DOCUMENT RESUME

ED 371 214 CE 066 724

AUTHOR Cascio, Wayne F.
TITLE Documenting Training Effectiveness in Terms of Worker Performance and Adaptability. EQW Working Papers WP23.
INSTITUTION National Center on the Educational Quality of the Workforce, Philadelphia, PA.
SPONS AGENCY Office of Educational Research and Improvement (ED), Washington, DC.
PUB DATE 94
CONTRACT R117Q00011-91
NOTE 42p.
PUB TYPE Information Analyses (070)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Adjustment (to Environment); *Instructional Effectiveness; *Job Performance; *Job Training; Literature Reviews; Personality Traits; Postsecondary Education; Program Effectiveness; Psychological Studies; Secondary Education; *Skill Development; *Teaching Methods; *Transfer of Training; Vocational Adjustment; Vocational Education

ABSTRACT

This report reviews the personnel psychology literature related to training effectiveness and summarizes it into a three-dimensional matrix. Following an introduction, section II discusses how three components of training studies--training content, training method, and transfer of training--can be considered within a three-dimensional framework. Before discussing the three dimensions of the matrix, sections III and IV address two general areas of concern--worker performance and adaptability. They conclude that few studies make the connection between training effectiveness and performance and worker adaptability is not a well-documented construct. Section V describes the empirical studies that can be categorized by content area. It considers findings of studies that reviewed training in motor and technical skills, including computer skills training, and adaptability skills development, including interpersonal skill development, cross-cultural training, complex skill acquisition, and problem-solving skills. Section VI summarizes findings of research to determine whether a specific method of training is superior. It covers lecture, integrative learning, behavior modeling, and computer-assisted instruction. Section VII reviews research on the transfer of training and concludes that although several variables have been identified that contribute to the transfer of training, the relationship between them and successful transfer is still unclear. Appendixes include 5 endnotes and 69 references. (YLB)

EQW WORKING PAPERS

Documenting Training Effectiveness in Terms of Worker Performance and Adaptability

by

Wayne F. Cascio
University of Colorado at Denver

"Documenting Training Effectiveness in Terms of Worker Performance and Adaptability"
by Wayne Cascio
EQW Catalog Number: WP23

The work reported herein was supported under the Educational Research and Development Center program, agreement number R117Q00011-91, CFDA 84.117Q as administered by the Office of Educational Research and Improvement, U.S. Department of Education. The findings and opinions expressed in this report do not reflect the position or policies of the Office of Educational Research and Improvement or the U.S. Department of Education.

Contents

I. Introduction

"Our economic future must be rooted in the only resource that will remain uniquely American: Americans themselves. The industries that will sustain the next stage of America's economic evolution will necessarily be based on a skilled, adaptable, and innovative labor force and on a more flexible, less hierarchical organization of work."

Robert B. Reich, *The Next American Frontier*

Training will be an essential tool for corporations competing in the 21st century. As both economic conditions and technological developments change rapidly, the ability to *adapt* to these changes becomes the essence of future competitiveness. Adaptation involves three processes: (1) identifying the areas needing change; (2) planning and implementing the actions necessary to make the change; and (3) evaluating the effectiveness of the changes. An organization's ability to adapt is defined by the ability of its employees to adapt. Although individual adaptability will be determined partially by cognitive ability, worker adaptability can be honed through training. In an analysis of 11 types of organizational interventions designed to improve productivity, Guzzo, Jette, and Katzell (1985) found that training programs had the most powerful effect.

Effective corporate training efforts have two major components: strategic and operational. On the strategic level, four characteristics have been identified (Cascio 1992):

- Top management's commitment to training and development;
- A demonstrated connection between the content of training and a business's strategy, objectives, and bottom-line results;
- A comprehensive and systematic approach to training; and
- A commitment to invest in the resources needed for training.

Assuming the appropriate components are present at the strategic level, the operational component of training focuses on what skills are needed and how to train individuals most effectively in those skills. According

to Goldstein and Gilliam (1990), some of the expected economic and technological changes expected in the year 2000 include: an increase in the rate of skill obsolescence requiring more retraining; a trend toward more technologically sophisticated systems requiring more complex cognitive skills; a shift from manufacturing to service industries requiring the need for more interpersonal skills; and an increased influence from international markets requiring more effective cross-cultural interactions.

The increased need for training in these areas raises the question of how to implement effective training programs. This report reviews the personnel psychology literature related to training effectiveness and summarizes it into a three-dimensional matrix. The three dimensions—training content, training methods, and transfer of training—represent the components that must be considered when developing an effective training program.

II. Overview

To address the question of training effectiveness, this report summarizes findings from a literature review of three academic journals in the field of personnel psychology: *Personnel Psychology* (1983-1993), *Journal of Applied Psychology* (1983-1993), and *Academy of Management Journal* (1983-1993). These journals were selected because of their established rigorous acceptance standards. Additional articles from other journals were added as points of reference from the articles gathered in the initial review process.

The aim of the search was to identify empirical studies that focused on training effectiveness. The use of the above-mentioned journals ensured that experimental or quasi-experimental research designs that incorporated control groups were used. The use of these techniques permits causal inferences, that is, inferences that the manipulated variable (e.g., training method and transfer of training technique) caused the outcomes of interest (e.g., behavior change and performance on-the-job). Over 50 journal articles that met the above criteria were reviewed and provided the substance for the following report.

Training research is in Kuhn's (1970) "puzzle-solving" stage, so the data available on its effectiveness come from many different viewpoints and do not always provide a complete picture. In general, there is no direct link between training effectiveness and adaptability, and the linkage between training effectiveness and performance is not well documented. However, the available research documents the various components of the training process, which in turn contributes to implementing effective training programs.

The research is divided into theoretical models and empirical studies testing the validity of these models. This study examines the empirical results and incorporates them into a three-dimensional matrix to facilitate training program design.

Three Components of Training Studies

Training studies generally look at findings for one of three components in the training design: (1) training

content; (2) training method; and (3) transfer of training techniques. The most obvious grouping, ***content of training***, covers a wide range of skills from simple technical skill development (such as proofreading skills) to more complex training interventions to improve cross-cultural interactions. Determining the most effective ***training method*** is another area of study that has generated much research. Although the traditional lecture has been researched, other methods such as behavior modeling are also reviewed. Finally, the question of how to ***transfer skills*** learned in training successfully to the work environment has provided fertile ground for recent analysis.

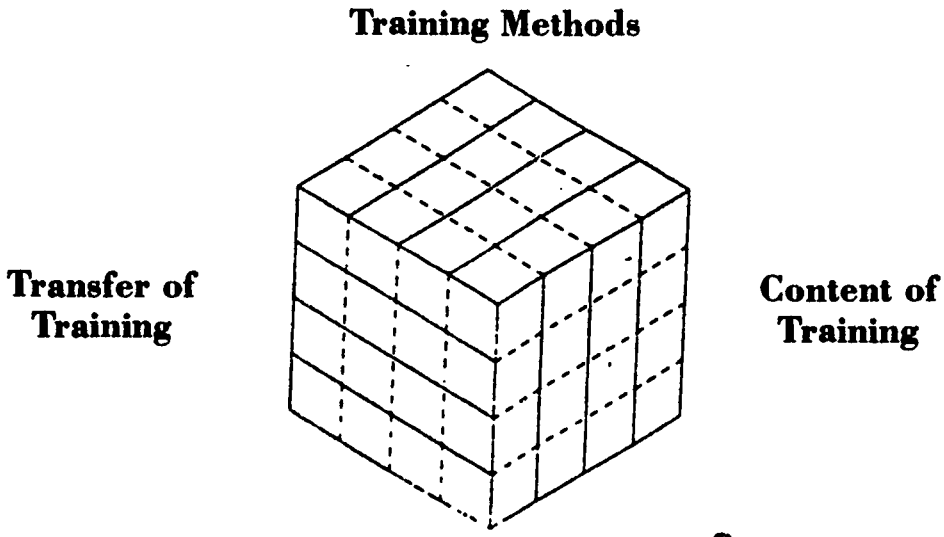
Although these three components are sometimes examined as isolated pieces, they are interrelated in a corporate training context. Hence, the results need to be considered within a three-dimensional framework (Figure 1).

Meta-Analysis

This three-dimensional matrix represents a complex system that is difficult to describe. The matrix will be discussed at the end of this report, but first it is important to analyze each of the three dimensions of the matrix individually. One approach used to cumulate empirical findings is meta-analysis. This quantitative approach to the cumulation of empirical literature has been advocated as a superior approach to the more qualitative narrative literature review (Hunter, Schmidt, and Jackson 1982).

Meta-analysis is a statistical technique that allows researchers to gain a better understanding of a phenomenon than would be available in any single study. The technique can be applied to any area having two or more empirical studies bearing on the same relation. The procedure "standardizes" the results from each of the studies (i.e., expresses the outcomes of each study

Figure 1
Three-Dimensional Matrix of Components Necessary for Effective Training Efforts



in terms of the same metric), and then estimates the average impact of the intervention under study.

For example, one section of a meta-analysis whose objective was to assess the effectiveness of training interventions in managerial training analyzed the results from five studies that used behavioral modeling (Burke and Day 1986). The conservative (lower bound of the 90 percent credibility value) calculation of the overall impact of these five training interventions on the trainees' job behavior (generally collected from performance appraisal results) was found to be .78, or more than three-fourths of a standard deviation improvement in performance. Since there was no remaining artifactual variance in these results, this number suggests that behavior modeling training to improve managerial skills was very effective in improving the job performance of the trainees.

To express the effect of the training program in terms of the percentage change in output, it is necessary to know the coefficient of variation: the pre-training standard deviation divided by the pre-training mean, multiplied by 100 (Sackett 1991). For low-complexity jobs (e.g., routine, blue-collar, clerical work) that figure is about 16 percent of the mean (Hunter, Schmidt, and Judiesch 1990). For professional jobs, the figure is about 46 percent of the mean. Thus, in the above-mentioned case of managerial training, a .78 standard deviation improvement after training implies a .78 x .46 = 36 percent improvement in output on the job. Assuming performance is measured on a ratio scale, the percentage change in output due to a training intervention is:

Percent change in output =

effect size x 100 x standard deviation $_{pretest}/\bar{x}_{pretest}$

The criteria for a meta-analysis of acceptable quality require, among other things, a precise domain within which to test the hypothesis and the inclusion of unpublished studies if available (Bullock and Svyantek 1985). Given the broad variability in rigor of the studies available on training effectiveness and the need for multiple studies on the same topic, it was not possible in this study to meet the criteria outlined above. Furthermore, the decision to include only articles from journals with rigorous review standards violates the more inclusive requirement for a meta-analysis. However, the studies that are available are more interpretable.

Perhaps more important than the technical requirements for a meta-analysis are the theoretical assumptions. In order to express the results of numerous research reports in terms of a common metric (i.e., effect size), the underlying theme of each of the reports must be similar. If most of the training studies used a simple research design that tested the effectiveness of a training intervention *per se*, then a meta-analysis would be helpful in determining how effective those training efforts were. However, the existing research reviewed in this paper covers such a large array of training concerns that summarizing the results into one or two effect sizes would not be very helpful.

Rather, the report will present an overview of the findings within each of the three components described above—training content, training method, and transfer of training techniques. Where available, effect sizes from other meta-analyses will be presented. Before discussing the three dimensions of the matrix, two more general areas of concern will be addressed—worker performance and adaptability.

III. Training and Job Performance

One of the most difficult issues in the training field is establishing the connection between the outcomes of training and job performance. Often, training is evaluated in terms of learning, but the next step of how that learning impacts on-the-job performance is not considered. Once a connection between training and job performance has been made, the program can be evaluated in terms of its economic contribution to corporate performance and competitiveness.

Program analysis at this level is called utility analysis (Goldstein 1986; Cascio 1989; Cascio and Morris 1991). Utility analysis takes into account costs of the training program, as well as more traditional capital investment considerations like the appropriate discount rate to be used over the life of the training. This technique, like traditional capital investment models, requires data that relate the program to the improvement of productivity. These assumptions can only be satisfied by using accurate information regarding the effectiveness of the training program. To obtain this accurate information, a systematic evaluation of how best to approach the training effort must be performed.

A Systematic Approach to Training

As seen in Figure 2, a systematic approach to developing a training program includes a *needs assessment*, the *actual training* program, an *evaluation* of the effort, and an analysis of the training in terms of its goals, which provides *feedback* to improve the training effort continually (Goldstein 1993). This systematic approach allows first, careful consideration as to whether training is needed. Assuming it is, the needs assessment provides an avenue for thoroughly examining the specific content and needs to be addressed through the training effort at both the organizational and individual levels. Gathering this information *before* making decisions regarding components such as training method or the duration of instruction is essential. As Gagné said, "There are good reasons why we should not be content with the idea that learning is learning is learning" (1984).

Once the needs analysis is complete, objectives for the training program must be developed. These objectives direct input for the training design and specify measures both for learning and on-the-job performance. This process clarifies the expectations for the training intervention.

In order to make decisions regarding the details of the training design, researchers have tried to identify the relevant components of effective training efforts and then relate those components to the use of specific techniques. Issues such as motivation and self-efficacy (the trainee's feeling of ability to succeed) impact the efficiency of learning within the training process. Other concerns, such as generalizing the learned behaviors and transferring the training to the work environment, determine how effective the training will be in improving work performance and organizational effectiveness as a result of training. Figure 3 diagrams one proposed model incorporating some of the factors impacting training effectiveness in terms of worker performance (Noe and Schmitt 1986). These factors will be discussed in more detail in the section on "Transfer of Training."

Figure 2
An Instructional System Approach to Training Design
(Source: Goldstein 1993)

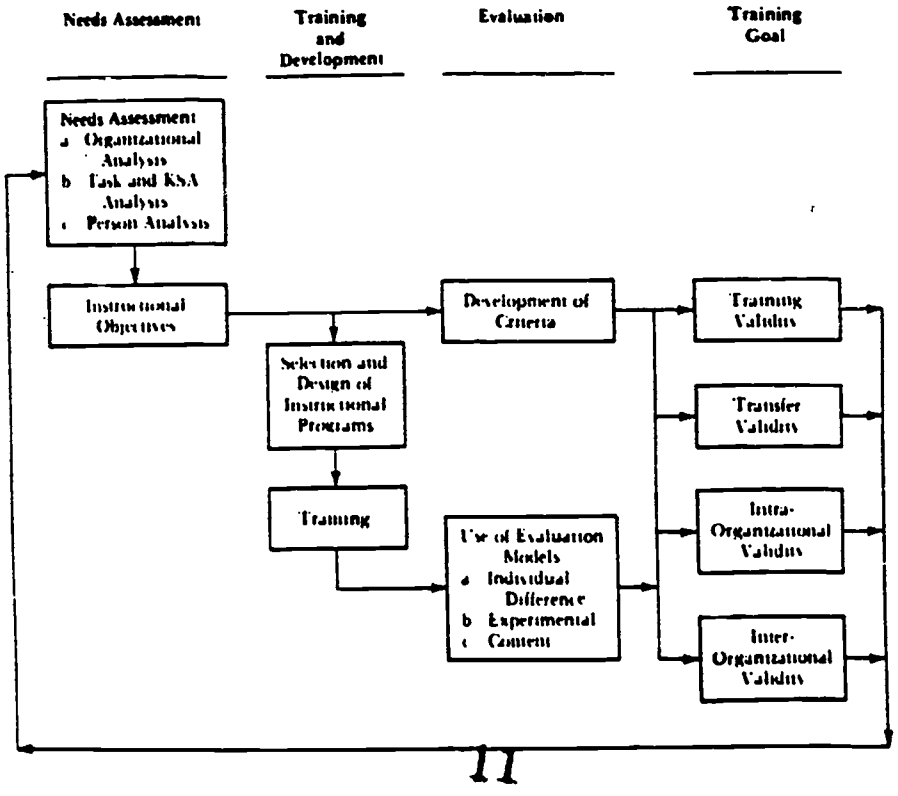
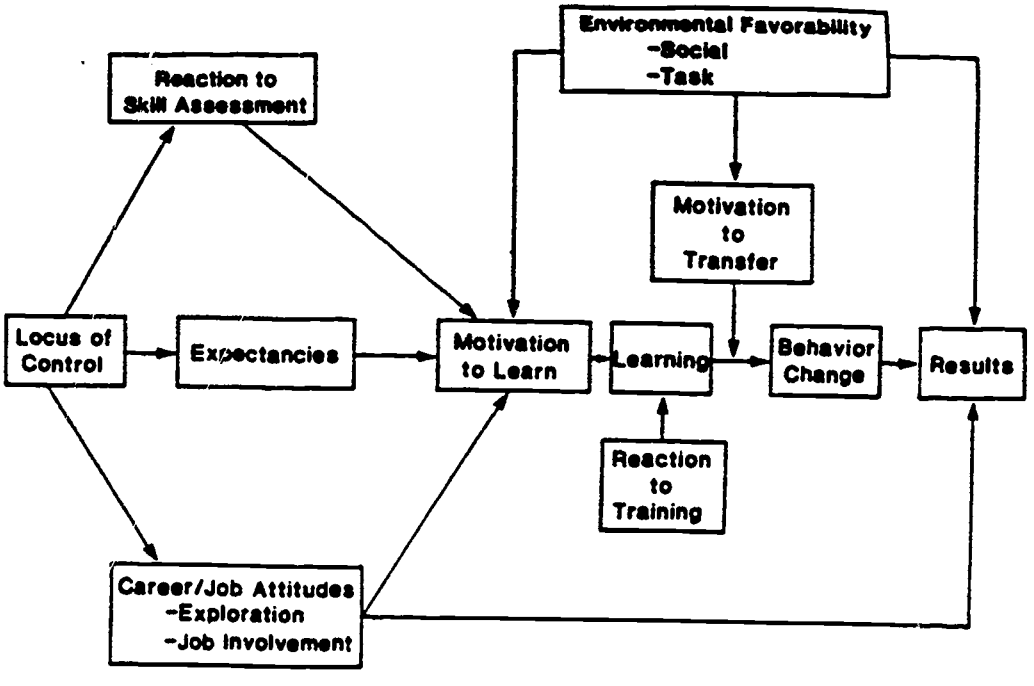


Figure 3
Motivational Influences on Training Effectiveness
(Source: Noe and Schmitt 1986)



Finally, the issue of effective training evaluation has become a pivotal factor in determining the effectiveness of training efforts.

Criteria for Measuring Training Effectiveness

Kirkpatrick (1959) provided four levels of criteria for evaluating training efforts—reaction, learning, behavior, and results. Reaction criteria measure a trainee's feelings about the program—was she or he satisfied, did she or he like it? Learning criteria assess skill mastery or the concepts learned. If proper design procedures have been followed, such as outlining training objectives, the assessment of these learning criteria can be very straightforward.

Behavior criteria help to determine how much of the learned material has been transferred to the job. A typical measure of behavior used in training studies is a standardized performance appraisal form such as a Behaviorally Anchored Rating Scale.[1] Results criteria measure changes that result in productivity improvements, such as cost reductions, lower absenteeism, or increased group morale.

A training program can be evaluated in terms of any of these four criteria. However, to determine the impact on the organization, either behavior or results criteria are needed. There are two steps involved in connecting these measures with the training program. First, the changes (either behavior or results criteria)

expected as a result of the training efforts need to be outlined. Second, these changes need to be linked to the training intervention. This linkage requires the use of experimental or quasi-experimental designs that help to eliminate alternative explanations for the observed changes (Cascio 1991).[2] These designs require more effort in the formulation phase of the training program, but, once performed, provide more accurate information regarding the return on investment in training programs.

Performance Measures in the Literature

Few studies have incorporated results criteria into their research designs. A meta-analysis (Burke and Day 1986) reviewed 70 managerial training studies; of the 472 effect sizes reported, only 60 measured objective results criteria (see Table 1). An effect size is a standardized value (e.g., expressed in terms of standard deviation units) that quantifies the impact of an intervention, such as a training program, on a measured outcome, such as the criteria described above.

Table 1

Number of Effect Sizes (ES) for All Training Areas (Human Relations, General Management, and Self-Awareness) in Burke and Day (1986) Meta-Analysis

Type of criteria	Number of Effect Sizes	Estimated true mean effect size	Lower bound of the 90% credibility value
Subjective learning criteria	58	.34	-.23
Objective learning criteria	77	.38	-.37
Subjective behavior criteria	277	.49	-.26
Objective results criteria	60	.67	-.06
Total	472		

(Note: The negative lower bound values shown in the table suggest that the data grouped in this manner spanned a confidence interval that included zero. This does not mean the training interventions were useless in all cases, just that there is much variability in the actual implementation of them.)

Objective Results Criteria. Two examples of studies that have incorporated objective results criteria and found positive impacts of training programs are Russell, Terborg, and Powers (1985) and Meyer and Raich (1983). Russell et al. (1985) examined the relationship between the use of a corporate-designed training program in basic sales procedures and some corresponding store-level results criteria (i.e., sales volume per employee and store image as evaluated by employees). The correlational design used archival data to compare the training emphasis (i.e., percentage of employees trained and subjective evaluation of the emphasis put on training within a given store) to the store results measures for that store. The authors found that the percentage of trained employees within a given store predicted significantly higher volume of sales per employee and store image ($r=.39$, $p<.05$; $r=.46$, $p<.05$).

Meyer and Raich (1983) also compared the sales performance of behavior-modeling-trained versus non-behavioral-modeling-trained groups. They compared sales commissions-per-hour (before training and after training) of seven stores incorporating a new behavior modeling training approach to that of seven control group stores that received on-going, non-behavioral modeling training programs. Salespersons in the stores using the behavior modeling training program showed a 7 percent increase in their average-per-hour earnings for the period after the training. The comparable average-per-hour earnings for salespersons in stores incorporating the on-going, non-behavioral modeling sales training decreased by 3 percent. That difference was significant at the .01 level.

Subjective Behavior Criteria. The use of subjective on-the-job behavior criteria (e.g., performance appraisal scores) is more popular. The Burke and Day (1986) meta-analysis found that over half of the effect sizes reported used a subjective behavior criterion (Table 1). An example of a study incorporating this type of criterion from the current literature review is Mathieu and Leonard (1987). This study looked at the performance of employees who had been trained in a behavior-modeling training program on supervisory skills. The post-hoc, quasi-experimental design matched a control group of employees to the trained employees on characteristics such as job classes, geographical location, salary, and age. The performance appraisal scores for the two groups were compared, and the results showed that the trained employees received significantly higher ratings than the untrained employees. The effect size for this study was .315, which represents a modest impact on performance as a supervisor.

Since effect sizes are sometimes difficult to comprehend in terms of impact on the organization, this study translated the effect size into economic terms. The effect size of .315 translated into a net benefit of $34,627. This is the one-year benefit due to training in dollar terms minus program costs for training, adjusted for variable costs, taxes, and discounting for 65 employees (using the appropriate estimates for the dollar value of a one standard deviation difference in performance). These benefits were assumed to accumulate over time, and, assuming obsolescence did not negate the effect, a $148,465 net benefit was calculated by year five. Although difficult to quantify, if training to improve adaptability is properly designed, the potential benefits of increases in adaptability due to training can be assumed to follow similar patterns.

Recent efforts have focused on identifying the appropriate means for training evaluation in terms of subjective criteria. For example, Ostroff (1991) suggested that a format incorporating entire job situations, as opposed to discrete job behaviors typically found in

behaviorally-anchored rating scales, would allow more discrimination by supervisors and thus provide more information about the performance impact of training efforts.

Reaction and Learning Criteria

Kirkpatrick's other two criteria—reaction and learning—are internal criteria that are used to evaluate the training effort itself. Although both measures are important precursors to determining the impact of training on-the-job, the actual relationship between these variables and job performance is not clear. Some results indicate that reaction and learning measures generally exhibit low correlations with performance (Alliger and Janak 1989). Other studies have suggested a complex role for reaction measures. In a study of the impact of motivation on the effectiveness of training employees in proofreading skills, Mathieu, Tannenbaum, and Salas (1992) found that the best performance was produced when trainees were motivated to learn *and* reacted positively to the training.

Since the connection between reaction measures and performance is still unclear, trainers should be cautious when using reaction measures in the evaluation of training. The overall goal for corporate training efforts is to improve job performance and to enhance corporate competitiveness; therefore, reaction measures in and of themselves are *not* sufficient to determine the effectiveness of a corporate training effort.

IV. Training in Terms of Adaptability: General Approach

Given the small number of studies available on training effectiveness and job performance, there are even fewer studies that look at training and adaptability. Therefore, a broad definition of adaptability on individual and organizational levels will be discussed. This definition will then be linked to the existing research on training effectiveness.

Individual Adaptability

Adaptability within the organization can be defined on two levels—the organizational level and the individual level. Since the title of this study refers to worker adaptability, the individual-level definition will be discussed first. Sjogren (1977) defines an adaptable individual "as one who can generalize, transfer, or form associations so that the skills, attitudes, knowledge and personal characteristics that have been learned or developed in one context can be readily used in a different context." The individual's ability to adapt within an organization can be accomplished in either or both of the following ways: (1) the individual, as an organism, can change (i.e., by learning new skills); and/or (2) the individual, as a member of an organization, can assist in changing the organization (e.g., by using skills such as divergent thinking to create alternative corporate strategies).

The first form of individual adaptation is essentially an adaptability construct[3] that includes an individual's ability to change (e.g., trainability). Here, the focus of training would be in technical or motor skills. The purpose of training these skills would be to facilitate *individual* adaptation to a new technology or a basic vocational content area, such as electronics principles. The outcome of this form of training would be improved performance in the specific skills trained, for example in the use of a lathe.

The second form of individual adaptation is a collection of knowledge and skills that enables the individual to effect change within the organization. Improving the individual's ability to cope with change would be the focus in this form of adaptation. The purpose of training these skills would be to increase

the flexibility of the organization when reacting to a changing environment. The outcome of training in terms of job performance would be to improve the individual's ability to identify, plan, implement, and/or monitor changes the organization needs to make.

Organizational Adaptability

At the organizational level, Koberg (1987) offers the following composite definition drawn from the sources shown below. "Adaptation is a general term for the process of accommodation between an organization and its environment (Lawrence and Dyer 1983). Described as a period of gradual, long-continued, and incremental change in response to environmental conditions (Tushman and Romanelli 1985), it differs from discontinuous, revolutionary change leading to a major transformation and reorientation of an organization (Miller and Friesen 1980)."

At the organizational level, training becomes the means to achieve change through adaptation instead of revolution. Training provides the organization with a tool to adjust to environmental changes. By training employees to impart the new skills needed in using a new technology, organizations have adapted to an environmental change. By teaching employees specific skills related to the process of adaptation, organizations themselves become more adaptable.

Miller and Friesen (1980) suggest that organizational adaptation is a series of changes that occur due to momentum. This momentum causes changes to occur that may be functional or dysfunctional for the organization. Training employees in skills related to adaptation may help in making the changes functional.

Adaptability Training Objectives

Although the two forms of adaptation—individual and organizational—seem to be separate, it is the combination of these processes that contributes to a truly effective organization. For example, participative skills without technical competence may result in extremely poor group decisions (Janis 1977). On the other hand, in the absence of participative skills, technical competence may be wasted. Hence, if the goal of training is to enhance adaptability, two objectives become evident: (1) to provide effective training in any technical or motor skill necessary to allow the organization to adapt to new conditions; and (2) to provide effective training in skills that will increase the individual's adaptability and, therefore, will increase the adaptability of the organization.

In terms of these objectives, the topics of training content are grouped as shown in Table 2.

The findings within any one content area usually will generalize to other content categories, described above *within* each of the adaptability objectives. For instance, behavior modeling is an effective technique both for interpersonal skill development and for cross-cultural training.[4]

These objective/content categories also relate to the changes outlined by Goldstein and Gilliam (1990). For example, the first objective of training in motor and technical skills incorporates Goldstein and Gilliam's need for retraining due to skill obsolescence. The second objective of training in adaptability skills helps to accommodate needs created by the increase in technological sophistication, the shift from manufacturing to services, and increased internationalization.

Table 2

Content of Training in Terms of Adaptability Training Objectives

Objective 1: Training in motor or technical skills	
Content Category	**Examples**
General	Motor skills such as bowling and technical skills such as proofreading and electronics principles
Computer Skills	How to use computer software and personal computers

Objective 2: Training in adaptability skills	
Content Category	**Examples**
Interpersonal Skills	Social interaction skills such as negotiation, assertiveness, and handling problem employees
Cross-cultural Skills	Cultural interaction skills; Knowledge of culture-specific behaviors and their appropriate use
Problem-solving Skills	Skills related to problem solving, such as improving divergent thinking
Complex Decision-Making Skills	Skills in coordinating several cognitive functions, such as air traffic control and manufacturing resource planning

V. Training Content by Adaptability Objective

This section describes the empirical studies that can be categorized by content area. It includes a brief description of the significant findings of each study. As mentioned previously, the findings do *not* provide a definitive base of appropriate procedures for conducting training. They do offer guidance in the types of design issues to consider for the respective content areas. As outlined in the Overview, this section represents one of the dimensions of the three-dimensional matrix (Figure 4) that will serve as a guide to designing effective training programs.

Objective 1: Training in Technical or Motor Skills

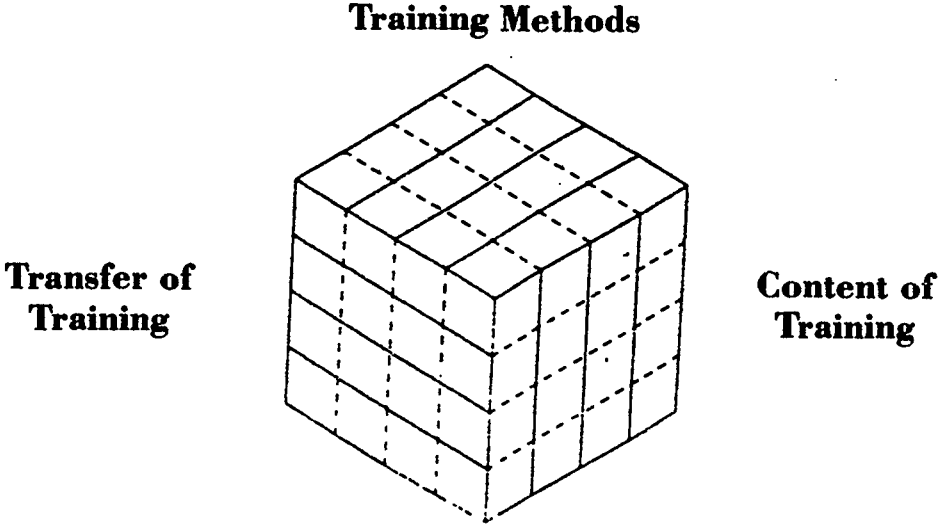
General. The research on motor/technical skills training included four different skills (bowling, proofreading, electronic principles, and training trainers on paper-cup folding). Although these skills seem very diverse, the binding characteristic is the need to reproduce very specific behaviors. Reproduction instead of generalization becomes the goal. Specific principles or behaviors are taught, and then participants are judged based on their ability to reproduce those behaviors as accurately as possible.

Training research on model development also occurs within this category. Since skill development is relatively easy to accomplish, research can be conducted on the many factors, like trainee motivation or self-efficacy, that may influence training success.

The four studies reviewed selected very different foci. Decker (1983) looked at group size and feedback in training-the-trainer. He found that, during the rehearsal stage of behavior modeling, trainees with only a single observer had higher reproduction rating scores than trainees in a larger group with ten observers. He also found that video feedback increased the reproduction rating scores of trainees in the larger group.

Dossett and Hulvershorn (1983) found that, when training military personnel on basic electronics principles, computer-assisted instruction achieved the same performance in less time than the conventional method. They also found that peer-trained CAI participants achieved comparable scores and required less training

Figure 4
Three Dimensional Matrix



time than conventionally trained participants. They also experimented with pairing trainees of varying cognitive levels to determine time and achievement impacts. They found that even the slowest peer groups required only 20 minutes (of 18 hours total training time) of the instructor's time. Optimal pairings were homogeneous, high cognitive-level groupings, but even high-low pairings decreased overall training times without impacting performance for high-level participants.

Mathieu et al. (1992) researched the impact that individual and situational characteristics had on basic skills learning to develop a model for understanding why training works. They found that individual characteristics, like career planning and job involvement, had no significant impact on motivation. Situational constraints, however, were found to have a negative impact on trainees' motivation. These results suggest that if organizational support for training is not available, trainees could become frustrated, and this frustration might impact their approach to future training efforts.

Another finding of the Mathieu et al. (1992) study was the complex interaction that trainee reaction had on the learning performance. The authors found that if the reaction was positive and the trainee was highly motivated, then the impact on performance was significant. However, if the reaction was positive, but trainees were not motivated to do well, the impact on performance was not significant. This study also looked at the impact of choice in training assignment. Individuals who *chose* training performed better than individuals who were *assigned* to training. These results need to be tempered with the findings of Baldwin et al. (1991) that trainees who were given a choice of training and who did not receive that choice performed worse than those not given a choice.

Mathieu et al. (1993) looked at the impact that individual and situational characteristics had on the trainees' self-efficacy and subsequent learning performance. They found that "several individual-level variables influenced self-efficacy, including initial performance,

achievement motivation, and trainee choice." Trainees who chose to participate in the training were more likely to develop increased self-efficacy during training, but this choice did not influence trainees' reactions to their training.

Individual constraints were found to impact reactions to training negatively, as were situational constraints. However, the authors found that the different kinds of constraints were different phenomena and that each type produced unique impacts. Situational constraints were not found to influence the development of self-efficacy. Self-efficacy, both initial and midway, was found to influence performance improvement. Hence, consideration should be given to minimizing both individual and situational constraints in order to maximize training effectiveness. (Although no moderating relationship was found between reactions and mid-course self-efficacy, as was found between reactions and motivation in Mathieu et al. (1992), the self-efficacy and motivation constructs differ slightly.) The results of studies reviewed in this section of the paper are summarized in Table 3 below.

Table 3
Summary of Findings for Studies on Technical or Motor Training Efforts

Author(s)	Hypothesis	Criteria	Significance
Decker (1983)	H_1= 1 observer > 10 observers H_2= group feedback > no group feedback	reproduction ratings	F(1,35)=16.86, p<.001 F(1,35)=6.35, p<.05
Dossett and Hulvershorn (1983)	H_1= CAI < conventional H_2= peer-trained < conventional	training time	t(54.0)=11.89, p<.001 t(35.0)=36.38, p<.001
Mathieu et al. (1992)	path analysis		
Mathieu et al. (1993)	path analysis		

(Note: Findings for path analyses require diagrams to demonstrate significant relationships; see the original article for specific findings from these studies; ">" means "exceeds," "<" means "is less than.")

Summary of Findings for Training in Motor/ Technical Skills. The studies analyzing training efforts in skill development for motor or technical skills have looked at issues in basic training design, as well as the impact individual and situational constraints have on training success. Specific recommendations for training design include: one observer during training in a behavior modeling rehearsal; if groups are necessary, use video feedback to these groups during the rehearsal stage to improve their performance.

The emerging model outlining individual and situational constraints suggests that such constraints may impact training negatively either through a decrease in motivation or through their negative reaction to training. Individual choice to participate in training also seems to have an effect on performance. Other individual characteristics, like achievement motivation and initial performance also impact self-efficacy and, therefore, performance.

Computer Skills. Computer skills training focuses primarily on training participants to use either computers or computer software. It is different from interpersonal skills in that there are very specific, concrete tasks to be learned. The results tend to be easily quantifiable through an objective learning test. The material to be presented is rather finite—and, although some generalization is needed for the numerous applications possible, the domain within which the applications will be used is predictable.

Computer skills training, although considered a skills-based learning outcome, is slightly different from other skills-based outcomes and, therefore, is categorized separately. Computer skills tend to require more generalization than the other skills-based training programs reviewed for this study. For example, bowling and proofreading skills are very straightforward and have a very limited domain, in contrast to computer skills.

While reviewing the four studies incorporating computer skills training, two were identified that helped to establish the effective use of behavior modeling in this content area. Other components of the training process that were considered included the impact that self-efficacy had on computer skills training, the relative effects of positive versus negative feedback, and the concept of "cognitive playfulness" in relation to learning computer skills.

The studies using behavior modeling (Gist 1988, 1989) found that participants trained by this method significantly outperformed trainees in the tutorial training condition. The question remaining was whether the increased costs of the behavior modeling training design were offset by the improved performance. Behavior modeling did have a significant impact on the self-efficacy individuals experienced after the training in the use of computer software, as well as a preferred working style. Trainees in the behavior modeling group also had more positive reactions to the training and were more satisfied with it. Gist (1988) also found that older trainees (over 45 years) had significantly lower performance than younger trainees.

Martocchio and Webster (1992) found that positive feedback enhanced trainees' self-efficacy, and it yielded improved task performance. This study also considered a "cognitive playfulness" construct in the performance results. Cognitive playfulness is described as playing with ideas. High cognitive playfulness individuals use inventiveness and imagination and "interact more playfully such that they exercise and develop skills through exploratory behaviors, resulting in enhanced task performance." Results indicated that individuals with a high score on the cognitive playful-

ness measure significantly outperformed low cognitive playfulness participants and had more positive reactions to the training.

Martocchio (1992) also looked at the impact the context of training had on trainees' performance. He found that by labeling a training experience as an opportunity, trainees experienced higher learning, lower computer anxiety, and higher self-efficacy with respect to the use of computers after the training. Opportunity was defined as a "positive situation in that gain is likely, and over which one has a fair amount of control." Martocchio used words such as "positive," "gain," and "control" for those subjects in the opportunity group and neutral words for the control group. The results of studies reviewed in this section of the paper are summarized in Table 4 below.

Summary of Findings for Computer Skills Training. The studies that reviewed computer training effectiveness suggested that trainees in a behavior modeling setting out-performed trainees using tutorial training. The same studies also found evidence to support the positive impact of self-efficacy on performance. Factors that demonstrated significant relationships with self-efficacy included positive feedback, cognitive playfulness, and labeling the training as an opportunity. Positive feedback also was linked with preferred working style, positive affect toward the training, and satisfaction with the training. Trainees in a training group labeled "opportunity" also reported significantly lower computer anxiety.

Objective 2: Training in Adaptability Skills

Interpersonal Skill Development. In looking at the training studies that focus on human relations skills, several issues become evident. First, the preferred method of training for this content area is behavior modeling. This content area contains training programs such as assertive communication, coaching employees, and leadership skill development. The primary goal of the training is to improve the nature of human interactions.

Three studies focused on identifying optimal training conditions for generalization, two of which compared outcomes on reproduction with generalization. The two conditions that were analyzed were the type of learning points used with the video display and the number or positive/negative mix of modeling scenarios. The results suggest that a mix of positive and negative scenarios in the modeling video increased generalization (Baldwin 1992), and that trainee-generated learning points are superior to trainer-provided learning points (Hogan et al. 1986). Also, Decker (1984) found that rule-oriented or summary learning points enhanced generalization more than either behavioral learning points or no learning points. Behavioral learning points were found to enhance reproduction over rule-oriented, summary, or no learning points.

Decker (1984) defined behavioral learning points as "an element-by-element description of the model's behavior." The emphasis on detail of behavior simply requires the trainee to replicate the details as closely as possible. "Summary-label learning points" (labels for the essential elements of the key behaviors), and "rule-oriented learning points" (the principles underlying the model's performance) develop rule-governed behavior that allows a selection of responses to unstructured or problematic situations.

Hogan et al. (1986) focused on trainee-generated learning points and found them superior to trainer-provided learning points in behavior generalization. The inferior quality of the trainee-generated rule codes suggest that the improved performance was "best attrib-

Table 4

Summary of Significant Findings for Studies on Computer Skills Training

Author(s)	Hypothesis	Criteria	Significance
Gist (1988)	H_1=Behavior modeling> tutorial	Objective performance	F=12.92, p<.001
	H_2=Younger > Older trainees		F=20.09, p<.001
Gist (1989)	H_1=Behavior modeling> tutorial	Objective performance	F(1,103)=6.70 p<.01
	H_2=High self-efficacy>low	Objective performance	F(2,103)=6.74 p<.01
	H_3=Behavior modeling> tutorial	Software self-efficacy	F(1,103)=15.49 p<.01
	H_4=Low self-efficacy x behavior modeling>low x tutorial	Software self-efficacy	F(2,103)=2.98 p<.05
Martocchio and Webster (1992)	H_1=Positive > negative feedback	Objective performance	F(3,59)=4.07 p<.05
	H_2=High > low cognitive playfulness	Objective performance	F(4,58)=4.72 p<.01
	H_3=Positive > negative feedback	Software self-efficacy	F(3,59)=20.72 p<.001
	H_4=Positive > negative feedback	Satisfaction feedback.	F(1,61)=186.34 p<.001 F(1,61)=31.34 p<.001
		Satisfaction trainer	F(2,60)=5.89 p<.05
	H_5=High > low cognitive playfulness	Mood	F(2,60)=5.49 p<.05
		Satisfaction feedback	
Martocchio (1992)	Path Analysis		

(Note: Findings for path analyses require diagrams to demonstrate significant relationships; review of the original article is recommended for specific significance levels from these studies; ">" means "are expected to exceed.")

uted to the additional cognitive processing required by writing one's own codes."

Baldwin (1992) researched the impact of including a negative scenario in the behavior modeling video. Trainees viewing both positive and negative scenarios received significantly higher generalization ratings than trainees viewing more than one positive scenario. Baldwin suggests the improved generalization is due to the "synthesis of exemplary and non-exemplary information" rather than variability. He suggests that the distinctiveness of the appropriate behavior is enhanced by the negative displays, and it is this sharpened distinctiveness that contributes to the superior generalization. The results of studies reviewed in this section of the paper are summarized in Table 5.

Summary of Findings for Interpersonal Skills Training. The three studies reviewed in this section helped to clarify components of the training design that enhance behavior modeling's effectiveness when training people in interpersonal skills. Two of the studies analyzed the role that learning points play in the modeling process. One study suggested the use of trainee-generated learning points; the other study determined that different types of learning points affected the generalizability/reproduction of behavior. Rule-oriented learning points were found superior to behavioral learning points for generalization, while the reverse was true for behavior reproduction. The third study suggested the use of both positive and negative scenarios in the modeling process to enhance generalization.

Cross-Cultural Training. Cross-cultural training is very similar to the human relations training just described, except that the interactions focus on understanding and successfully interfacing with a foreign culture, rather than a new interaction technique like assertive communication. Similar concepts should apply, but the unique characteristics of cross-cultural training must be recognized. This type of training should be very representative of training that enhances worker adaptability. Interaction with a foreign culture not only requires an ability to sense the need for new behaviors (as well as a knowledge of the appropriate behaviors), but also requires an "unlearning" of some very fundamental behaviors. The literature on cross-cultural training suggests that, in general, the effect is positive.

A literature review done by Black and Mendenhall (1990) summarized the training effects of 29 studies on cross-cultural training. With the exception of four laboratory studies, training had a positive effect on cross-cultural skill development, adjustment to a new culture, and job performance within a culture. (The authors noted that the laboratory studies did not provide enough time to judge the impacts of training adequately.) A difficulty with many of the studies analyzed, however, was their reliance on self-report measures. Control groups were used in only one-half of the studies, and six of the studies used a longitudinal design. Only three of the studies incorporated rigorous research designs.

Black and Mendenhall (1990) also developed a theoretical framework based on social learning theory. They suggested that one of the basic differences unique to cross-cultural training (compared to other types of domestic training efforts using social learning theory) included the increased impact of the novelty of the training content. Since most trainees are less familiar with foreign culture norms than the content to be presented in domestic training programs (e.g., assertiveness, negotiation skills, coaching employees), the attention and retention components of social learning

Table 5

Summary of Significant Findings: Interpersonal Skills Training

Author(s)	Hypothesis	Criteria	Significance
Decker (1984)	H_1=Learning points >no learning points	Generalization Reproduction	F(1,79)=6.4, p<.05 F(1,79)=13.1, p<.001
	H_2=Rule learning points> behavioral	Generalization	F(1,79)=17.9, p<.001
	H_3=Behavioral learning points > rule	Reproduction	F(1,79)=3.74, p<.05
	H_4=Behavior > Summary learning points	Reproduction	F(1,79)=5.6, p<.05
Hogan et al. (1986)	H_1=Trainee-generated rule codes > trainer-provided rule codes	Coaching generalization Complaints generalization	F(1,13)=34.31, p<.001 F(1,13)=57.36, p<.001
Baldwin (1992)	H_1=Single scenario with positive & negative > single positive only	Generalization	t(68)=2.53, p<.01
	H_2=Multiple scenarios with positive & negative> multiple positive only	Generalization	t(68)=3.72, p<.01

(Note: ">" means "are expected to exceed")

theory become more important in a cross-cultural training design.

A second factor to be considered when designing cross-cultural training programs is the sequence of symbolic modeling and participative reproduction. Symbolic modeling involves watching actions and then mentally rehearsing them. Participative reproduction involves actual practice rather than mental rehearsal. They suggest that symbolic modeling should always precede participative modeling. Two other considerations include the motivation and self-efficacy levels of potential trainees. Black and Mendenhall suggest that the minimum levels of these two variables will be higher than for other types of programs.[5]

A more recent study by Harrison (1992) compared two popular methods used in cross-cultural training—a cultural assimilator and behavior modeling. (A cultural assimilator is a programmed learning technique that tests a trainee's knowledge of cultural differences and provides explanations for both correct and incorrect answers.) The results from this study suggest that the combined use of behavior modeling and a cultural assimilator was most effective. When used independently, behavior modeling and the cultural assimilator yielded significantly higher learning scores than the no-training group. However, trainees' learning in the respective comparison groups incorporating skeletal versions of each of these techniques did not differ significantly from the more elaborate versions. It should be noted that the effect sizes for these differences were moderate, suggesting that a larger sample may yield a significant difference.

Summary of Findings for Cross-Cultural Training. The studies on cross-cultural training suggest that most of the training efforts in this area have been successful. Black and Mendenhall (1990) suggested a behavioral modeling approach, with symbolic modeling preceding participative reproduction. Harrison found that trainees receiving a combination of behavior modeling and a cultural assimilator performed better than individuals trained in either method.

Complex Skill Acquisition. Complex decision-making processes, such as air traffic control systems or manufacturing resource planning, incorporate cognitive strategies involving numerous decision-making levels and multiple sources of information. They tend to be more complex than interpersonal skill development because they deal with more dimensions of interactions, and the combination of these interactions becomes critical in the successful mastery of the skill.

In Kanfer and Ackerman (1989), the air traffic control simulation was used to look at the interaction between goal setting, ability, and level of resource demand for the learning at hand. Although the training intervention was only a small part of this study, it provides some interesting findings related to cognitive learning. The results indicate that

> "interventions designed to engage motivational processes may impede task learning when presented prior to an understanding of what the task is about. Interventions designed to engage motivational processing following development of declarative knowledge may facilitate performance. Beneficial effects of goal assignments for tasks that are neither completely novel nor performed at asymptotic levels are more pronounced for low-ability persons than for high-ability persons."

In Bretz and Thompsett (1992), the performance levels of integrative-learning-based training (IL) and lecture-based training were compared for trainees learning a manufacturing resource planning technique. The results indicated that the IL and lecture training techniques did not influence learning results. Reaction

to the training was more positive for the IL group than the lecture-trained group, and the participants believed that they had learned more. The authors noted that the application of this technique to a cognitive-intensive task may be the reason no learning improvements were found and suggested that IL, since it is designed to reduce the barriers to learning, might be more appropriate "for topics that tend to cause apprehension, or anxiety or those topics that are generally disliked."

Summary of Findings for Complex Skills. The results from the two studies above suggest that integrative learning may not be necessary for complex skill development, unless some anxiety regarding the training exists. Kanfer and Ackerman's findings suggest that motivational interventions need to be geared to ability levels and delivered once the goal of training has been understood by the trainees.

Problem-Solving Skills. Problem-solving skills involve the ability to identify problems, generate solutions, and evaluate alternatives. Of all the content areas, problem-solving skills are probably most closely related to adaptability. Unfortunately, only two studies are reviewed in this content area. One study by Basadur, Graen, and Scandura (1991) looked at training designed to improve divergent thinking in mechanical engineers. The other study by Ganster, Williams, and Poppler (1991) focused on training to improve an individual's effective use of task knowledge.

The Ganster et al. (1991) study found no significant changes due to the training. However, the training in this example consisted of an instructor reading the subject material. This process took about ten minutes. Hence, the findings might reflect the method of training rather than the content.

The Basadur et al. (1991) study did find significant differences between the trained group's ratings before and after training. They looked at two measures—preference for ideation and premature critical evaluations—rated both by the trainees and their supervisors. They found significant differences between the gains of the trained versus untrained groups on all findings except preference for ideation. The method of training for this study was simply to encourage participants to discover new ways of performing a task by comparing their individual results with the results of other participants. This study suggests that training in divergent problem solving can be successful.

VI. Training Methods

Much of the current research on training attempts to determine whether a specific method of training is superior to other methods. This includes matching method to content, comparing the time required for training across different methods, and determining the most appropriate techniques for a given method. Studies in this area comprise the second dimension of the three-dimensional matrix.

Table 6 outlines the various methods considered in the studies reviewed for this report.

Lecture

The traditional method of lecturing to a large audience has been used in many training settings from public education to corporate environments. Because of its relative ease and cost-effectiveness, its use has predominated. Many studies continue to verify its usefulness.

Burke and Day (1986) found that lecture/discussion plus role play or practice was very likely to generalize across situations using objective learning criteria (lower bound of 90 percent credibility value = .46). The positive lower-bound credibility values for the three lecture methods evaluated in the study using subjective behavior criteria suggest that the lecture method is likely to generalize across situations to some degree (Table 7). However, other studies (e.g., Korman 1977) have questioned the usefulness of this method. The desired learning outcomes may impact its utility. Training situations in which conveying information (thereby increasing the *knowledge* of the trainees) is the primary objective may incorporate the lecture method more effectively than training in which the objective is to modify behaviors or to change attitudes.

Integrative Learning

New methods of training are always being pursued. The search for effective training methods and specific procedures to enhance learning usually revolves around theoretical assumptions about adult learning. Integrative learning (also referred to as accelerated learning or super learning) is rooted in Lewin's (1951) theory that

Figure 5
Three-Dimensional Matrix

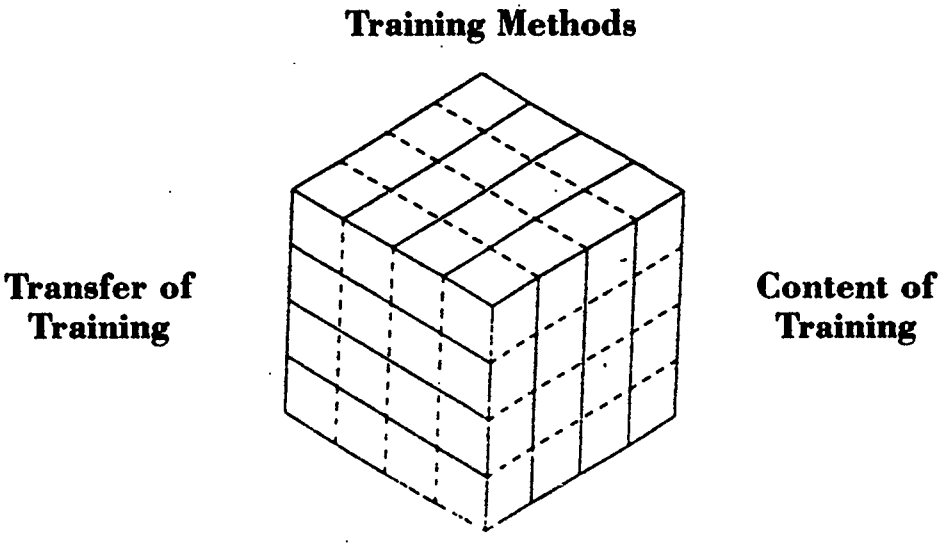


Table 6
Description of Training Methods Used in Literature Review

Lecture	The traditional training method; an expert verbally conveys relevant information to an audience; generally includes a question/answer period
Lecture with practice	The lecture plus a practice session
Integrated learning	A very specific form of training that seeks to eliminate barriers to learning through physical relaxation, mental concentration and baroque music
Behavior modeling	A very popular form of training that relies on Social Learning Theory; it incorporates a model performing the behavior to be trained (usually videotaped), plus practice by the trainee and reinforcement on the job
Computer-assisted instruction	The use of a computer tutorial and feedback in a training program (not exclusive to computer-related content)

Table 7

Average Mean Effect Sizes for the Lecture Method by Criteria in Burke and Day (1986) Meta-Analysis

Method	No. of ES	Estimated true mean effect size	Lower bound of the 90% credibility value
Subjective learning	10 (c)	.66	.17
Objective learning	20 (a)	.37	-.03
	24 (b)	.23	-.06
	8 (c)	.93	.46
Subjective behavior	12 (a)	.46	.13
	11 (b)	.11	.03
	21 (c)	.34	.07
Objective results	15 (a)	.82*	-.04

(a) = Lecture; (b) = Lecture/discussion; (c) = Lecture/discussion plus role-play or practice
Note: Only 3 studies were available—too few to conduct a meaningful analysis.

behavior is a function of the person and the environment. Creating a positive environment, free from traditional barriers to learning (e.g., anxiety, fear of failure, and boredom) is the central focus of this technique. Procedures such as mental concentration and guided imagery, as well as a wide variety of instructional components, are used to create this positive learning environment.

Bretz and Thompsett (1992) compared the use of integrative learning with a more conventional lecture/discussion method. Although trainees reported positive reaction to the integrated learning-based training and a belief that more learning had occurred, no differences in learning were found between the two groups. Since positive results have been reported when using this method in the teaching of foreign language courses (Rose 1985), this approach may be used most appropriately in training interventions that produce anxiety or attempt to modify behavior.

Behavior Modeling

Behavior modeling is based upon Bandura's (1977) Social Learning Theory. Four subprocesses are important parts of modeling training: attention, retention, motor reproduction, and motivation. Generally, behavior modeling includes observing, modeling, and vicarious reinforcement of the behavior to be modified. Although some studies indicate that this technique is successful (Burke and Day 1986; Meyer and Raich 1983), others have questioned its effectiveness (Rus-

sell and Mayer 1985; Russell, Wexley, and Hunter 1984). Russell et al. (1984) compared a behavior-modeling-trained group to a group trained without modeling films (but with the learning points acted out by the trainers). They found that the behavior-modeling-trained group had more positive reactions to training and superior cognitive learning, but found no significant difference in on-the-job behavior.

Manz and Sims (1986) found a pure behavior modeling stimulus (no guidance as to the desirability; no learning points) to yield significant changes in leadership behavior, but the behaviors produced did not correspond directly with the modeled behaviors presented. For example, after viewing a goal-setting model, the change in behavior for trainees was that they were more likely to use reprimand behavior than to engage in goal-setting behavior. Similarly, a reprimand model was more likely to elicit positive-reward behavior than reprimand behavior. Hence, behavior modeling as a training method appears to be effective only in some instances. The complexity of the process has led to substantial research on what components create effective behavior modeling training.

A major issue in the behavior modeling literature is the distinction between the reproduction and generalization of the desired behavior. These two outcomes, although not mutually exclusive, appear to be correlated negatively (Baldwin 1992; Decker 1980, 1982; Clark and Voogel 1985). *Reproduction occurs when trainees mimic the modeled behavior as closely as possible.* It is an appropriate outcome for many types of motor skills training, such as the operation of a power tool. Reproduction is best enhanced with little variability, repetition, no negative examples in the model's behavior, and behavior-oriented learning points (Decker 1980, 1982, 1984; Baldwin 1992; Bandura 1977). Decker (1983) found that one observer was superior to a large group (ten people) during skill rehearsal for reproduction. This study also found that video feedback improved reproduction for group rehearsals.

Can the newly learned behaviors be generalized to novel situations? Evidence suggests that the answer is yes, thus enhancing the transferability of trained skills (Baldwin and Ford 1988). Generalization is a very important component of interpersonal skills training or other more cognitive training tasks. Studies have suggested that generalization may be best with multiple scenarios, inclusion of negative examples, and rule-oriented and/or trainee-generated learning points (Baldwin 1992; Decker 1984; Duncan 1958; Decker and Nathan 1985). (More discussion on this topic can be found in the section entitled "Interpersonal Skills Development.")

Computer-Assisted Instruction

Dossett and Hulvershorn (1983) found that computer-assisted instruction (CAI) was more time-efficient than conventional training. They found that student-pairings also yielded the same learning achievement in less time. Since these findings were based on a training program in electronics principles, the results should generalize to other vocational training programs. Gist et al. (1988, 1989) found that behavior modeling was superior to computer tutorials, especially in the development of self-efficacy with respect to the operation of a computer. As pointed out by Gist, the relative cost-effectiveness between behavior modeling and CAI needs to be examined further.

VII. Transfer of Training

The degree to which trainees effectively apply the knowledge, skills, and attitudes gained through training to their jobs is called positive transfer of training (Baldwin and Ford 1988). In order for training to be effective, transfer must occur. Learning without transfer is meaningless. Techniques to enhance this transfer process comprise the third dimension of the three-dimensional matrix (Figure 6).

Baldwin and Ford (1988) suggest that the learned behavior must be generalized to the job context and *maintained over a period of time* on the job for transfer to occur. They provide a model for this process (Figure 7) that includes three training inputs (trainee characteristics, training design, and work environment), training outputs (learning and retention), and conditions of transfer (generalization and maintenance). They suggest that each of the three training inputs directly influences the training outcomes of learning and retention (links 1, 2, and 3). Through learning and retention, these three training inputs indirectly influence generalization and maintenance of transfer (link 6). They also acknowledge that the two training inputs—trainee characteristics and work environment—directly influence transferability regardless of success in learning (links 4 and 5). For example, lack of motivation may interfere with the transfer of well-learned skills on the job.

In reviewing the literature to reinforce their model, Baldwin and Ford (1988) generally found support. They acknowledged, however, that the findings lack a systematic framework and many results were based on self-reported measures that limited their usefulness.

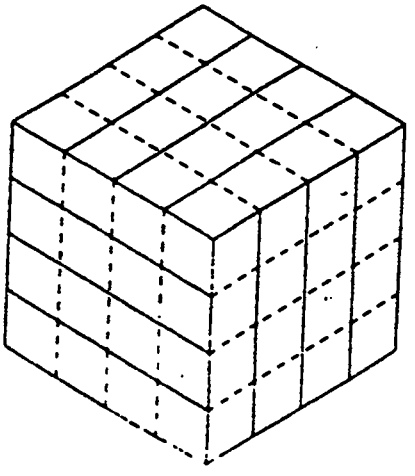
In sum, the research suggests that transfer is more likely when trainees: (1) are confident in using their newly learned skills; (2) are aware of work situations in which demonstration of the new skills is appropriate; (3) perceive that their job performance will improve if they use the new skills; and (4) believe that the knowledge and skills emphasized in the training program are helpful in solving work-related problems (Cascio 1991).

Of the studies that have been performed since the Baldwin and Ford study, three have focused on training

Figure 6
Three-Dimensional Matrix

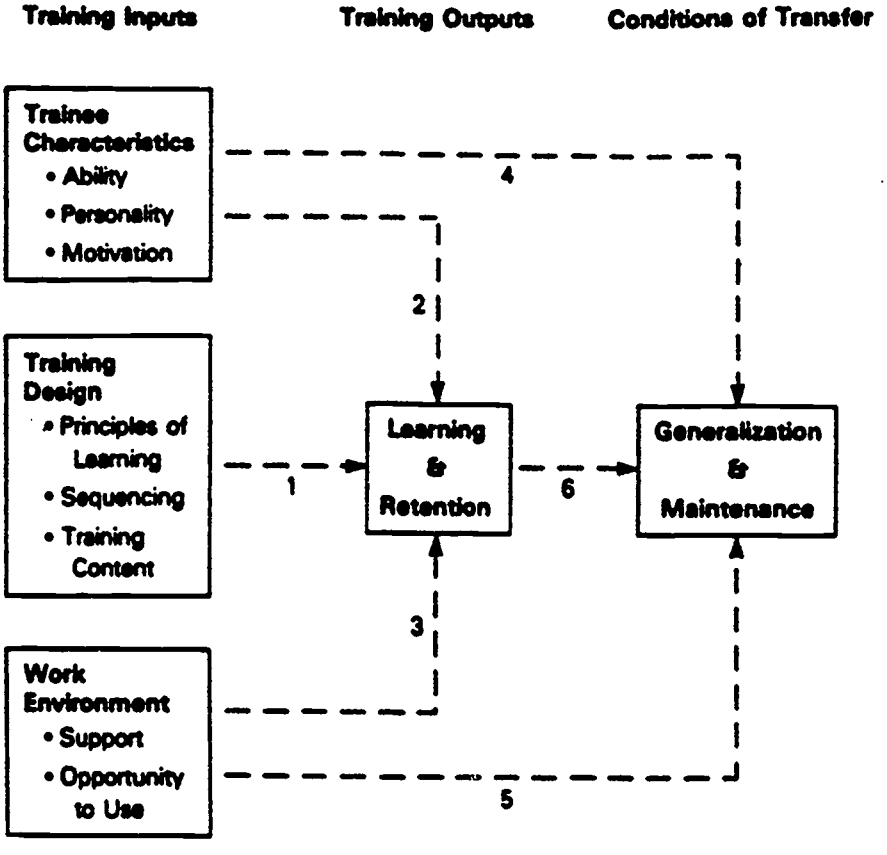
Training Methods

Transfer of Training



Content of Training

Figure 7
A Model of the Transfer Process
(Source: Baldwin and Ford 1988)



techniques that may enhance the transfer of training to improve job performance. Two studies by Gist, Stevens, and Bavetta (1990, 1991) compared self-management to goal setting techniques. The first study found that self-management training produced superior transfer to novel, complex tasks. They concluded that self-management enhanced generalizability and, therefore, transferability (possibly through the significant increase in self-efficacy).

The second study focused on the impact each of the techniques had on a trainee's performance; both interventions had a significant effect on the performance outcome. Goal setting accentuated the influence self-efficacy had on performance, while self-management attenuated those differences. They also found that initial self-efficacy measures significantly influenced initial performance levels as well as skill maintenance (measured seven weeks later). Since this study was performed using an interpersonal skills (negotiation) training content, these findings extend the use of self-efficacy to predict training performance in the interpersonal skills training content.

Larsson (1987) analyzed the impact of mental training techniques (relaxation, meditation, and imagery rehearsal) on performance in task examinations and mental tests. He found that mental training improved actual task performance, enhanced trainees' ability to handle stressful situations, and improved performance on mental tests. Interestingly, he found no significant difference in the trainees' physical well-being due to the training.

Summary of Findings on the Transfer of Training

Although several variables have been identified that contribute to the transfer of training (e.g., motivation, self-efficacy, and attitude), the relationship between these factors and successful transfer is still unclear. There is some evidence to indicate that the objective of training, or level of training content, may influence the type of transfer technique that would be most successful. As Gist et al. (1990) suggested, "a significant challenge exists for training researchers to develop a typology of tasks for which organizational training is conducted and to specify, based on such a typology, the domain within which trained skills may transfer."

In terms of the adaptability objectives, appropriate transfer techniques may depend on whether training is directed at motor skill development or the enhancement of adaptability skills (such as divergent thinking). In the discussion on behavior modeling, the issue of reproduction versus generalization may influence transfer strategies. For example, Baldwin (1992) found that viewing both positive and negative scenarios during training in *interpersonal skills* enhanced generalization. In contrast, Baldwin and Ford (1988) cited documentation for improved retention in *motor behavior* training with the use of identical elements (maximizing the similarity of stimulus and response elements).

Similarly, if these two objectives are found to differ on trainees' expected self-efficacy (e.g., higher self-efficacy for learning motor skills and lower self-efficacy for complex decisions), then the appropriate transfer technique may be different. For example, Gist et al. (1991) found that goal-setting and self-management techniques had different impacts on individuals with different levels of self-efficacy regarding the task (i.e., the performance of individuals with a high self-efficacy trained in self-management was lower than that of trainees in goal-setting, while the opposite was true for individuals with moderate and low self-efficacy).

The existing research has not documented the precise nature of the transfer process. Pieces and proba-

ble linkages are emerging, but additional research needs to be performed. It is clear that transfer is an essential step in effective training programs. Clearly, it is important to focus explicitly on this piece of the process in developing any training design.

VIII. Summary and General Conclusions

After reviewing the personnel psychology literature documenting training effectiveness in terms of worker performance and adaptability, several conclusions become evident:

1. Few studies make the connection between training effectiveness and performance. This connection is vital if training is to be viewed as a key component of corporate competitiveness. More emphasis needs to be placed on evaluating training in terms of on-the-job performance improvements. In order to evaluate training accurately, a thorough needs analysis must be performed and appropriate objectives and criteria developed.

2. Worker adaptability is not a well-documented construct. Given the increasing need for both adaptable individuals and adaptable organizations, additional research on this construct may be appropriate. Within this study two training objectives address the issue: (1) to provide training in technical or motor skills necessary to allow the organization to adapt to new conditions; and (2) to provide effective training in skills that will increase the individual's and, therefore, the organization's ability to adapt.

3. Training effectiveness is not a one-dimensional process. As presented in this review, there are at least three dimensions of the process that must be considered—training content, training methods, and transfer of training. Although numerous studies have researched several pieces of the puzzle, there are many questions that have not yet been answered. As Gist et al. (1990) suggested, "a significant challenge exists for training researchers to develop a typology of tasks for which organizational training is conducted and to specify, based on such a typology, the domain within which trained skills may transfer."

Author Notes

I would like to thank my Research Assistant, Kim Eberle, for her hard work and dedication throughout all phases of this project.

Endnotes

[1] Behaviorally Anchored Rating Scales are one type of a performance appraisal form that defines the dimensions to be rated in behavioral terms and uses critical incidents to describe various levels of performance (Cascio 1989).

[2] Experimental designs designate which variables will be studied and how alternative explanations for the findings will be ruled out. By controlling for time and other salient events that may influence the outcome, a causal explanation is possible.

[3] A construct is an idea that is used to organize or integrate existing knowledge about some phenomenon (Schneider and Schmitt 1986).

[4] Most of the studies on rater training in performance appraisal were not included in this study. These studies were not included because of the specific nature of the reports; most did not generalize to other forms of training.

[5] Although Black and Mendenhall suggest a Social Learning Theory framework, there is no analysis of the training method used in the studies reviewed.

References

Alliger, G.M., and Janak, E.A. 1989. "Kirkpatrick's Levels of Training Criteria: Thirty Years Later." *Personnel Psychology* 42: 331-342.

Baldwin, T.T. 1992. "Effects Of Alternative Modeling Strategies on Outcomes of Interpersonal-Skills Training." *Journal of Applied Psychology* 77: 147-154.

Baldwin, T.T., and Ford, J.K. 1988. "Transfer of Training: A Review and Directions for Future Research." *Personnel Psychology* 41: 63-105.

Baldwin, T.T., Magjuka, R.J., and Loher, B.T. 1991. "The Perils of Participation: Effects of Choice of Training on Trainee Motivation and Learning." *Personnel Psychology* 44: 51-66.

Bandura, A. 1977. *Social Learning Theory.* Englewood Cliffs, NJ: Prentice-Hall.

Basadur, M., Graen, G.B., and Scandura, T.A. 1986. "Training Effects on Attitudes Toward Divergent Thinking among Manufacturing Engineers." *Journal of Applied Psychology* 71: 612-617.

Black, J.S., and Mendenhall, M. 1990. "Cross-Cultural Training Effectiveness: A Review and a Theoretical Framework for Future Research." *Academy of Management Review* 15: 113-136.

Bretz, Jr., R.D., and Thompsett, R.E. 1992. "Comparing Traditional and Integrative Learning Methods in Organizational Training Programs." *Journal of Applied Psychology* 77: 941-951.

Bullock, R.J., and Svyantek, D.J. 1985. "Analyzing Meta-Analysis: Potential Problems, an Unsuccessful Replication, and Evaluation Criteria." *Journal of Applied Psychology* 70: 108-115.

Burke, M.J., and Day, R.R. 1986. "A Cumulative Study of the Effectiveness of Managerial Training." *Journal of Applied Psychology* 71: 232-245.

Campbell, J.P., and Campbell, R.J. 1990. *Productivity in Organizations: New Perspectives from Industrial and Organizational Psychology.* San Francisco, CA: Jossey-Bass Publishers.

Cascio, W.F. 1989. "Using Utility Analysis To Assess Training Outcomes." In I. Goldstein (Ed.), *Training and Development in Organizations.* San Francisco: Jossey-Bass.

Cascio, W.F. 1991. *Applied Psychology in Personnel Management.* Englewood Cliffs, NJ: Prentice Hall.

Cascio, W.F. 1992. *Managing Human Resources.* McGraw-Hill Book Company.

Cascio, W.F., and Morris, J.R. 1990. "A Critical Re-Analysis of 'Problems and Pitfalls in Using Capital Budgeting and Financial Accounting Techniques in Assessing the Utility of Personnel Programs.'" *Journal of Applied Psychology* 75: 410-417.

Clark, R.E., and Voogel, A. 1985. "Transfer of Training Principles for Instructional Design." *Educational Communication & Technology Journal* 33(2): 113-123.

Davis, B.L., and Mount, M.K. 1984. "Effectiveness of Performance Appraisal Training Using Computer Assisted Instruction and Behavior Modeling." *Personnel Psychology* 37: 439-452.

Decker, P.J. 1980. "Effects of Symbolic Coding and Rehearsal in Behavior Modeling Training." *Journal of Applied Psychology* 65: 627-634.

Decker, P.J. 1982. "The Enhancement of Behavior Modeling Training of Supervisory Skills by the Inclusion of Retention Processes." *Personnel Psychology* 35: 323-332.

Decker, P.J. 1983. "The Effects of Rehearsal Group Size and Video Feedback in Behavior Modeling Training." *Personnel Psychology* 36: 763-773.

Decker, P.J. 1984. "Effects of Different Symbolic Coding Stimuli in Behavior Modeling Training." *Personnel Psychology* 37: 711-720.

Decker, P.J., and Nathan, B.R. 1985. Behavior Modeling Training. New York: Praeger Publishers.

Dossett, D.L., and Hulvershorn, P. 1983. "Increasing Technical Training Efficiency: Peer Training Via Computer-Assisted Instruction." *Journal of Applied Psychology* 68: 552-558.

Dugan, B. 1988. "Effects of Assessor Training on Information Use." *Journal of Applied Psychology* 73: 743-748.

Duncan, C.P. 1958. "Transfer after Training with Single Versus Multiple Tasks." *Journal of Experimental Psychology* 55: 63-72.

Earley, P.C. 1987. "Intercultural Training For Managers: A Comparison of Documentary and Interpersonal Methods." *Academy of Management Journal* 30: 685-698.

Fleishman, E.A., Mumford, M. D. 1991. "Evaluating Classifications of Job Behavior: A Construct Validation of the Ability Requirement Scales." *Personnel Psychology* 44: 523-575.

Ganster, D.C., Williams, S., and Poppler, P. 1991. "Does Training in Problem Solving Improve the Quality of Group Decisions?" *Journal of Applied Psychology* 76: 479-483.

Gagne, R.M. 1984. "Learning Outcomes and Their Effects: Useful Categories of Human Performance." *American Psychologist* 39: 377-385.

Gist, M., Rosen, B., and Schwoerer, C. 1988. "The Influence of Training Method and Trainee Age on the Acquisition of Computer Skills." *Personnel Psychology* 41: 255-265.

Gist, M.E., Schwoerer, C., and Rosen, B. 1989. "Effects of Alternative Training Methods on Self-efficacy and Performance in Computer Software Training." *Journal of Applied Psychology* 74: 884-891.

Goldstein, I.L. 1993. "*Training in Organizations: Needs Assessment, Development, and Evaluation*, 3rd edition. Pacific Grove, CA: Brooks/Cole Publishing Company.

Goldstein, I.L., and Gilliam, P. 1990. "Training System Issues in the Year 2000." *American Psychologist* 45 (2): 134-143.

Guzzo, R.A., Jette, R.D., and Katzell, R.A. 1985. "The Effects of Psychologically Based Intervention Programs on Worker Productivity: A Meta-Analysis." *Personnel Psychology* 38: 275-291.

Harrison, J.K. 1992. "Individual and Combined Effects of Behavior Modeling and the Cultural Assimilator in Cross-Cultural Management Training." *Journal of Applied Psychology* 77: 952-962.

Hicks, W.D., and Klimoski, R.J. 1987. "Entry into Training Programs and Its Effects on Training Outcomes: A Field Experiment." *Academy of Management Journal* 30: 542-552.

Hogan, P.M., Hakel, M.D., and Decker, P.J. 1986. "Effects of Trainee-Generated Versus Trainer-Provided Rule Codes on Generalization in Behavior-Modeling Training." *Journal of Applied Psychology* 71: 469-473.

Hunter, J.E., Schmidt, F.L., and Jackson, G.B. 1982. *Meta-Analysis: Cumuluting Research Findings across Studies.* Beverly Hills, CA: Sage.

Hunter, J.E., Schmidt, F.L., and Judiesch, M.K. 1990. "Individual Differences in Output Variability as a Function of Job Complexity." *Journal of Applied Psychology* 75: 28-42.

Janis, I.L., and Mann, L. 1977. *Decision Making.* New York: Free Press.

Kirkpatrick, D.L. 1959, 1960. Techniques for evaluating training programs. *Journal of the American Society of Training Directors* 13: 3-32.

Kanfer, R.K., and Ackerman, P.L. 1989. Motivation and Cognitive Abilities: An Integrative/Aptitude-Treatment Interaction Approach to Skill Acquisition." *Journal of Applied Psychology* 74: 657-690.

Koberg, C.S. 1987. "Resource Scarcity, Environmental Uncertainty, and Adaptive Organizational Behavior." *Academy of Management Journal* 30: 798-807.

Korman, A.K. 1977. *Organizational Behavior.* Englewood Cliffs, NJ: Prentice-Hall.

Kraiger, K., Ford, J.K., and Salas, E. 1993. "Application of Cognitive, Skill-Based, and Affective Theories of Learning Outcomes to New Methods of Training Evaluation." *Journal of Applied Psychology* 78: 311-328.

Kuhn, T.S. 1970. *The Structure of Scientific Revolutions.* Chicago: The University of Chicago Press.

Larsson, G. 1987. "Routinization of Mental Training in Organizations: Effects on Performance and Well-being." *Journal of Applied Psychology* 72: 88-96.

Lawrence, P.R., and Dyer, D. 1983. *Renewing American Industry: Organizing for Efficiency and Innovation.* New York: Free Press.

Lewin, K. 1951 . *Field Theory in Social Science: Selected Theoretical Papers.* New York: Harper & Row.

Manz, C.C., Sims, Jr., H.P. 1986. "Beyond Imitation: Complex Behavioral and Affective Linkages Resulting from Exposure to Leadership Training Models." *Journal of Applied Psychology* 71: 571-578.

Martocchio, J.J. 1992. "Microcomputer Usage as an Opportunity: The Influence of Context in Employee Training." *Personnel Psychology* 45: 529-552.

Martocchio, J.J., and Webster, J. 1992. "Effects of Feedback and Cognitive Playfulness on Performance in Microcomputer Software Training." *Personnel Psychology* 45: 553-578.

Mathieu, J.E., and Leonard, Jr., R.L. 1987. "Applying Utility Concepts to a Training Program in Supervisory Skills: A Time-Based Approach." *Academy of Management Journal* 30: 316-335.

Mathieu, J.E., Martineau, J.W., and Tannenbaum, S.I. 1993. "Individual and Situational Influences on the Development of Self-efficacy: Implications for Training Effectiveness." *Personnel Psychology* 46: 125-147.

Mathieu, J.D., and Russell, Jr., L.L. 1987. "Applying Utility Concepts to a Training Program in Supervisory Skills: A Time-Based Approach." *Academy of Management Journal* 30: 316-335.

Mathieu, J.D., Tannenbaum, S.I., and Salas, E. 1992. "Influences of Individual and Situational Characteristics on Measures of Training Effectiveness." *Academy of Management Journal* 35: 828-847.

Meyer, H.H., and Raich, S.R. 1983. "An Objective Evaluation of a Behavior Modeling Training Program." *Personnel Psychology* 36: 755-762.

Miller, D., and Friesen, P.H. 1980. "Momentum and Revolution in Organizational Adaptation." *Academy of Management Journal* 23: 591-614.

Noe, R.A. 1986. "Trainees' Attributes and Attitudes: Neglected Influences on Training Effectiveness." *Academy of Management Review* 11: 736-749.

Noe, R.A., and Schmitt, N. 1986. "The Influence of Trainee Attitudes on Training Effectiveness: Test of a Model." *Personnel Psychology* 39: 497-523.

Ostroff, C. 1991. "Training Effectiveness Measures and Scoring Schemes: A Comparison." *Personnel Psychology* 44: 353-374.

Pratzner, F.C. 1978. "Occupational Adaptability and Transferable Skills." *Information Series No. 129.* Columbus, OH: The National Center for Research in Vocational Education.

Rose, C. 1985. *Accelerated Learning.* New York: Dell Publishing.

Russell, J.S., Terborg, J.R.. and Powers, M.L. 1985. Organizational Performance and Organizational Level Training and Support." *Personnel Psychology* 38: 849-863.

Russell, J.S., Wexley, K.N., and Hunter, J.E. 1984. "Questioning the Effectiveness of Behavior Modeling Training in an Industrial Setting." *Personnel Psychology* 37: 465-481.

Sackett, P.R. 1991. "On Interpreting Measures of Change Due to Training or Other Interventions: A Comment on Cascio (1989, 1991)." *Journal of Applied Psychology* 76: 590-591.

Schneider, B., and Schmitt, N. 1986. *Staffing Organizations.* Harper Collins Publishers.

Sjogren, D. 1977. "Occupationally-Transferable Skills and Characteristics: Review of Literature and Research." *Information Series No. 105.* Columbus, OH: The National Center for Research in Vocational Education.

Tushman, M.L., and Romanelli, E. 1985. Organizational Evolution: A Metamorphosis Model of Convergence and Reorientation." In L.L. Cummings and B.M. Staw (Eds.), *Research in Organizational Behavior* 7: 223-262. Greenwich, Conn.: JAI Press.

National Center on
the Educational Quality
of the Workforce

University of Pennsylvania
4200 Pine Street, 5A
Philadelphia, PA 19104-4090