 1/2"x11" originals on one side of 8 1/2"x11" copy)

Subject #________


2. Placement of Original:
   Glass - center left_____  lower left_____  upper left_____
   center rt._____  lower rt._____  upper rt._____
   other (describe)_________________________

   Autofeed________________________

   Vertical (11)___________  Horizontal (8.5)_________

   Face down_______________  Face up_______________

3. Key(s) Pressed:
   Auto Reduce/Enlarge________
   Select Cassette___________
   Reduce____________________
   Zoom______________________
   Other (specify)_____________________________

   Start________

   Total number of keystrokes_________

4. Total number of errors (incorrect copies):___________

5. Time for completion of task:_______________________
Task 5 - Transfer Task
(Four 8 1/2 x 11 originals on one 2-side copy)

Subject #__________

   Help_______  No help_______

2. Placement of Original:
   Glass - center left____  lower left____  upper left____
   center rt._____  lower rt.____  upper rt.____
   other (describe)_____________________

   Autofeed___________________________

   Vertical (11)__________  Horizontal (8.5)__________

   Face down______________________  Face up______________________

3. Key(s) Pressed:

   Duplex___________________________

   Auto Reduce/Enlarge___________

   Select Cassette_______________

   Reduce___________________________

   Zoom____________________________

   Other (specify)___________________________

Start__________

Total number of keystrokes__________

4. Total number of errors (incorrect copies):__________

5. Time for completion of task:___________________________
The purpose of this research is to evaluate methods that can be used effectively to train photocopier operators. I understand that this experiment consists of two one-hour sessions to be conducted in Lagomarcino W135 and I agree to participate in both sessions. I understand that during this study I will be videotaped while operating a photocopier. I also understand that I will be asked to complete a demographic form and several measurement instruments.

I understand that this study will not be harmful to me in any way, but if at any time I become uncomfortable I may withdraw from the experiment and suffer no penalties for withdrawing. Also, if after the completion of this experiment I have any questions concerning this experiment, I can contact the experimenter at 294-8126.

I further understand that my privacy and confidentiality will be protected by the researchers conducting the study. I will be identified only by a subject number. The videotapes from this study will only be used by individuals involved in the research. The videotapes will be retained pending publication of combined results and will then be erased after expiration of the required retention period.

Under these conditions, I agree to participate in this study.

__________________________  ______________________
Name                                             Date
APPENDIX G. DEMOGRAPHIC DATA FORM
Demographic Data

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
<th>Date of Birth</th>
</tr>
</thead>
</table>

Is English your native language? Yes____ No____

Are you right handed____ left handed____

Academic classification: (please circle)
- Freshman
- Sophomore
- Junior
- Senior

Major or intended major: ____________________________

How often, on average, have you used copy machines? Please check the line next to the option MOST appropriate to your own frequency of use.

- ____ almost every day
- ____ several times a week
- ____ about once a week
- ____ about once a month
- ____ less than 10 times a year
- ____ never

When making copies, they are usually for: (check all that apply)

- ____ Class
- ____ Requirement of job
- ____ Personal business

Documents usually copied: (check all that apply)

- ____ Chapters of books
- ____ Journal articles
- ____ Magazine articles
- ____ Class notes
- ____ Other (please specify) ____________________________
When photocopying a document, how many times on average does it take you to make a satisfactory copy? (please check)

_____ Make satisfactory copy on first trial
_____ Sometimes need to make more than one copy
_____ Frequently need to make more than one copy
_____ Almost always need to make more than one copy

What brand and model (if known) copy machine do you currently use most often?

Brand ___________________________ Model ___________________________

Does the copy machine you use most often use symbols (pictures), words, or both to communicate its functions to you? (please circle)

Symbols Words Both symbols and words Don't know

Which of the functions listed below is available to you on the copy machine you use most often? If the function is available, do you use the function? (please circle)

<table>
<thead>
<tr>
<th>Function</th>
<th>Available</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighter or darker copy</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Sort (collate)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Reduce or enlarge</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Duplexing (automatically makes two-side copies)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Automatic feed of stacked originals</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Automatic movement of copy on page</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Color copying</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
Group 1 In-Person Demographic Data

Male 4   Female 6   Date of Birth Avg.age=20
Is English your native language? Yes 10   No  
Are you right handed 10   left handed 

Academic classification: (please circle)
Freshman=5   Sophomore=4   Junior=1   Senior

Major or intended major: ____________________________

How often, on average, have you used copy machines? Please check the line next to the option MOST appropriate to your own frequency of use.

3  almost every day
1  several times a week
   about once a week
3  about once a month
3  less than 10 times a year
   never

When making copies, they are usually for: (check all that apply).
Percent responding:
80% Class
40% Requirement of job
30% Personal business

Documents usually copied: (check all that apply)
30% Chapters of books   20% Journal articles
50% Magazine articles   40% Class notes
30% Other (please specify) ________________________________
When photocopying a document, how many times on average does it take you to make a satisfactory copy? (please check)

_3_ Make satisfactory copy on first trial

_7_ Sometimes need to make more than one copy

____ Frequently need to make more than one copy

____ Almost always need to make more than one copy

What brand and model (if known) copy machine do you currently use most often?

Brand IBM=1 Xerox=2 Model Xerox 9900=1

Does the copy machine you use most often use symbols (pictures), words, or both to communicate its functions to you? (please circle)

<table>
<thead>
<tr>
<th>Symbols</th>
<th>Words</th>
<th>Both symbols</th>
<th>Don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>8</td>
<td>119</td>
</tr>
</tbody>
</table>

Which of the functions listed below is available to you on the copy machine you use most often? If the function is available, do you use the function? (please circle)

<table>
<thead>
<tr>
<th>Available</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighter or darker copy</td>
<td>Yes No Don't know</td>
</tr>
<tr>
<td>Sort (collate)</td>
<td>Yes No Don't know</td>
</tr>
<tr>
<td>Reduce or enlarge</td>
<td>Yes No Don't know</td>
</tr>
<tr>
<td>Duplexing (automatically makes two-side copies)</td>
<td>Yes No Don't know</td>
</tr>
<tr>
<td>Automatic feed of stacked originals</td>
<td>Yes No Don't know</td>
</tr>
<tr>
<td>Automatic movement of copy on page</td>
<td>Yes No Don't know</td>
</tr>
<tr>
<td>Color copying</td>
<td>Yes No Don't know</td>
</tr>
</tbody>
</table>

Preferred instruction method (percent):

Instruction Book = 10% Demonstration = 90%
Group 2 In-Person Demographic Data

Male 6   Female 4   Date of Birth Avg. age = 21

Is English your native language? Yes 9   No 1

Are you right handed 10   left handed

Academic classification: (please circle)
Freshman = 3   Sophomore = 4   Junior = 1   Senior = 2

Major or intended major: ____________________________

How often, on average, have you used copy machines? Please check the line next to the option MOST appropriate to your own frequency of use.

_____ almost every day

1   several times a week

2   about once a week

6   about once a month

1   less than 10 times a year

_____ never

When making copies, they are usually for: (check all that apply).
Percent responding:

100% Class

20% Requirement of job

20% Personal business

Documents usually copied: (check all that apply)

20% Chapters of books   40% Journal articles

100% Magazine articles   40% Class notes

30% Other (please specify) ____________________________
When photocopying a document, how many times on average does it take you to make a satisfactory copy? (please check)

______ Make satisfactory copy on first trial
______ Sometimes need to make more than one copy
______ Frequently need to make more than one copy
______ Almost always need to make more than one copy

What brand and model (if known) copy machine do you currently use most often?

Brand_________________________ Model_________________________

Does the copy machine you use most often use symbols (pictures), words, or both to communicate its functions to you? (please circle)

<table>
<thead>
<tr>
<th>Symbols</th>
<th>Words</th>
<th>Both symbols and words</th>
<th>Don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2</td>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

Which of the functions listed below is available to you on the copy machine you use most often? If the function is available, do you use the function? (please circle)

<table>
<thead>
<tr>
<th>Available</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighter or darker copy</td>
<td>Yes No Don't know</td>
</tr>
<tr>
<td>Sort (collate)</td>
<td>Yes No Don't know</td>
</tr>
<tr>
<td>Reduce or enlarge</td>
<td>Yes No Don't know</td>
</tr>
<tr>
<td>Duplexing (automatically makes two-side copies)</td>
<td>Yes No Don't know</td>
</tr>
<tr>
<td>Automatic feed of stacked originals</td>
<td>Yes No Don't know</td>
</tr>
<tr>
<td>Automatic movement of copy on page</td>
<td>Yes No Don't know</td>
</tr>
<tr>
<td>Color copying</td>
<td>Yes No Don't know</td>
</tr>
</tbody>
</table>

Preferred instruction method (percent):
Instruction Book = 20% Demonstration = 80%
Group 3 Video Demographic Data

Male_6 Female_4 Date of Birth_Avg.age=22

Is English your native language? Yes_9 No_1

Are you right handed_9 left-handed_1

Academic classification: (please circle)

Freshman Sophomore=4 Junior=4 Senior=2

Major or intended major: ____________________________

How often, on average, have you used copy machines? Please check the line next to the option MOST appropriate to your own frequency of use.

___1 almost every day
___ several times a week
___3 about once a week
___4 about once a month
___2 less than 10 times a year
___ never

When making copies, they are usually for: (check all that apply).

Percent responding:

___90% Class
___20% Requirement of job
___50% Personal business

Documents usually copied: (check all that apply)

___50% Chapters of books ___20% Journal articles
___60% Magazine articles ___40% Class notes
___60% Other (please specify) ____________________________
When photocopying a document, how many times on average does it take you to make a satisfactory copy? (please check)

2. Make satisfactory copy on first trial
7. Sometimes need to make more than one copy
1. Frequently need to make more than one copy
_____ Almost always need to make more than one copy

What brand and model (if known) copy machine do you currently use most often?

Brand: Xerox=4 Savin=1 Model: ________________

Does the copy machine you use most often use symbols (pictures), words, or both to communicate its functions to you? (please circle)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Words</th>
<th>Both symbols</th>
<th>Don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>

Which of the functions listed below is available to you on the copy machine you use most often? If the function is available, do you use the function? (please circle)

<table>
<thead>
<tr>
<th>Function</th>
<th>Available</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighter or darker copy</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Sort (collate)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Reduce or enlarge</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Duplexing (automatically makes two-side copies)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Automatic feed of stacked originals</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Automatic movement of copy on page</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Color copying</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

Preferred instruction method (percent):
Trial and Error = 10%  Demonstration = 90%
Group 4 Video Demographic Data

Male 6 Female 4 Date of Birth Avg.age=21

Is English your native language? Yes 9 No 1

Are you right handed 10 left handed

Academic classification: (please circle)
Freshman=3 Sophomore=2 Junior=2 Senior=3

Major or intended major:

How often, on average, have you used copy machines? Please check the line next to the option MOST appropriate to your own frequency of use.

___ almost every day
___ 2 several times a week
___ 2 about once a week
___ 3 about once a month
___ 3 less than 10 times a year
___ never

When making copies, they are usually for: (check all that apply). Percent responding:

___ 90% Class
___ 30% Requirement of job
___ 40% Personal business

Documents usually copied: (check all that apply)

___ 30% Chapters of books ___ 60% Journal articles
___ 80% Magazine articles ___ 60% Class notes
___ 50% Other (please specify) ____________________
When photocopying a document, how many times on average does it take you to make a satisfactory copy? (please check)

1 Make satisfactory copy on first trial
2 Sometimes need to make more than one copy
____ Frequently need to make more than one copy
1 Almost always need to make more than one copy

What brand and model (if known) copy machine do you currently use most often?

<table>
<thead>
<tr>
<th>Brand</th>
<th>Model</th>
</tr>
</thead>
</table>

Does the copy machine you use most often use symbols (pictures), words, or both to communicate its functions to you? (please circle)

<table>
<thead>
<tr>
<th>Symbols</th>
<th>Words</th>
<th>Both symbols</th>
<th>Don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

Which of the functions listed below is available to you on the copy machine you use most often? If the function is available, do you use the function? (please circle)

<table>
<thead>
<tr>
<th>Function</th>
<th>Available</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighter or darker copy</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Sort (collate)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Reduce or enlarge</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Duplexing (automatically makes two-side copies)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Automatic feed of stacked originals</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Automatic movement of copy on page</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Color copying</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

Preferred instruction method (percent):
- Instruction Book = 10%
- Demonstration = 90%
Instruction Manual Demographic Data

Male 10  Female 10  Date of Birth Avg.age=23

Is English your native language?  Yes 16  No 2

Are you right handed 16  left handed 4

Academic classification: (please circle)
Freshman=3  Sophomore=8  Junior=6  Senior=3

Major or intended major: ____________________________________________

How often, on average, have you used copy machines? Please check the line next to the option MOST appropriate to your own frequency of use.

1  almost every day
2  several times a week
3  about once a week
4  about once a month
5  less than 10 times a year
6  never

When making copies, they are usually for: (check all that apply).
Percent responding:

1 95% Class
2 30% Requirement of job
3 40% Personal business

Documents usually copied: (check all that apply)

1 45% Chapters of books  3 35% Journal articles
2 45% Magazine articles  4 60% Class notes
3 50% Other (please specify) _______________________________________
When photocopying a document, how many times on average does it take you to make a satisfactory copy? (please check)

- Make satisfactory copy on first trial
- Sometimes need to make more than one copy
- Frequently need to make more than one copy
- Almost always need to make more than one copy

What brand and model (if known) copy machine do you currently use most often?

Brand: Xerox=1 Sharp=1 Model __________________________
       Epson=1 Cannon=1 IBM=1

Does the copy machine you use most often use symbols (pictures), words, or both to communicate its functions to you? (please circle)

<table>
<thead>
<tr>
<th>Symbols</th>
<th>Words and words</th>
<th>Don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>11</td>
</tr>
</tbody>
</table>

Which of the functions listed below is available to you on the copy machine you use most often? If the function is available, do you use the function? (please circle)

<table>
<thead>
<tr>
<th>Available</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighter or darker copy</td>
<td>Yes</td>
</tr>
<tr>
<td>Sort (collate)</td>
<td>Yes</td>
</tr>
<tr>
<td>Reduce or enlarge</td>
<td>Yes</td>
</tr>
<tr>
<td>Duplexing (automatically makes two-side copies)</td>
<td>Yes</td>
</tr>
<tr>
<td>Automatic feed of stacked originals</td>
<td>Yes</td>
</tr>
<tr>
<td>Automatic movement of copy on page</td>
<td>Yes</td>
</tr>
<tr>
<td>Color copying</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Preferred instruction method (percent):
Trial and Error = 20%  Instruction Book=30%  Demonstration = 50%
Trial and Error Demographic Data

Male__8__ Female__12__ Date of Birth_Avg.age=20

Is English your native language? Yes__13__ No__7__

Are you right handed__17__ left handed__3__

Academic classification: (please circle)
Freshman=5 Sophomore=11 Junior=3 Senior=1

Major or intended major: ________________________________

How often, on average, have you used copy machines? Please check the line next to the option MOST appropriate to your own frequency of use.

_____ almost every day
_____ several times a week
10__ about once a week
7__ about once a month
2__ less than 10 times a year
_____ never

When making copies, they are usually for: (check all that apply).
Percent responding:

95% Class
10% Requirement of job
35% Personal business

Documents usually copied: (check all that apply)

50% Chapters of books. 50% Journal articles
65% Magazine articles 45% Class notes
50% Other (please specify) ________________________________
When photocopying a document, how many times on average does it take you to make a satisfactory copy? (please check)

- **7** Make satisfactory copy on first trial
- **11** Sometimes need to make more than one copy
- **1** Frequently need to make more than one copy
- **1** Almost always need to make more than one copy

What brand and model (if known) copy machine do you currently use most often?

<table>
<thead>
<tr>
<th>Brand</th>
<th>Xerox</th>
<th>Model</th>
</tr>
</thead>
</table>

Does the copy machine you use most often use symbols (pictures), words, or both to communicate its functions to you? (please circle)

<table>
<thead>
<tr>
<th>Symbols</th>
<th>Words</th>
<th>Both symbols and words</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>16</td>
</tr>
</tbody>
</table>

Which of the functions listed below is available to you on the copy machine you use most often? If the function is available, do you use the function? (please circle)

<table>
<thead>
<tr>
<th>Available</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighter or darker copy</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Don't know</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Sort (collate)</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Don't know</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Reduce or enlarge</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Don't know</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Duplexing (automatically makes two-side copies)</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Don't know</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Automatic feed of stacked originals</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Don't know</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Automatic movement of copy on page</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Don't know</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Color copying</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Don't know</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
</tbody>
</table>

Preferred instruction method (percent):

- Trial and Error = 50%
- Instruction Book=10%
- Demonstration = 40%
In-person Combined Demographic Data

Male _10_ Female _10_ Date of Birth Avg. age=20

Is English your native language? Yes _19_ No _1_

Are you right handed _20_ left handed

Academic classification: (please circle)
Freshman=8 Sophomore=8 Junior=2 Senior=2

Major or intended major:

How often, on average, have you used copy machines? Please check the line next to the option MOST appropriate to your own frequency of use.

___ 3 ___ almost every day
___ 2 ___ several times a week
___ 2 ___ about once a week
___ 9 ___ about once a month
___ 4 ___ less than 10 times a year
___ never

When making copies, they are usually for: (check all that apply).
Percent responding:

___ 90% Class
___ 30% Requirement of job
___ 25% Personal business

Documents usually copied: (check all that apply)

___ 25% Chapters of books ___ 30% Journal articles
___ 75% Magazine articles ___ 40% Class notes
___ 30% Other (please specify) __________________________
When photocopying a document, how many times on average does it take you to make a satisfactory copy? (please check)

5 ___ Make satisfactory copy on first trial
15 ___ Sometimes need to make more than one copy
____ Frequently need to make more than one copy
____ Almost always need to make more than one copy

What brand and model (if known) copy machine do you currently use most often?

Brand Xerox = 2 IBM = 1 Model Xerox 9900 = 1

Does the copy machine you use most often use symbols (pictures), words, or both to communicate its functions to you? (please circle)

<table>
<thead>
<tr>
<th>Both symbols</th>
<th>Don't know and words know</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
</tr>
</tbody>
</table>

Which of the functions listed below is available to you on the copy machine you use most often? If the function is available, do you use the function? (please circle)

<table>
<thead>
<tr>
<th>Available</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighter or darker copy</td>
<td>Yes</td>
</tr>
<tr>
<td>19</td>
<td>1</td>
</tr>
<tr>
<td>Sort (collate)</td>
<td>Yes</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Reduce or enlarge</td>
<td>Yes</td>
</tr>
<tr>
<td>17</td>
<td>1</td>
</tr>
<tr>
<td>Duplexing (automatically makes two-side copies)</td>
<td>Yes</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Automatic feed of stacked originals</td>
<td>Yes</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Automatic movement of copy on page</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Color copying</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
</tr>
</tbody>
</table>

Preferred instruction method (percent):
Instruction Book = 15% Demonstration = 85%
Video Combined Demographic Data

Male 12  Female 8  Date of Birth Avg.age=22

Is English your native language?  Yes 18  No 2

Are you right handed 19  left handed 1

Academic classification: (please circle)
Freshman=3  Sophomore=6  Junior=6  Senior=5

Major or intended major: ____________________________

How often, on average, have you used copy machines? Please check the line next to the option MOST appropriate to your own frequency of use.

1  almost every day
2  several times a week
5  about once a week
7  about once a month
5  less than 10 times a year
never

When making copies, they are usually for: (check all that apply). Percent responding:

90%  Class
25%  Requirement of job
45%  Personal business

Documents usually copied: (check all that apply)

40%  Chapters of books  40%  Journal articles
70%  Magazine articles  50%  Class notes
55%  Other (please specify) ____________________________
When photocopying a document, how many times on average does it take you to make a satisfactory copy? (please check)

3. Make satisfactory copy on first trial
15. Sometimes need to make more than one copy
1. Frequently need to make more than one copy
1. Almost always need to make more than one copy

What brand and model (if known) copy machine do you currently use most often?

Brand Xerox=4 Savin=1 Model

Does the copy machine you use most often use symbols (pictures), words, or both to communicate its functions to you? (please circle)

<table>
<thead>
<tr>
<th>Symbols</th>
<th>Words</th>
<th>Both symbols and words know</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>4</td>
<td>9</td>
</tr>
</tbody>
</table>

Which of the functions listed below is available to you on the copy machine you use most often? If the function is available, do you use the function? (please circle)

<table>
<thead>
<tr>
<th>Function</th>
<th>Available</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighter or darker copy</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Sort (collate)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Reduce or enlarge</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Duplexing (automatically makes two-side copies)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Automatic feed of stacked originals</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Automatic movement of copy on page</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Color copying</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

Preferred instruction method (percent):
Trial and Error=5% Instruction Book=5% Demonstration = 90%
Total Sample Demographic Data

<table>
<thead>
<tr>
<th>Male 40</th>
<th>Female 40</th>
<th>Date of Birth Avg. age=21</th>
</tr>
</thead>
</table>

Is English your native language?  Yes 68  No 12

Are you right handed 72  left handed 8

Academic classification: (please circle)
Freshman=19  Sophomore=33  Junior=17  Senior=11

Major or intended major: 45 different majors

How often, on average, have you used copy machines? Please check the line next to the option MOST appropriate to your own frequency of use.

- [ ] 4  almost every day
- [ ] 8  several times a week
- [ ] 21  about once a week
- [ ] 30  about once a month
- [ ] 16  less than 10 times a year
- [ ] 1  never

When making copies, they are usually for: (check all that apply).
Percent responding:

- [ ] 94%  Class
- [ ] 24%  Requirement of job
- [ ] 37%  Personal business

Documents usually copied: (check all that apply)

- [ ] 41%  Chapters of books
- [ ] 39%  Journal articles
- [ ] 65%  Magazine articles
- [ ] 49%  Class notes
- [ ] 47%  Other (please specify)
When photocopying a document, how many times on average does it take you to make a satisfactory copy? (please check)

19. Make satisfactory copy on first trial
55. Sometimes need to make more than one copy
2. Frequently need to make more than one copy
2. Almost always need to make more than one copy

What brand and model (if known) copy machine do you currently use most often?

Brand: Xerox=8  Savin=1  Model: Xerox 9900=1  IBM=2  Epson=1  Sharp=1  Cannon=1

Does the copy machine you use most often use symbols (pictures), words, or both to communicate its functions to you? (please circle)

<table>
<thead>
<tr>
<th>Symbols</th>
<th>Words and words</th>
<th>Both symbols</th>
<th>Don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>11</td>
<td>49</td>
<td>8</td>
</tr>
</tbody>
</table>

Which of the functions listed below is available to you on the copy machine you use most often? If the function is available, do you use the function? (please circle)

<table>
<thead>
<tr>
<th>Available</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighter or darker copy</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Don't know</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Sort (collate)</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Don't know</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Reduce or enlarge</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Don't know</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Duplexing (automatically makes two-side copies)</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Don't know</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Automatic feed of stacked originals</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Don't know</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Automatic movement of copy on page</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Don't know</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Color copying</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Don't know</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
</tbody>
</table>

Preferred instruction method (percent):
Trial and Error=19%  Instruction Book=15%  Demonstration = 66%
APPENDIX H. SELF-EFFICACY QUESTIONNAIRE
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pages 228-231

University Microfilms International
The following statements are related to operating various types of electronic equipment. For each statement, indicate whether or not you think you can perform the listed task by placing a "Yes" or "No" in the first column. If you answer "yes" in the first column, in the second column, rate how confident you are of performing the task by entering a number from 1 to 10, with "no confidence" = 1 and "completely confident" = 10.

<table>
<thead>
<tr>
<th></th>
<th>Yes/No</th>
<th>Confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No</td>
<td>Completely Confident</td>
</tr>
</tbody>
</table>

Sample:

When operating a word processor
I can correctly set the line space from single space to double space. Yes 6

When operating a VCR, I can:

<table>
<thead>
<tr>
<th></th>
<th>Yes/No</th>
<th>Confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>correctly insert a tape cassette.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>insert a pre-recorded cassette and watch a movie.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>use the rewind and/or fast forward buttons to locate a specific scene on the tape.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>record a TV program while watching the program.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>program the VCR to record in my absence.</td>
<td></td>
</tr>
</tbody>
</table>
When operating an **automatic** teller machine, I can:

<table>
<thead>
<tr>
<th>1. withdraw cash</th>
<th>Yes:</th>
<th>No:</th>
<th>Confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. make a deposit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. transfer amounts from my savings account to my checking account or vice versa.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. check balance of checking or savings account without withdrawing cash.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

When operating a **photocopier**, I can:

<table>
<thead>
<tr>
<th>1. load a supply of copy paper.</th>
<th>Yes:</th>
<th>No:</th>
<th>Confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. make an exact copy of a one-side original.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. make a two-side copy from two single originals.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. reduce two 8.5&quot; x 11&quot; originals to fit on one side of an 8.5&quot; x 11&quot; copy.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. reduce four 8.5&quot; x 11&quot; originals so that two fit on the front and two fit on the back of an 8.5&quot; x 11&quot; copy.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

When operating a **camcorder**, I can:

<table>
<thead>
<tr>
<th>1. set the date and time display.</th>
<th>Yes:</th>
<th>No:</th>
<th>Confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. record an event.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. play back the tape.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. program the camcorder to record at a specific time.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX I. VOCABULARY TEST
This is a test of your knowledge of word meanings. Look at the sample below. One of the five numbered words has the same meaning or nearly the same meaning as the word above the numbered words. Mark your answer by putting an X through the number in front of the word that you select.

jovial

1 - refreshing
2 - scare
3 - thickset
4 - wise
X - jolly

The answer to the sample item is number 5; therefore, an X has been put through number 5.

You will have 4 minutes for each of the two parts of this test. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.
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pages 236-237

University Microfilms International
Training Program Evaluation

This questionnaire contains a series of statements that will be used to evaluate the training program. We are interested in knowing what you think about the training you received. Please answer questions one through five by circling the one number on the scale below each question that best reflects your reaction to the training program. Question 6 can be answered by placing a check mark on the line that corresponds to your choice. Question 7 provides space for your comments and suggestions.

1. The training I received will be of value to me in the future.

   1  2  3  4  5
   strongly agree
   disagree

2. The training session adequately covered the basic photocopier functions.

   1  2  3  4  5
   strongly agree
   disagree

3. The training sessions were conducted in a professional manner.

   1  2  3  4  5
   strongly agree
   disagree

4. This training added to my knowledge, skill, and ability with regard to photocopiers.

   1  2  3  4  5
   strongly agree
   disagree
5. I would recommend participation in this training to others.

1  2  3  4  5
strongly disagree strongly agree

6. If you had been given a choice of a training method before this experiment, which would you have chosen?

______TRIAL AND ERROR (you prefer to figure it out on your own by going directly to the machine).

______INSTRUCTION BOOK (you prefer to read the instructions in order to figure out how to use the machine).

______DEMONSTRATION (you prefer to have an expert show you how to use the machine).

7. What suggestions do you have for improving the training program?
APPENDIX K. TESTING SESSION SCRIPT
SESSION II INSTRUCTIONS FOR EXPERIMENTER

BEFORE SUBJECT ARRIVES

1. Post signs
2. Be sure you have subject file, task files, and video tape
3. Plug key into copier
4. Check electrical connections on camera
5. Turn camera on
6. Insert tape
7. Turn monitor on and check camera angle
8. Move wastebasket
9. Close cover on advanced function keys
10. Check paper cassettes

AFTER SUBJECT ARRIVES

1. Put microphones on
2. Turn microphones on
3. Turn camera on (BE SURE RED LIGHT ON FRONT OF CAMERA IS LIT)

In order to determine whether or not the training you received was effective, I would like for you to complete the four training tasks from last week plus a transfer task. Like last week, I will not answer any questions. However, if the machine jams, I will clear it. You will have a total of 20 minutes to complete all the tasks. Do you have any questions?

We'll begin with Task 1 and work through the tasks one at a time.

TASK 1 CLEAR MODES READ INSTRUCTIONS
TASK 2 CLEAR MODES READ INSTRUCTIONS
TASK 3 CLEAR MODES READ INSTRUCTIONS
TASK 4 CLEAR MODES READ INSTRUCTIONS
TASK 5 CLEAR MODES READ INSTRUCTIONS

4. Have subject complete the SEQ and the Evaluation Questionnaire
5. Sign and date extra credit form. Give to subject
6. Debrief

AFTER SUBJECT LEAVES

1. Turn microphones off
2. Turn camera off
3. Turn monitor off
4. Put copies in subject file
5. Write subject number, date, and time on video tape
6. Remove key from copier
APPENDIX L. DEBRIEFING SCRIPT
Debriefing

This research is being conducted to evaluate three different instructional methods for training photocopier operators. One method is Trial and Error. This method serves as a control group because no training actually takes place—the individual figures out how to do a task by going directly to the machine. Another method is using an instruction manual. This is training with written text—an individual reads the instruction manual to figure out how to use the machine. A third method is demonstration. One form of demonstration is Behavior Modeling. In this method, an expert model demonstrates how to use the machine.

We know that people learn certain behaviors by watching other people (modeling). We also know that Behavior Modeling is an effective demonstration method for training in interpersonal skills. However, we are trying to extend our knowledge to see if Behavior Modeling is also effective for training on electronic equipment. Also, Behavior Modeling, even though we know it's effective, has been compared infrequently to other training methods so we don't know if it's better than other training methods. So, these are the two questions we are trying to answer:

1. Is Behavior Modeling effective for training electronic equipment operators.
2. Is Behavior Modeling more effective than text training and no training.

Because I am assessing training effectiveness through task performance, there are two other variables that I need to consider since they both predict performance. The first variable is self-efficacy. Self-efficacy means that you think you can complete a certain task. Usually, if you think you can do something you will find a way to get it done. However, self-efficacy may vary depending upon whether you are successful or unsuccessful in completing a task. That is why you completed this self-efficacy questionnaire three different times. I want to see if self-efficacy does vary depending on the type of training you received.

The second variable that predicts performance is general mental ability. I assessed that with the vocabulary test you completed during the first session.

By assessing these two variables, I can control for any effects due to self-efficacy and general mental ability. That way, there will be a clearer picture with regard to the training method effectiveness.

Do you have any questions regarding this research?
APPENDIX M. SUBJECTS' SUGGESTIONS FOR IMPROVING TRAINING PROGRAM
Subjects' Suggestions for Improving Training Program

Group 1

I like how she read the different information to me and then showed me how to do each task. For me, when I went back to do each task it helped me to remember by visual aid.

None. Program is very good— all students should have this training during Library.

None. It was done well.

None - cooler room?

None

NC

Training users where to look if they have problems or if they find instructions ambiguous.

None

More trial of machine

Group 2

Soft music!

I feel the student should read more about how to do the functions and also maintain the same amount of demonstration.

None needed or add more tasks to do.

It was very helpful. No suggestions.

None

I understand that experiments must be conducted in an identical manner. However, the instructions read by the trainer were very dry. In a professional scene, perhaps it would be best to allow the trainer to use his/her own voice.

None

Nothing that I can think of at this time needs improving.
NC

Group 3

None - they are simple and easy to follow.
None. It went rather well the way it was.
None. It was well planned and organized. Interesting to me.
NC

Show the operations twice—perhaps quicker the second time without the intermediary comments (press clear, then...) but keep "this is how to make a 1 sided copy" etc. The person on the videotape is just dull, it's easy to lose attention. At least I remember her that way.

? Sessions were fine.

Make the subjects be confidence to theirselves by telling them something good.

Why did we take a vocabulary test?

None

Make the presentation or person talking on the videotape more interesting.

Group 4

None

I don't really think the program needs to improve.

None

NC

None

A close-up of the control panel would be helpful when certain buttons are being referred to.
None. It was done professionally.

NC
Think it was a neat experience, the most fun experiment I have done yet. Don't change a thing. Experimenter was excellent, stated facts and was very friendly! I'll give it an A.

In the 1st training session, when going through the copying, I think it would have been beneficial to go through it a second time. This would have cemented it in my brain a bit better.

**Group 5**

NC

Only that a demo would be given first. But that of course would take away the whole point of this learning experiment.

Maybe the trainer could be asked questions after a set number of try's.

I think people remember what they've learned better if it comes from trial and error on their own parts. Since I think that's the best way to learn, I wouldn't change the training program. It's good the way it is.

None

None

N/A

None

I don't think that you can really call this a training program. I had fun, though, "playing around" with a copier. Usually I do not get the chance to really try out different things but I just make normal one-sided copies. This experiment gave me the impression however that the photocopying was not the main part of the experiment, but the questionnaires seemed to be more important.

The instruction manual should be written more concisely and the machine should have a greater number of more concise labels on it to help the person using it.

NC

None

With the instruction book, it's almost trial and error. If there are any ways to improve the program, for a learner like myself, I don't know them.
Don't do it on a Monday morning at 8 a.m.

I didn't think of it as a training program. I wasn't trained on anything—just told to do it. If you want a training program you should show how to do a task and a week later ask us to do it.

Have a few more easier tasks before the more difficult ones (reducing, etc).

Better, more detailed operator guide.

More people should be required to participate. Even with demonstrations some people still have difficulty but could be another standpoint to watch from. Very well done otherwise.

Good way (instruction manual). Makes the person try on their own. Learn by mistakes.

The instructions were very vague on how to do the reduced copies on the one side. But other than that the training program was very good.

Group 6

NC

NC

NC

I myself am familiar enough with copiers that trial and error quickly works. Others may prefer demonstrations if they aren't familiar with copiers.

These sessions were conducted very professionally and will be helpful in the future.

I've always been a person who likes to be shown how to do things, so I would rather have a demonstration of how to do each task than have to figure it out by myself. I'm sure other people might like to experiment and figure things out for themselves but I'm not one of them. I think this will help me in the future since coming in here I didn't know how to do much beside make a single copy in the library.

NC

Making any kind of photocopy so it's not only 5 kinds of photocopying.
Provide more information on some of the functions on the copier that were not mentioned in the instructions that the trainer was giving.

NC

NC

None

Nothing

The training program would have been a greater learning experience for the student if every individual function on the photocopier was explained by the trainer. Otherwise, on the basis of trial and error, a great quantity of time is wasted in learning how to use some of the basic functions on a photocopier unfamiliar to the student.

Usage of the color functions on photocopier and automatic sort.

I think demonstration would make it easier for the trainee to learn how to use the copier. After watching a demonstration then they can learn through trial and error although trial and error gave me confidence that I can learn to do things on my own.

Supply more information about the training program.

Better instruction booklet on machine. More complete instructions.

NC

NC = No written comment