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ABSTRACT

A comprehensive review of the literature on organizational training and development is undertaken in this report. Developments in learning, motivation, and attitude theory are discussed, with particular attention being paid to the theory and techniques of behavior modification and to General Systems Theory. Computer-assisted instruction and methods for training disadvantaged applicants are discussed. The literature of research and evaluation methodology is noted, along with its lack of innovation. Finally, empirical studies of training and development outcomes are reviewed; most of these studies are concentrated in three areas: laboratory education, programed instruction, and training the disadvantaged. Research in these three areas has borne fruit, but they are bright spots in an otherwise dismal picture. For example, although management development is a huge enterprise, we know next to nothing about its behavioral effects. The report concludes with a discussion of reasons why the state of the art is what it is and with recommendations for future research and practice. (Author/MF)

PERSONNEL TRAINING AND DEVELOPMENT

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13. ABSTRACT

The report constitutes a comprehensive review of the literature on organizational training and development, including skills training, supervisory training, training for disadvantaged workers, and management development. All available sources were searched for the previous 5 years, the material summarized, and conclusions drawn. The review is written for social scientists, not laymen. The report begins by discussing recent developments in learning, motivation, and attitude theory which have relevance for the training and development problem. Particular attention is paid to the theory and techniques of behavior modification and to General Systems Theory. Next, the most recent developments in training techniques are outlined. Methods for training disadvantaged applicants and computer-assisted instruction (CAI) are discussed at some length. The third section deals briefly with research and evaluation methodology. This literature is conspicuous by its lack of innovation. Finally, empirical studies of training and development outcomes are reviewed. The bulk of the empirical literature is concentrated in three areas: laboratory education, programmed instruction, and training the disadvantaged. Research in these three areas has born fruit, especially with regard to the disadvantaged. However, they are bright spots in an otherwise dismal picture. For example, although management development is a huge enterprise, we know next to nothing about its behavioral effects. The report concludes with a discussion of reasons why the state of the art is what it is and recommendations for future research and practice. (U)

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This review was frustrating for at least two reasons. First, as the term is commonly used, personnel training and development can include such diverse elements as computer assisted instruction, encounter groups for executives and their wives, and training in basic work habits for so called hard core unemployables. It is an incredibly wide spectrum and certain topics are given scant attention. At the one extreme are very molecular studies of such things as acquisition and transfer problems in pursuit rotor training and concept learning. These border on basic research in learning, more properly belong in such a chapter, and will not be reviewed here. At the other extreme are the existentially derived basic encounter experiences. We will discuss neither the psychology not the organizational utility of shouting nasty things about one's spouse in front of a group or having a sensitivity session sans clothing.

Second, this is the first review of its kind. Training and development previously have been discussed as a subsection of "the psychology of men at work" [Hinrichs (104)] or "personnel management" [Porter (158)]. Thus, a question arises as to whether the review should cover the past two years, five years, or hark back to antiquity itself (1940 or thereabouts). As a result, the period of the review varies haphazardly with the particular subtopic. The overall objective was to go back far enough to uncover sufficient substance to describe the state of the art and document trends. In most cases this meant going back three to five years. Beyond that, secondary sources were employed. Also, since there were no previous chapters to serve as guides, the search for the psychology in the field was especially difficult.

Another recurring phenomenon is the cyclical article. That is, there are several prototype papers that appear in the literature at regular intervals. For example there is the article admonishing people to evaluate their training efforts. There is another which argues that training should be well planned and systematic. Yet another reminds us that training and development efforts must have the support of top management or they will fail. There are 5-10 of these basic types, which say the same things over and over again in almost the same language.

The plan of the current chapter is to discuss first some theoretical and conceptual issues that bear on the training and development problem. Second, recent developments in training techniques will be briefly noted. Third, fresh thoughts on the evaluation problem will be discussed. Finally, the empirical literature will be organized around specific topic areas.

Models, Theories, and the Training Problem

Historically, the primary theoretical foundation of training in organizations has been the so called "learning principles". They are still given a prominent place in the major textbooks [Bass & Vaughan (9), Blum & Naylor (20)] and they appear consistently in the literature [Hallstein (91), McCord (139)].

Gagne's (77) classic paper pointed out the secondary importance of the principles and suggested that other considerations were far more powerful. He first made the reasonable assumption that total performance can be analyzed into a set of component tasks that are relatively distinct from each other. Further, proficiency on the task components is what mediates total performance. Given these assumptions, the basic principles of training design consist of: 1) identifying the task components that make up the desired performance, 2) incorporating these component tasks or

"mediators" in the training program, and 3) arranging the learning of the components in the optimal sequence for transfer to total performance. This sort of conceptualization implies that training practitioners and researchers should be concerned with such things as task analysis, terminal behaviors, component task achievements, the fidelity of training task components, and sequencing. It places the emphasis where it belongs, on the two questions of what is to be learned and what the substantive content of a training or development experience should be. Once these are answered, the additional question of what techniques to use, massed versus distributed practice, how to reinforce learner responses, etc., can be considered. Unfortunately, Gagne's statement has stimulated very little activity among people interested in organizational training and development. It stands in a state of suspended animation. What follows is a mere pittance of what there should be.

Considering the question of what is to be learned, an earlier study by Glickman and Vallance (80) analyzed descriptions of specific mistakes made by naval technicians on the job and used this information to alter training content. By using the critical incident method the question of what is to be learned is answered in terms of actual job behavior and the specification of training content follows directly. This prototype study deserves a great deal of imitation, but there has been very little. In one exception, Folley (71) determined the desired behaviors of retail sales personnel by collecting critical incidents from customers. Over 2000 incidents were collected, catagorized, and made the basis for training in customer service. In somewhat the same vein Buehler (28) developed a series of scaled critical job behavior incidents that defined the "desirability for retention" of clerical personnel. In effect, this was an analysis of total performance into its components.

Backing away from a strict critical incident methodology, Harmon (94) discusses a more molar approach for specifying behaviors to be learned. He presents an analysis of performance objectives for Job Corps curriculum development. Fourteen objectives are grouped under three major headings: verbal performance, physical performance, and attitudinal performance. Each objective is explicated by descriptions of the desired behavior, the conditions under which the behavior should occur, and the success criteria by which the trainee's behavior is to be judged. If a similar plan were followed by the majority of people interested in training and development problems, the knowledge gained would increase exponentially.

An example of the difficulties generated by a retreat from behavioral specification of what is to be learned is illustrated by much of the content of management development. Hersey and Kellner (103) have reviewed many of the "theories" underlying such content. The theory of need achievement implies that training should create a high achievement need. Theory X versus Theory Y suggests managers should be taught the versatile use of Theory Y. The Herzberg two factor theory says that supervisors should learn to use intrinsic factors to motivate subordinates. Likert's System Four suggests that a participative and consultative approach to management is best. Finally, the original Ohio State variables of consideration and initiating structure appear most forcefully in the management Grid approach. The prescription is that managers should be taught a style that maximizes both a concern for production and a concern for people.

A controversy has recently arisen over whether the management Grid deserves a third dimension. Reddin (165, 166) argues that style theories aren't useful because they imply an either/or approach using either the ideal or non-ideal style and they structure the world in terms of a few types instead of several gradations along a continuum. He also proposes that the

Grid must be made three dimensional and argues that each combination of employee and production centeredness can vary along an "effectiveness" dimension. That is, there may be situations in which even a 1, 9, 9, 1, or 5, 5, may be effective. The implication is that a manager's use of various styles must take account of situational and individual differences. Hersey and Blanchard (102) sound much the same theme and argue that the proper mix of production centeredness and employee consideration depends in a large degree on the developmental stage in the life cycle of the work group. For example, new work groups may require different management than old work groups. Common (51) also makes the Grid three dimensional by postulating a commitment dimension which implies training should take account of individual differences in the probability of using various styles.

The reviewer feels strongly that the above formulations of what is to be learned suffer because they have no direct link to behavior. The definitions of the variables provide no clear specification of what the desired behaviors are or what the training content should be to insure acquisition of the component tasks. Determining training content thus is a rather large inferential step and depends a great deal upon the artistry of Blake, Likert, McClelland, and the like.

One place we might expect to find a rigorous approach to specifying what is to be learned is in the area of programmed instruction and computer assisted instruction. Not so. Although there is certainly more emphasis on describing terminal behaviors, no recognizable body of methodology for doing so has evolved. As yet, we lack even the rudiments of a theory of what is to be learned. Frank and Smith (74) observe that task analysis and behavioral specification of training objectives seems to be a much more prevalent practice in Britain than in the United States.

Attitude Theory

Rather than think of management style as a set of overt behaviors one could also think of it in attitudinal terms, since it is so often measured via self report questionnaires. Thus, the things to be learned are a particular set of attitudes, beliefs, or opinions. The attitudinal emphasis can be found in other training activities as well, such as supervisory attitudes toward minority groups. For such reasons, theories of attitudes and attitude change become relevant. Four excellent books on attitude measurement and attitude change have appeared in recent years. Shaw and Wright (184) succinctly compare all the major definitions of attitudes, discuss the theoretical and psychometric issues in attitude measurement, and systematically review almost every published attitude scale in domestic psychology. Fishbein (67) has edited an excellent book of readings dealing with a broad spectrum of topics. Rokeach (172) reviews much of the literature on attitude change, distinguishes attitude from other concepts and presents his own comprehensive theory of attitudes. Kiesler, Collins, and Miller (115) spend their entire volume discussing five major types of attitude change theory. Anyone who deals with attitudes as training content should read these four books. All the major issues surrounding how to conceptualize attitudes, how to measure them, and how to change them are discussed. They also document our lack of knowledge concerning the link between attitude change and behavior change. So far, none has been demonstrated.

Motivation Theory

Articles on training are fond of saying that the learner should be motivated but things never go much beyond that. The field could profit from a closer look at recent conceptual developments in work motivation.

The work of E. A. Locke and his colleagues (128) suggests a number of important points. For example, the effects of reinforcement on learning may be mediated by a process of goal setting [Locke (126), Locke, Bryan, & Kendall (128)]. That is, unless the learner changes his goals in the training situation, reinforcements such as knowledge of results, money, or recognition may have no effect. Another suggestion is that adopting a specific goal, as opposed to a "do your best" goal, results in greater effort and perhaps better response acquisition. Also, Locke (125) reanalyzed Fryer's data dealing with learning Morse Code and demonstrated that those who said they set high goals acquired correct responses faster than those who set low goals or no goals at all.

Konwin (120) showed much the same thing with female operatives in a stocking factory. The training program was geared to teaching the girls to pace themselves with goal setting. Production went up significantly and turnover went down. However, there was no control group and a placebo might have done as well.

The reviewer has argued elsewhere (42) that some of the effects of goal setting may be due to its task definition component. That is, performance is enhanced because in the process of setting a goal, the individual learns what he is supposed to do, whereas the task previously may have been unclear. Thus, as a training device, performance appraisal by means of mutual goal setting may be effective because it allows the subordinate to bring order to a previously ambiguous situation. This may be the explanation for the results of a study of T-group training by Kolb, Winter, and Berlew (119) which showed that when subjects (graduate students) set personal training goals there were more self and trainer perceived changes. Also, the stronger the commitment to the goal, the more the perceived change. In sum,

the data are clear enough to warrant special consideration of how goal setting can be used in training and development programs.

Also, Campbell et al. (42) postulate and cite evidence for the motivational influence of the individual's degree of belief or expectancy that he can accomplish a particular goal or master a particular task. Thus an individual's expectations of how well he will be able to handle the training content may have a lot to do with his motivation in the training situation. The expectancy/valence model is the strongest theme in current theories of work motivation and has considerable potential utility for training and development. Recent elaborations are given by Porter and Lawler (159), Lawler (121), and Locke (127).

Behavior Modification

One of the most important books to be published during the period of this review is a definitive treatment of behavior modification principles and technique by Bandura (7). To date, this model of behavior change has been applied almost exclusively to neurotic, psychotic, or delinquent behaviors. However, the concepts and techniques are quite general and the reviewer strongly believes it could become a powerful training model in organizations. It is impossible to summarize the wealth of conceptual and empirical information in the Bandura book, but a few points are in order. A briefer but less definitive treatment can be found in Ullmann and Krasner (198). A popularized version is given by Mehrabian (140).

Behavior modification is based in part on the Skinnerian and Pavlovian principles of conditioning but it goes considerably beyond and takes advantage of many recent findings in basic learning theory. Simply put, it seeks to change individual responses by changing the individual's environment, primarily by altering reinforcement contingencies or stimulus pairings. It

is the behavior that is at issue, not the underlying causes or internal mediators. In very general terms, the process would look something like this:

- The training objectives must be carefully specified in terms of specific desired behaviors.
- For purposes of alteration, the existing reinforcement contingencies or stimulus pairings currently operating must be carefully described.
- New contingencies or pairings must be selected that will directly support the desired behavior. The new reinforcers must be powerful enough to alter behavior, and to maintain it once it has been changed.
- Change agents must be selected to administer the reinforcement.
- If the desired behavior is seldom emitted or is too complex to be reinforced contiguously then sub goals must be defined and the appropriate reinforcement contingencies applied to them (i.e. behavior must be "shaped").
- After the behavior has been altered provisions must be made for making it self regulating.

Bandura describes six methods of instituting new contingencies: modeling and vicarious processes, positive reinforcement, negative reinforcement, extinction, positive counterconditioning, and aversive counterconditioning. Each is treated at length, examples are given, and the possible uses and limitations of each are discussed. For organizational purposes a combination of modeling and positive reinforcement would seem useful for many training situations. That is, the learner is shown a model who acts in the desired fashion and who is reinforced. The learner is then reinforced for

emitting behavior similar to that of the model. Thus many behaviors which previously were not in the individual's repertoire can be generated and reinforced. The book deals with moral and ethical issues at length. In the societal setting, it is both possible and desirable that the change agent and learner agree on the reinforcement contingencies to be used and Bandura presents evidence to show that an individual's awareness of the contingencies involved has an enhancing rather than distracting effect. A careful reading of the entire book suggests numerous organizational applications. Of course, the major stumbling block is in getting hold of the relevant reinforcers and being able to apply them directly and skillfully to the desired behavior. For example, rather than sending supervisors to human relations seminars to convince them of the desirability of acting certain ways toward subordinates, we should provide them with the correct behavior models and then reinforce the desired behavior with highly valued rewards. Because it would require such a radical reorientation of organizational life, substantial applications of behavior modification principles are not yet possible. However, the mass of data reviewed by Bandura suggests the awesome power of the technique and some tentative beginnings are desirable. Perhaps the employment problems of the so called "hard core" are a good place to begin.

In a very interesting paper, Nord (152) argues that the operant conditioning model, in truth, has a great deal of structural similarity to the motivational theories of McGregor, Maslow, and Herzberg. It simply gets to the heart of the matter much more quickly.

Individual Differences

The relationship of individual differences to experimental treatments is an honored topic. This review is no exception. At the conceptual level

the most important recent publication is a book edited by Gagne (78).

Cronbach (55) conceptualizes the problem of how instruction can be adapted to individual differences. He discusses: adaptation with fixed goals and fixed methods; adaptation by matching the instructional goals to the individual; adaptation by matching instructional methods to the individual; and adaptation by selecting homogeneous groups. He then suggests that two individual variables of prime importance are general mental ability and the need achievement-fear of failure configuration. Evidence is cited to support his view. Glaser (79) makes a distinction between the traditional kinds of ID's measures and what he calls initial states, and argues than the latter are potentially more interactive than the former. Thus, variables like prior achievement, training expectations, and initial skill level, are more potent than aptitude, interest, or personality measures. Lundberg (131) has outlined some potentially important initial state variables for management development. Jensen (111) specifically rejects the 40 or more ID's measures developed from factor analytic work and suggests a new taxonomy for explaining the error variance in training results. Perhaps his most important distinction is between intrinsic variables, or individual differences in the learning processes themselves, and extrinsic variables which have an effect on learning outcomes but bear no resemblance to the learning process itself.

Fleishman (69) summarizes the sizable amount of data he has produced on individual differences in psychomotor learning and makes a distinction between abilities, as relatively enduring traits, and skills, as levels of proficiency of specific tasks. The objective is then to explain task performance skill via the underlying abilities. A taxonomy of psychomotor and motor abilities is presented. A number of studies using different methodologies are used to support the now famous argument that the ability requirements for

task performance change considerably over the training period since as learning progresses the nature of the task changes. Also, as the number of trials increases, a larger and larger proportion of total variance is explained by factors specific to the task itself. Fleishman suggests that the ability variables which correlate highly with task performance at various training stages should dictate the instructional cues, or content, emphasized at each stage. Anderson (2) disagrees and argues that ability correlations are not as useful as a rigorous task analysis itself for specifying training content.

Hulin and Alvarez (107) take a more radical approach and argue that an individual's ability level indeed may not be constant and might also change with training. Thus Fleishman's results conceivably could be explained by changes in ability factors as well as task factors. They outline a research study to test the proposition.

Historically, factor analyses of ability tests included in the same matrix with performance scores over trials have also been used to demonstrate the increasing importance of task specific factors during training. Hinrichs (104) conducted a study in which he varied the instructional set in a pursuit rotor task by emphasizing speed in one sample and accuracy in another. Each sample produced two task specific factors, one of which increased in importance over trials and one of which decreased. However, the patterns of factor loadings were somewhat different across samples and conformed to expectations based on the instructional sets. The impact of these results is weakened somewhat by an earlier paper by Humphreys (108) which suggested that including trial x trial data in a correlation matrix may artifactually yield an increasing task specific factor and a decreasing task specific factor.

General Systems Theory

The "systems approach" definitely qualifies as a buzz word. It is frequently mentioned in the titles of articles [e.g. Miller (142)] but typically, few hints are given as to what distinguishes the systems approach from other approaches to training. However, a recent book by Berrien (16) does provide a meaningful explanation of General Systems Theory (GST) that should have considerable heuristic value. Berrien makes some intriguing distinctions between two types of system inputs (maintenance versus signal), two types of system outputs (usable versus waste), and among three concepts of system growth, adaptation, and learning. Simply studying the adaptive mechanisms of the training subsystem (with the heuristics of the GST model) should be an eye opener for most organizations. GST also leads to certain deductions about the relationship of subsystems (e.g. the training function) to the suprasystem (e.g. the organization). For example, a subsystem cannot survive if all its outputs must be directly usable by the suprasystem. The reviewer believes a careful reading of this book will yield a number of useful strategies for the training practitioner and suggest a large set of important hypotheses for the researcher.

To sum up, a more sophisticated analysis of the learning task, a la Gagne; and a more sophisticated translation of work motivation theory, behavior modification principles, and system theory to the training and development enterprise would pay huge dividends in effective behavior change. So far, our efforts in these directions have been slight.

New Developments in Technique

Campbell et al. (42) document the fantastic amount of training and development activity that takes place in organizations. It is a pervasive enterprise. Almost all reasonably large corporations have formal, in-house training programs and many corporate training budgets are comparable to the budgets of many large universities. The Campbell et al. volume also discusses 22 distinct training methods that are applicable to management development. The number would be even greater if other types of training were considered. Similar lists can be found in House (106), Blum and Naylor (20), and Lynton and Pareek (134).

There are a number of surveys available [e.g. Foreman (72), Quakenboss (161), and Utgaard and Dawis (200)] that consider the frequency with which various techniques are used. On the job training, job rotation, lectures, and the conference or seminar method are used by almost everyone (i.e. 75-90 percent) while techniques such as simulation, role playing, programmed instruction, and T-groups are used by a relatively small minority (i.e. 15-20 percent). One interesting survey was done by Hannon (93), who asked a sample of 146 firms what they thought of their training and development programs. The almost unanimous response to this call for introspection was an expressed opinion that things were in bad shape. The reviewer agrees.

The more recent trends in new techniques seem to be the following:

Computer assisted instruction (CAI). Computer assisted instruction is a sophisticated descendent of programmed instruction and the core elements are much the same. Duncan (63) and Stolurow (193) describe the distinctive features of CAI. A definitive source book is a series of readings edited by Atkinson and Wilson (5). The power of CAI lies in its memory and storage capability which allows many possibilities for interaction (automated) with the learner.

Among many possible interaction modes, the CAI system may permit drill and practice, i.e. the asking of questions by the student; a problem solving mode where algorithms may be called to help the student solve problems; or the Socratic mode, in which the computer asks the student questions, the student responds, and the system provides feedback for the response. A more familiar mode is simulation and gaming which tests the student against some model of the real world.

A very sophisticated form of interaction is the tutorial mode. Besides being Socratic in its dialogue this mode has a managerial component in that different content subroutines and various instructional strategies can be used depending on the initial characteristics of the student and his pattern of responses during learning. Thus it attempts to stimulate much of the complexity of individualized tutorial instruction.

Organization development. A relatively new approach toward training and development which supposedly takes into account a broader range of system considerations is organizational development (OD). At least the name is new. OD can take one of several colorations. One of the most attention getting is the management Grid which was recently expanded and codified by Blake and Mouton (17, 18). In its present form it consists of six phases, from the now familiar Grid seminar to a formal critique phase. Unfortunately, the enterprise rests on little data. A second type of OD approach is most commonly labeled "action research". A paper by Beer (12) gives a lucid description, along with a real world example, of what is meant by this term. The process is that the "change agent" must first search the organization for the most fertile ground in which to plant his initial development effort. Concommitantly he must collect data that will tell him if he is on the right track, guide future efforts, and demonstrate the worth of the

method to the rest of the organization. If the data are positive the change effort can be expanded and more data collected. The touchstone is not the content of the change effort but the ever expanding cycle of action--data, action--data. The process is also described by Zaner (213). A third major thrust is systems four management as described by Likert (124). It is a corporate wide attempt to instill participative and consultive management by means of conference techniques and the feedback of diagnostic questionnaire results. Finally, laboratory education has increasingly been modified to include groups sampled from a vertical or diagonal slice of the organization [e.g. Benedict, Calder, Callahan, Hornstein, & Miles (14)]. Thus the interpersonal difficulties, communication problems, and interlevel conflict that hinder organizational functioning can be faced directly.

Basic encounter and personal growth training. The reviewer senses an increasing emphasis in the T-group type literature toward even more existential and less intellectual group experiences. For example, Buchanan and Schindler-Rainman (27) describe the so called personal growth experience. A parallel development is the use of direct encounter groups with management, as described by Golembiewski and Carrigan (84) and Golembiewski and Blumberg (83).

Television. Video tape is seeing ever increasing use as a feedback mechanism. Kennedy (114) suggests how it can be used in training the "hard core" and Stoller (192) describes examples in sensitivity training and group counseling.

Cross-cultural training. This label does not focus on a new technique but rather on an area in which new methods are needed. The training and development world seems to have discovered cultural differences only recently. Some of the most innovative work has been done for or by the military. For example, R. D. Campbell (43) summarizes the types of programs that have been

used to train people for overseas assignments and Foster (73) outlines a needs and task analysis for cross-cultural training. The non-military literature is more mundane. Lee (122) outlines five problems encountered when developing managers in developing countries but suggests no innovative solutions. Rodgers (171) advocates an on-the-job training and counseling program for developing foreign managers and Harrison and Hopkins (96) describe a living-in program modeled after the NTL approach. The entire spectrum of cross-cultural studies of organization (not just training) has been reviewed by Roberts (169) and found wanting.

The disadvantaged, the hard core, and the unemployable. Again, these developments do not deal with a new technique but with a new area in need of useful methods. As was mentioned at the start of this chapter, training and development is a fadish enterprise. Training the disadvantaged became fashionable during 1967 and 1968 and there are now a large number of such programs. A survey by Hausknecht (99) of the Detroit membership of the American Society of Training Directors showed that two thirds of the member firms were involved with the hard core and 50% had a formal training program of some sort. The sources cited below are not exhaustive but are meant to illustrate the major distinctive parameters.

One distinction is between programs run by a community or governmental agency and those conducted by the employing organization itself. Hutson (109) describes the total community involvement program in Ypsilanti, Michigan. This same program illustrates another distinction, namely, whether or not the trainee is assured of a permanent job if he completes the program successfully. Many government programs financed under the Manpower Development and Training Act of course do not.

A major distinction among such programs is in terms of training content. Many of them deal with remedial education [e.g. Murphy (146)]. Kline (117)

describes a computer based system for teaching basic skills. Ten packaged programs are available. Another major content area is specific job training. Jaffee and Friar (110) describe a job training program for secretaries that uses an In-basket simulation. Western Electric uses an entire plant as a vestibule site from which the trainees are assigned to other locations [Chernick & Smith (49)]. However, most job training is of the usual classroom variety [Doeringer (61)]. A third major content area deals with attitudes, motivation, and self concept considerations. It is here that most of the innovation has taken place. Ford's Project 250 [Hellervik (101)] made extensive use of counselors and role models. The counselors monitored the trainees very closely and were available for assistance at any time of the day or night. Sensitivity training, role playing, and psychodrama have also been used [e.g. Purcell & Webster (160), Hodgson & Brenner (105)].

A number of programs have tried to deal with the conflict between the disadvantaged employee and the already established work force. Morrison (145) gave a group of blacks and whites an attitude scale measuring racial attitudes. The participants were required to respond to the questions aloud and the feelings which were generated became the inputs for group sensitivity sessions. VanBrunt (202) gives an account of using a T-group to overcome the resistance of supervisors to a remedial type training program. Rosen (173) used on-the-job role playing to increase the involvement of supervisors in the special problems of the disadvantaged.

Obviously, specific programs can combine one or more of these content areas. A very comprehensive program which includes almost all of them is described by Adelberg (1).

Overall, new developments in techniques during the period of the review have not been startling. What has proven noteworthy, is the sudden discovery of discrimination and cultural/ethnic differences.

Evaluation Methodology

The recurring admonition to "evaluate" training programs is a gross misrepresentation of the empirical question. It strongly implies a dichotomous outcome; to wit, either the program has value or it doesn't. Such a question is simple-minded, unanswerable, and contributes nothing to practical or scientific understanding. The phrase should be banished.

General discussion. Numerous papers [e.g. Ferguson (65)] suggest the use of Kirkpatrick's model for training research. That is, training research should attempt to measure participant reactions, or how well they liked the program; learning, or the extent to which the training content was assimilated; behavior, or the changes in job behavior; and results, or the changes in organizational variables such as costs, productivity, and turnover. Catalanello and Kirkpatrick (45) surveyed 110 firms as to which of these variables they used in evaluating their training efforts. Not surprisingly, a high percentage assessed trainee reactions but few tried to measure behavior or results. They conclude that training research is still in its "infancy".

The Campbell et al. (42) volume devotes one chapter to training research methodology. The criteria problem is discussed at length, experimental design problems are reviewed, feedback and systems problems are touched on, and the question of what constitutes interpretable data is faced but not solved. Elsewhere, Campbell (40) has argued that so called "objective" dependent variables are of little value for training research. What is needed are carefully developed observational and measurement techniques for scaling actual behavior changes. A variant of the method of scaled expectations [Smith & Kendall (187)] is suggested as a difficult but very useful strategy.

Dependent variables. A number of recent studies have investigated new approaches to training criteria. Eddy, Glad, and Wilkins (64) let participants develop their own criteria. One thing they found was that there are stylistic differences in individual approaches to training, such as: the traditional desire for knowledge, fear of failing, time filling, and socializing. Baum, Sorenson, and Place (10) measured the change in perceived influence of various individuals within the work group resulting from human relations training. An interesting finding was that although the managers self perceived influence stayed the same, his subordinates perceived him to have less. Bonjean and Vance (21) attempted to develop a measure of change in self actualization. However, the scales appeared to be nothing more than a means for rating the perceived importance of Herzberg type job factors. In a very interesting T-group study Dunphy (62) asked undergraduates, over the course of a semester, to write a weekly paper interpreting what was going on in the group. The papers were then content analyzed via a computer program with the aim of measuring role differentiation and describing group phases.

In a pioneering study, Flaugher, Campbell, and Pike (68) obtained samples of white and black medical technicians who were rated on a number of job performance factors by both black and white supervisors. There was a slight tendency for white supervisors to rate whites higher than blacks and a somewhat greater tendency for black supervisors to rate blacks higher than whites. It is imperative that we study this aspect of the criterion problem from every possible angle.

Experimental design. Little is new in the area of pragmatic experimental design. Campbell and Stanley (39) remains the definitive treatment. Weiss and Rein (205) challenge the usefulness of the experimental and quasi-experimental approach in complex field research on the grounds that it is

difficult to select satisfactory criteria, the situation is essentially uncontrolled, treatments are not standardized, and most experimental designs are too limited in the information they can produce. As alternatives, they suggest process oriented qualitative research, historical research, and case analyses. In a rejoinder, Campbell (38) argues that none of the criticisms leveled by Weiss and Rein are intrinsic to the experimental method.

On a more primitive level Golembiewski and Carrigan (84) and Becker (11) argue the relative merits of the pre and post measure, no control group design. The former did a study in which they measured the effects of an organizational development program using Likert's 42 item profile of organizational characteristics pre and post. Positive changes were observed and attributed to the OD effort because they were in line with the theory and supported by much anecdotal evidence. Becker argues that such a design may be permissible if the objective is to sell something to management but it is not science.

The statisticians have been reasonably busy arguing about how best to judge the significance of the data yielded by a particular design. Lykken (133) employs a charming, if somewhat anal, example to put yet another nail into the coffin of statistical significance tests and high correlations that make little theoretical sense. However, D. T. Campbell (37) argues eloquently for a restricted but important use for null hypothesis testing.

Fleiss (70) and Vaughan and Corballis (203) derive a number of strength of relationship measures from various design models and discuss their relative advantages and disadvantages. The picture with regard to omega squared is not as simple as it may once have appeared, and these two articles bear careful reading by the research minded. Overall (154) continues previous attempts to take a Bayesian approach to inferring the significance of experimental results. Lord (129) and Werts and Linn (207) discuss the prob-

lems concerned with making statistical comparisons between non randomized groups, a relatively common problem in training research.

Finally, the time honored Hawthorne effect has come in for its share of lumps. Sommer (189) makes the general argument that it should not be considered as an experimental error but rather as a much too global label for important independent variables. He suggests we should study the phenomena intensively from a multi-dimensional point of view and argues that to control for the Hawthorne effect is to rule out much of psychology. For example, if pay effected performance in an unequivocal manner, industrial psychology would become mere economics. Taking aim at the Hawthorne studies proper, Sykes (195) builds a convincing case that economic rewards did indeed play a large part in explaining the Hawthorne data and Carey (44) argues that the morale or "attention" characterization of the Hawthorne effect was itself confounded with many others in the original studies. The reviewer agrees that the notion of the Hawthorne effect as a global nuisance variable should be cast aside and replaced with a more sopohisticated non-error oriented view.

Systems considerations. Lundberg (132) strikes a responsive cord when he argues that regardless of what happens in a management development program the organization may in fact permit no changes in behavior. Thus it would be foolish to expect to find them in a research study. Belasco and Trice (13) and Denova (58) discovered that certain elements in the training program serendipitously increased loyalty and commitment to the organization. In an excellent paper, Goodman (86) outlines the system in which a hard core training program must operate and analyzes possible conflicting objectives. For example, certain conflicts between community agencies and various organizational subsystems are reasonably predictable. Lastly, Greiner (88) presents an interesting descriptive account of the organizational situation in which the well known Blake, Mouton, Barnes, and Greiner (19) Management Grid study

was done. He argues that a number of previously unmentioned situational factors made it possible for the program to have the effects it apparently did, and his description adds a great deal to the interpretation of the results.

A unique contribution. One of the most provocative methodological papers of recent years is the attack by Argyris(4) on the scientific method as it is used in the social sciences. It should be read and reread by everyone who wants to do empirical research in organizations. The main thrust of his argument is that much of the research in social and organizational psychology creates a Theory X relationship between the researcher and the subjects, with predictable consequences for subject behavior. Research subjects are simply not the passive creatures we believe them to be and the only way out of the dilemma is to involve them as full participants in the research effort. This rules out such things as deception research, many questionnaire studies, and many studies requiring control groups.

In sum, the methodology of training and development research cries for innovation. Unfortunately, a flight into more sophisticated statistics, even such meritorious ones as variance estimates, does not face up to the principle issue. As yet we have no workable technology that is capable of producing a large amount of training research data.

Empirical Research

Ideally, this section should be organized around dependent variables. That is, the research literature should tell us what kinds of experiences will produce particular outcomes and what parameters affect these treatment/outcome relationships. Such is not the case. Research studies tend to cluster

around demonstrating effects for a particular training technique or focus on specific groups of personnel (e.g. management or the "hard core"). The sub-sections that follow represent the reviewer's qualitative cluster analysis of what is published.

Management Development

A base line. Much of the management development research during the last two decades has been summarized by Campbell et al. (42). They review 84 studies and 73 of them are organized via a 3-way classification. One classification dimension is in terms of methods and content. Five categories are used: 1) a broad category labeled general managment and supervision programs which are taught via lectures and small group discussions and include material on labor relations, company policies, leadership, etc.; 2) general human relations programs, employing conference methods and role playing, that deal with the human relations problems of supervisors; 3) programs that attempt to teach generalized problem solving and decision making skills; 4) T-groups, sensitivity training, and laboratory education; and 5) specialized programs which are devoted to very specific objectives such as increasing reading speed or reducing the halo error in appraisal systems.

In addition, the studies were classified according to whether internal or external criteria were used and whether the study employed "some" or "few" experimental controls. Internal criteria are outcome measures linked directly to the training content and assessed during or immediately after the learning experience. Attitude measures, achievement tests, in-basket performance, and opinion questionnaires are examples. External criteria are designed to assess behavior changes in the organizational role. By "some" control is meant the inclusion of a control or comparison group. "Few" controls are defined as no control group but both a pre and post measure for

the trained group. Given these three means of classification, the 73 studies group themselves as shown in Table 1.

Insert Table 1 about here

As can be seen from the table, the large majority of studies used internal criterion measures. In over 20 years of research only 21 studies used external criteria of behavior changes. Only 13 of these 21 were what could be loosely described as controlled studies and 9 of the 13 controlled studies produced statistically significant differences on a major criterion variable. Management development is not exactly a flourishing research area.

Campbell et al. (42) generate a number of conclusions from these data.

1. Approximately 80% of the 35 studies in the first two content categories produced significant results but over one-half of them used one particular kind of criterion measure, namely, an attitude measure of "employee centeredness" or "consideration". Surely this is an overly narrow research view of management development.

In one of the best and most recent studies of general management programs, Schwartz, Stilwell, and Scanlan (178, 179) used a time lag design to examine the effects of a university sponsored program on management behavior. The participants were split into two groups which were trained six months apart, thus the second group provided a control for the first group to be trained. The Leader Behavior Description Questionnaire (LBDQ) was administered to the subordinates of each group before and after the program. Managers in the first group were described as becoming less active, less definitive, less production centered, less oriented toward supervisors, and

TABLE 1

Classification of Management Development Research Studies by Content Area, Type of Criteria, and Degree of Experimental Control

	External Criteria		Internal Criteria		
	Some Controls	Few Controls	Some Controls	Few Controls	Total
General Management Programs	2	1	8	5	16
General Human Relations Programs	--	3	10	6	19
Problem Solving & Decision Making	--	1	3	--	4
T-groups & Laboratory Educ.	6	3	8	9	26
Specialty Programs	5	--	3	--	8
TOTAL	13	8	32	20	73

more oriented toward subordinates. In contrast, the second group was seen by their subordinates as becoming more active and using more structure. Apparently there was an important interaction between the development program and other parts of the organization such that the second group reacted differently than the first. This study deserves to be emulated. It used a feasible experimental design that provides considerable information.

Unfortunately almost all of the other studies of general management and human relations training cited by Campbell et al. provide considerably less information.

2. Perhaps contrary to expectations, there has been more research on T-group training and laboratory education than any other specific area. T-group studies account for nearly half of those utilizing external criteria. There is evidence that T-groups produce behavior changes in the work role for about 20-25% of all participants.

The backbone of the external evidence for the management development utility of laboratory education is found in the perceived change studies, of which there have been five (22, 30, 141, 199, 201). The primary dependent variable was an open ended question which asked subordinates and/or associates of the experimental and control subjects, approximately a year after the laboratory experience, to describe specific changes they had observed in the subject's behavior in working with people during the previous year. All studies featured at least one control group. Four of the five chose control subjects by asking the training participants to "nominate" people similar to themselves. Experimental and control subjects in turn nominated several associates as observers.

The results obtained in the Bunker (30) study are typical. Responses to the open ended questions were content analyzed using 15 inductively

derived categories. Eleven of the fifteen subcategories yielded statistically significant differences between the experimental and control group with the trained group showing greater change. The greatest differences (20-25%) were in areas related to increased openness, receptivity and tolerance of differences, increased skill in interpersonal relationships, and improved understanding of self and others. There were no differences for initiation of action, assertiveness, and self confidence.

While the results of these five studies seem favorable, they must be qualified in view of the way the control subjects and observers were selected. Also, with the exception of Underwood (199), the perceived changes were not evaluated in terms of their influence on job performance.

The T-group studies using internal criteria which Campbell et al. (42) cite, have produced very mixed results. The evidence for laboratory produced changes in self awareness, interpersonal sensitivity, personality, and performance on case problems or business games is largely negative. Some positive results were cited for the ability of T-groups to change certain kinds of attitudes, but the data were not overwhelming. In essence, the positive data with external criteria and negative data with internal criteria, argues that we do not yet know what aspects of the training experience produce the behavior changes in the organization.

3. Only a very few studies have been made of attempts to teach problem solving and decision making skills and the results have been largely negative.

4. Studies comparing the relative effectiveness of two or more methods for the same goal or evaluating treatment interactions with individual differences are too few to warrant making and generalizations. Actually, most of the empirical research deals with just a very few of the many possible methods.

5. In terms of methodological characteristics there is an almost exclusive reliance on statistical significance as a sign of changes to be interpreted. Almost no studies tried to link internal criterion changes with external criterion changes. Finally, no studies attempted to deal specifically with the effect of organizational structure or climate on training activities.

Given the above characteristics of management development research, the following sections summarize some of the more recent literature.

Laboratory methods. Only two recent studies using an external criterion were found. O'Rourke and Castelli (153) conducted relatively instructured interviews with the bosses of 27 supervisors six months after they had been in a T-group. The results seemed to indicate favorable changes in job performance but the study featured no control group, no before measure, and the bosses knew the reason for the interview. Zand, Steele, and Zalkind (212) measured self perceived changes of manager's job behavior via a 42 item questionnaire. Pre and post measures were employed but no control group. In terms of laboratory education objectives the post measures went down, but returned to the pre training state when the sample was followed up a year later.

In one of the better internal criterion studies, Rubin (175) assessed changes in racial prejudice during a two week T-group with a 15 item questionnaire that asked people to rank action alternatives in hypothetical situations. One of two training groups was given a pre-pre measure two weeks before the T-group started. Thus the difference between the first and second pre measures constituted the control comparison. The T-group did produce a decrease in racial prejudice and the effect was greater for those low on psychological anomy (measured by a 9 item Guttman scale). There was also a suggestion that the decrease in prejudice resulted from feelings of greater

self acceptance. In another good study, Hall and Williams (90) used 20 groups from each of three populations (student, management, and neuropsychiatric patients) to study the effects of laboratory experience on a group decision task--the prediction of juror capitulation in the film Twelve Angry Men. Half the groups were experimentals and half the groups were controls and differences were examined on decision accuracy, degree to which the group used its individual resources, and the degree to which the group produced better predictions than any of its individuals. The laboratory appeared to facilitate this kind of decision making, but for some dependent variables, the effect was much greater for ad hoc groups than for established groups.

In four rather poor studies, Slocum (185) demonstrated that college students reported on a pre versus post comparison that they were more sensitive and self aware after a T-group; Finston (66) used in interview to show that good, bad, and so-so reactions to a T-group were distributed about equally in an R & D sample; Golembiewski and Blumberg (82) showed rather weak attitudinal support for the positive effects of a management confrontation experience; and finally, Nadler and Fink (148) demonstrated changes, without a control group, on questionnaire measures of broad democratic attitudes.

Laboratory education is a complex process. Fortunately, an increasing number of studies are beginning to explore this complexity. Varying the feedback parameter, Myers, Myers, Goldberg, and Welch (147) asked participants at the end of each session in an eight session T-group to rate each other sociometrically and to predict how others would rate them. They also were given feedback as to how they were rated. The dependent variable was the accuracy of their predictions. One control group made the ratings but was given no feedback and another control group did nothing. The crucial determiner of accuracy was not feedback but whether the participants rated other people. A study by French, Sherwood, and Bradford (75) tended to show the same

thing, in that "attending" to the variables to be rated produced almost as much change as feedback. When the cue properties of the variables were removed there was a significant drop in rated change.

Culbert (56) varied the amount of trainer self disclosure (i.e. high versus low) and noted its effect on the amount of individual "self awareness" exhibited in tape recordings of group sessions. There was an interaction between trainer disclosure and the stage of training. To maximize self awareness, as rated by judges, the trainer should practice high self disclosure at first and change to low self disclosure later in the training. Cooper (54) studied the effects of trainer attractiveness and the degree to which he exhibited behavior congruent with T-group values. Participants who rated the trainer as attractive and congruent became more like him in both attitudes and behavior (as judged from tapes).

Two studies explored the interaction of the T-group itself with other supporting experiences. Bunker and Knowles (31) reanalyzed the original Bunker (30) data and compared the results of a two week versus three week laboratory program where the only difference was in the time devoted to lectures, exercises, and theory sessions. Time in the T-group remained constant. Results on the perceived change measure gave a significant advantage to the three week program. Friedlander (76) used six questionnaire measures of work group functioning to study the effects of a laboratory program. The content of the laboratory sessions varied considerably but these differences were completely over shadowed by the amount of pre training and post training followup by the consultants. Friedlander also makes some biting comments about the reinforcement contingencies governing consultant behavior and argues that they tend to encourage discrete, short term training experiences.

Perhaps in reaction to a common criticism, Lubin and Zuckerman (130) used checklist measures of anxiety, depression, and hostility to show that the level of emotional arousal in a T-group is not as great as in a perceptual isolation experiment.

The relationship of individual differences to T-group training continues to be a neglected area. Steele (190) found no relationship between trainer rating of participant change and the Myers-Briggs Type Indicator. Harrison and Lubin (97) demonstrated that task oriented people were rated as learning more in a T-group than people oriented participants. However, we still do not know which are the more effective group members in the end. In fact, we still know absolutely nothing about how various kinds of people interact with the T-group experience.

Other recent reviews of the T-group literature can be found in Buchanan (26), Delbecq (57) and Mangham and Cooper (136). All of them interpret the data in very favorable, optimistic, and even glowing terms. They see things differently than the present reviewer [e.g. Campbell and Dunnette (41)].

Research on management development exclusive of T-groups and laboratory education is abysmally infrequent. Witness the pitifully small number of studies cited below and the meager information they provide. The classification is that used by Campbell et al. (42).

General management programs. Miller (142) used a conference and case method approach to train 54 supervisors in a variety of supervisory topics. As cited previously, a multi-stage need analysis was used to group participants in terms of their training needs. Positive results were shown on specially constructed achievement tests. Kohn and Parker (118) report an opinion evaluation by 2000 managers who participated in a three day seminar sponsored by the American Management Association. Regression analysis was

used to determine the weight of various seminar components in determining overall satisfaction with the program. The opinion components with the largest beta weights dealt with: practicality of subject matter, the balance of participant backgrounds, and the opportunity for participation, all of which is not very surprising. Finally, six months after a one week development program using lectures and discussion groups, Thorley (197) interviewed the bosses of 234 English managers and discovered a generally favorable response to their subordinates participation in the program. None of these three studies used any experimental controls and taken together they advance the state of knowledge hardly at all.

Human relations programs. Bartlett (8) asked participants to role play parts antagonistic to their previously determined management style. This led to considerable discussion of the participants' organizational situation and tapes of the discussion were fed back to top management. There was a subsequent reduction in organizational variables such as costs and absenteeism; however, no controls were provided and the inferences are tenuous. Burke (33) administered scales designed to measure Machiavellianism and social attitudes before and after an undergraduate course in human relations. No changes were observed.

Problem solving and decision making. There have been almost no recent attempts to study the development of problem solving and decision making skills even though a number of strategies exist for developing these skills. The closest thing is a study by Moore (144) which compared the business game versus case method in teaching problem solving in production management. There was little difference between the two on an achievement examination.

Training the Disadvantaged

As one might expect, there has been very little published research dealing with training the disadvantaged. As a fad, this kind of training is still in the "let me describe my program" stage and rewards apparently are given for having programs not for sponsoring research. The reviewer suspects, and hopes, that there are many research reports currently residing in corporate and agency files that will soon see the light of day.

Training in basic skills. Byars and Crane (35) describe a program which was limited to basic skills by default. The New York Public Service Careers Programs sponsored 240 hours of classroom instruction for disadvantaged applicants, mostly female. Significant gains were produced such that most participants were close to passing the high school equivalency examinations, but the job training aspect of the program ran afoul of New York City budget problems. Burcin (32) and Mollenkopf (143) did similar studies and demonstrated significant increases on basic skills achievement tests resulting from remedial training. Patten and Clark (155) did a six month follow up of 48 minority group members who completed a literacy training program in Detroit. The program had made no provision for employment and only 12 of the 48 had jobs. The overwhelming impression from the interview data was the extreme lack of confidence generated by a feeling of being hopelessly undereducated. The study reinforces Rosen, Williams, and Foltman's (174) earlier study (and the conventional wisdom) that if a program doesn't lead directly to a job opportunity, morale suffers severely and attitudes toward such training programs become much more negative.

Job skills training. Two studies by economists attempted to judge the effects of job training programs financed under the Manpower Development and Training Act. Stromsdorfer (194) did a two year follow up of 1379

workers trained under the MDTA in West Virginia. He concluded that earnings and the amount of time employed increased significantly for the trained group. Comparing training costs to taxes paid suggested that the training paid for itself in 13 months. Main (135) surveyed a national sample of 1200 former MDTA trainees and matched them with 1024 untrained controls. After allowing for certain biasing factors, he estimated that the training increased earnings an average of $10 per week. In similar studies, Solie (188) and Scott (182) also demonstrated favorable results for retraining programs. In spite of their faults, retraining efforts seem to have had beneficial effects.

A massive effort that should be studied intensively is Project 100,000 being conducted by the Armed Services [Wool & Flyer (211)]. Since 1966, the goal has been to induct an additional 100,000 men per year, primarily by lowering standards on the Armed Forces Qualification Test; and as might be expected, people from disadvantaged backgrounds are over represented. The new entrants are not identified in any way and proceed through normal basic training and advanced training activities. Preliminary results suggest that overall attrition rates and disiplinary problems are much the same as for individuals inducted under the old standards, but performance in advanced skills training is significantly lower. The project represents a golden opportunity to study new training strategies for disadvantaged people on whom we have lots of data. The reviewer hopes it is not lost.

Easily the best and most informative research that occurred during the period of this review is reported by Hodgson and Brenner (105). Two studies in the Lockheed Aircraft Company, one in California, and one in Georgia, are summarized. The bulk of the training in both plants was job related but with some remedial training in reading and shop math. The Georgia program was 12

weeks long, was oriented toward fairly high level training in sheet metal work, included 72 hours of psychodrama and role playing, and the participants were paid only a subsistence stipend provided by a MDTA contract. The California program was only four weeks long, was geared toward specific training for specific jobs, and participants were paid a full wage for that job. Considerable individual counseling but no role playing or psychodrama was used. Three-fourths of the Georgia sample were black, two-thirds were 21 or younger,and all were male. The Californmia sample was older and evenly divided among blacks, Mexican-Americans, and whites. It included both males

and females. The unique thing about both samples is that the applicants had to meet four of the following five criteria: 1) school dropout, 2) unemployed head of household, 3) income less than $3000 during last 12 months, 4) poor work history, and 5) no primary work skills. At the California site 70% of the applicants were turned down because they weren't "hard core" enough or because their arrest records were overwhelmingly severe. None of the trainees could meet traditional company hiring standards. Dropout rates for the training periods were extremely low. After four months on the job, turnover was about 10% in both samples, which was significantly below the normal level. A study of the California group showed no difference in quantity or quality of work between trainees and regular hires. The authors attribute the success of the training to appropriate instructional methods, frequent recognition and reinforcement, training content that was directly linked to a specific job, and jobs that were not "dead end".

What have these few studies domonstrated? At least we know that basic skills can be improved and that job training programs can pay off if they are carefully done, include lots of personal attention, and lead to a desirable job. We know almost nothing about the effectiveness of efforts to deal with role problems arising from a lifetime of discrimination.

Programmed and Computer Assisted Instruction

Programmed instruction (PI). The research literature on programmed instruction is large. What follows is meant to be a representative sample. Much of the literature is concerned with one time, one place comparisons between a PI method and a conventional method using internal criteria as dependent variables. For example, Hedberg, Steffen and Baxter (100) compared a programmed text and a conventional text in teaching insurance fundamentals and demonstrated that the same content could be covered in less time with PI. Subjects also preferred the PI method. Neidt and Meredith (150) also found

more favorable attitudes toward PI than conventional texts in an Air Force technical course and the difference was greater for the high ability students. Mayo (137) summarizes a number of studies on PI conducted in the Navy and concludes that PI yields similar learning in a shorter time than conventional methods, i.e., is more efficient. Comparable achievement in a shorter time seems to be a recurrent finding from PI research. However, there are at least two recent exceptions. Connor (52) compared a teaching machine, PI text, and conventional text for a course in electrical engineering and found that both the teaching machine and PI text produced higher examination scores than the control group. Cavanagh and Jones (46) compared a PI method to three conventional seminar methods for teaching management principles and found considerably higher scores for PI on a multiple choice criterion test.

There are at least two possible explanations for inconsistencies in the above results. First, as shown by Pikas (157), the criterion used to measure achievement may not be "fair" to all methods. For example, Brinkman (25) compared PI to conventional methods for teaching certain aspects of geometry. However, the criterion test was geared directly to the content of the PI mode, which differed from the content of the conventional procedure. Mayo and Longo (138) compared a nine hour PI course to a thirteen hour conventional course for teaching electronics fundamentals and found no difference on a test originally written for the conventional course but a significant difference on a test written for the PI course. Rawls, Perry, and Timmons (163) carefully constructed a criterion test that favored neither mode and found equal initial achievement but somewhat better retention and lower variability for the PI group. Long term retention is largely a neglected research topic. Second, most such comparative studies imply that PI is PI and a conventional method is a conventional method, yet the variability in quality must surely be great within each of these two modes.

Comparative studies are difficult because we have no quality model for instructional strategies.

In the organizational setting, external criteria are sometimes used to assess the effects of PI. Patten and Stermer (156) used PI to train foremen in work standards but the results were equivocal. However, Cook (53) used PI booklets to train regional cosmetic saleswomen and the data suggest a significant increase in sales and lower turnover.

A number of other PI studies have focused on certain parametric considerations. Individual differences, teaching machines versus programmed texts, the amount of material per frame, response mode (e.g. written versus oral), topic arrangement, pacing, and prompting versus confirmation or cueing versus knowledge of results (KR), are the major ones. The latter distinction refers to providing numerous cues or stimulus support before the response is made such that the correct response is always given versus reducing the probability of a correct response and providing post response KR.

Two studies examined prompting versus confirmation. Seidel and Hunter (183) found for a military technical specialty that stimulus support facilitates response acquisition during training but detracts from long term retention. Anderson, Faust, and Roderick (3) also showed that heavy prompting hinders post test performance. Variation in response mode (constructive response versus "thinking it") had no significant effects. Berglund (15) varied the degree of partial reinforcement, or confirmation, but found no significant differences on the criterion test. Hartley (98) has reviewed the PI literature on self versus external pacing. The conventional PI wisdom says self pacing is best, but the data are not in complete agreement. A number of studies showed that external controls on the learner's pace had a facilitating effect. Noble (151) and Cahoon, Peterson, and Watson (36) investigated the interactions of various measures of individual

differences with achievement in PI and found no significant results, which is also a consistent finding in the literature. Johnson (112) generated a number of programs in which the topics were dispersed in varying degrees throughout the program. Although the more dispersed programs required more time, they led to better retention then when all the material on a topic was presented at a single location. Schuster (177) tested a scrambled branching program in which the learner must hunt for the reasons for a wrong answer. He found no achievement differences when the scrambled version was compared to a linear branching version, but subjects much preferred the linear method.

Several studies investigated three parameters at once. Welsh, Antoinetti, and Thayer (206) varied response mode, confirmation--no confirmation and the amount of review material in a PI course designed to teach insurance fundamentals. Attitudes and knowledge tests (varying in similarity to the program itself) were the principal criteria. The review material helped slightly, but response mode and confirmation made little difference. Also, PI was only superior to the conventional method on the criterion test most similar to the program. Whitlock (208) varied pacing, number of frames, and KR and found no difference across treatments on a knowledge test. He also makes the cogent point that the better the basic program, the less relevant are parametric differents. Attwood and Wiener (6) allowed subjects to select their own level of KR, cueing, and rate of stimulus presentation for PI training in a vigilance monitoring task. KR and stimulus presentation had beneficial effects.

Additional reviews of PI studies are given by Schramm (176) and Burris (34).

In sum, the recent PI literature holds no new surprises. A reasonable conclusion is still that, for appropriate material, PI is faster but probably does not lead to greater proficiency on an immediate post test.

Long term retention remains an open question. The failure of parametric changes to influence results suggests that the PI enterprise should get back to the basic question of the structure of what is to be learned. The payoff is in the substance, not the form, of the program.

Computer assisted instruction (CAI). It is apparently too soon in the cycle for a recognizable pattern of empirical studies on CAI to emerge. A great deal of hardware and software is being constructed but the research efforts are restricted largely to elementary and secondary education settings. Two studies are representative of the small amount of research in organizations. For teaching data processing principles, Schwartz and Haskell (180) compared a PI text to a CAI system that incorporated more branches and skip options. Achievement was the same, but the CAI system was slightly faster. Using a similar CAI system, Schwartz and Long (181) could find few differences between CAI and a self study program for teaching new developments in computer technology. Dick and Lotta (59) compared CAI and PI in a student population and found PI to be slightly superior for teaching numerical concepts. The difference was due to the special difficulties that low ability students had with CAI.

Taken together, these data do not favor the CAI strategy; however, all three studies used CAI systems that were quite unsophisticated and which used little of the potential capability of CAI.

Additional Research Areas

The remaining sections describe areas containing relatively little activity.

Orientation training. It seems obvious that an individual's initial period at work is extremely critical in terms of how he defines his activities, what he learns to expect from the organization, and how he learns his job. Gomersall and Myers (85) studied a one day orientation program for new pro-

duction employees in a large electronics firm. The training was designed to reduce their anxiety by explaining what the company expected, the hazing they would probably get from experienced employees, and the type of behavior to expect from their supervisor. As compared to a control group the trained group reached high production levels much more quickly. Lefkowitz (123) experimented with different schedules of vestibule and on-the-job training for sewing machine operators. An initial day in the vestibule followed by a day on the line followed by more vestibule training seemed to have the most beneficial effects. It is unfortunate that such a fertile area of research has not been tapped to a greater extent.

Sales training. Another critical area that has not been researched to any great extent is sales training. The recent literature offers only two studies. Harris and Vincent (95) investigated the effects of a two year life insurance training program on 88 salesmen who were matched with 88 controls. Significant differences were found on first year premiums and size of policies produced. The investigators ruled out a self selection explanation for the results but could not rule out the possibility of regression effects. Graves (87) also studied life insurance sales training which included a three day clinic in role playing interviews. Large differences were found in total sales and the six month termination rate.

Training via television. Although closed circuit television as a fad has run its course, a few studies still appear. Rawls and Rawls (164) compared CCTV to conventional instruction in educational psychology and discovered no differences in achievement or retention but very negativistic attitudes toward the TV mode. In addition, students spent almost no time looking at the screen. Rock, Duva, and Murray (170) compared CCTV, films, and conventional instruction in a military setting and demonstrated television to be at least as effective as the other modes. Questions of how to improve

the quality of TV instruction and overcome possible negative reactions have not been explored. One promising avenue is the use of video recording for providing feedback in certain kinds of skills training. Thoresen (196) used this mode to give history instructors feedback of how they encouraged class participation. Although the data are tentative, the additional feedback seemed to have a positive effect.

Team training. Training teams as coordinated units should be an active topic, given its potential importance in organizations. Some of the laboratory education and OD techniques do deal with team problems. This empirical research has already been discussed under management development. Blum and Naylor (20) point out that two fundamental questions in team training are the relative effectiveness of group versus individual training of team members, and the kind of feedback that is provided during training.

The Ohio State group has studied two man teams working in a simulated radar situation where the objective is to track and intercept incoming aircraft. Johnston (113) varied the amount of coordination and communication in the training task and demonstrated that team training was better than individual training when the criterion task required coordination between individuals. Naylor and Briggs (149) investigated the effects of task complexity, task organization, and replacement of team memebers. They showed that transfer of team skills varies inversely with task complexity and that task organization was important only under the stress of changing team membership. Strangely enough, the previous training experience of the replacement had only a very temporary effect on team performance. Briggs and Naylor (24) used three man teams and varied the degree of task organization and the fidelity of the training task (real radar scope versus a cardboard cutout). Team training did not transfer very well when the training simulation was of low fidelity. Briggs and Johnston (23) studied this effect with

regard to stimulus fidelity versus response fidelity and showed that stimulus fidelity was by far the most important.

Klaus, Grant, and Glaser (116) used another laboratory task to examine the effects of different reinforcement patterns on team training. A clear finding was that team or group reinforcement must be supplemented by individual reinforcement both during training and in the actual performance situation. Team reinforcement alone is not enough.

The above studies suggest that team training has value for transfer to tasks requiring interaction but the additional increment is quite fragile and can be largely obviated by such things as lack of stimulus fidelity in the task or lack of individual reinforcement. However, the tasks used to study the benefits of team training have been quite limited and we have no good definitions of such concepts as team, coordination, or fidelity.

Simulation. Again, the reviewer anticipated a large amount of material and again there was not very much. Two studies dealt with fidelity problems in simulated training equipment. Hammerton and Tickner (92) varied the fidelity of the remote operation of a toy trolley. Background detail and depth cues during training were crucial for initial performance but training fidelity had few effects on long term retention and performance. Essentially the same finding was demonstrated in a study by Grimsley (89) in which service personnel were trained on guided missile system controls of varying fidelity. Few differences in performance were observed when the criterion data were obtained four to six weeks after training.

In management development there exist a large number of simulation methods such as business games, case problems, and role playing. However, these seldom find their way into research studies such that their unique effects can be studied [Campbell et al. (42)]. They are most often combined

with other techniques and the overall package is "evaluated". The business game is an infrequent exception. Raia (162) demonstrated that playing a business game improved test performance in a business policy course. Two levels of game complexity (fidelity?) did not influence the results. Steir metz and Patten (191) showed only that students reacted favorably to using a business game in an accounting course.

Specialty programs. These studies are grouped here because they deserve mention but do not fit anywhere else. Chaney and Teel (47) report an excellent study of improving quality inspector performance by means of classroom instruction plus visual aids. A control group was compared to three experimental groups: classroom alone, visual aids alone, and classroom combined with visual aids. The training content was specified by a careful analysis of inspector performance and the criterion was the percent of defects subsequently discovered on the job. The largest increment in the criterion resulted from using visual aids.

In one of the few cross cultural studies, Chemers (48) used the "culture assimilator" to train Americans in Iran. The technique asked the participant to analyze hypothetical situations in a specific culture and then provided feedback for right or wrong analyses. When asked to lead three man Iranian problem solving groups, the trained Americans were found to generate more favorable group climates and better leader-member relations. However, group productivity did not change.

Finally, Viteles (204) reports a long range follow up of executives who participated in the University of Pennsylvania's humanistic studies program. The trends toward more liberal attitudes and less emphasis on economic values which were found in the original study tended to hold up over the period of the follow up.

Summary of Empirical Results

What do we know? We know that management development can change managers toward more employee centered attitudes. We know that laboratory education probably can change behavior in the work role, but the nature and implications of these changes are unclear. We know that PI is at least as effective as conventional instructional methods in some situations and is probably faster when used appropriately; however many parametric and situational contingencies remain unspecified. We know almost nothing about what makes orientation, sales, or team training effective. Hard core training programs can produce valuable outcomes but we really don't know why. We know that technical training, as well as remedial training in basic skills does produce significant increments in knowledge. We do not know anything about the relative effectiveness of different training strategies for achieving particular objectives. In sum, we know a few things but not very much.

Concluding Remarks

Even though the study of training and development problems has produced a certain amount of knowledge and there are grounds for a bit of optimism, one cannot come away from this literature without feeling disheartened. The yield of information is depressingly small, and if current trends are extrapolated, there are few reasons for expecting any significant increase in the rate of return. We simply must get off the trend lines we are currently following. Potentially, the training and development enterprise is an awesome instrument for change. However, there are both internal and external reasons for why it has not realized its potential.

The major internal reason is that there has been a broad and full scale retreat from the fundamental task of defining what is to be learned. If this review illustrates nothing else, it indicates that in area after area researchers and practioners have retreated from a concern with the structure of what is to be learned to an almost exclusive concern with hardware and techniques. This is as true for computer assisted instruction as it is for laboratory education.

The major external reason is that rewards are given for putting together programs, courses, or automated systems that are attractive, and that elicit a favorable impression from trainers, trainees, and sponsors. There are few incentives available in public or private institutions for attracting the personnel and stimulating the kind of effort it will take to develop sound theoretical models, build a technology of assessing what is to be learned, and accumulate a broad data base. As a nation, we seem unwilling to devote many resources to these kinds of things even though many of our most crucial national problems stem from an inability to educate, train, and develop.

These phenomena are nowhere more apparent than in our approach to the so called hard core. Not too long ago organizations were finally coerced into discovering that unequal opportunity created problems. The training response has been to proliferate relatively short term "programs". At best this response has had a very limited success. At worst, it is mere tokenism. The training establishment has failed to describe hard core training needs in specific behavioral detail and to directly link training content to desired behaviors. But then why should it? It is not reinforced for doing so. Our collective tragedy is that this potentially lethal problem will become larger and larger and no long term solution will result. We must become more political as well as more empirical and theory oriented.

In spite of these heavy constraints, the few bright spots in this review suggest that some progress can be made. If we are ever to make training and development a profitable enterprise in terms of important behavior changes we must at least do the following:

1. Devote considerable time to an empirical analysis, via the systems approach, of the training and development system and its interactions with other systems. This must go considerably beyond putting general labels on block diagrams.

2. Take an intelligent plunge into the methods and concepts of behavior modification. It holds considerable promise.

3. Adopt the PI model for every training activity. That is, our task should be to specify terminal behaviors, decompose the learning task into its structural components, and seek an optimal sequencing of these components. This is rational not mechanistic behavior.

4. Forget about the either/or approach to training evaluation. Instead, we should worry about measuring behavioral outcomes and their interaction with other subsystems in the organization. We should also worry about the differential effects of competing training strategies. Knowing these differential effects is the ultimate payoff.

In moments of guarded optimism, the reviewer believes that moving in these directions would provide substantially greater knowledge and far more beneficial practices than have characterized the field during the last 20 years.

FOOTNOTE

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LITERATURE CITED

1. Adelberg, M. Industrial training of the hard core unemployed. Personnel Psychol., 46 (6), 22-27 (1969)
2. Anderson, R. C. Individual differences and problem solving. In R. M. Gagne (Ed.) Learning and Individual Differences (Merrill, Columbus, Ohio, 1967)
3. Anderson, R. C., Faust, G. W., Roderick, M. C. Overprompting in programmed instruction. J.Educ. Psychol., 59, 88-93 (1968)
4. Argyris, C. Some unintended consequences of rigorous research. Psychol. Bull., 70, 185-197 (1968)
5. Atkinson, R. C., Wilson, H. A. (Eds.) Computer Assisted Instruction: A Book of Readings (Academic Press, New York, 1969)
6. Attwood, D. A., Wiener, E. L. Automated instruction for vigilance training. J. Appl. Psychol., 53 (3), 218-223 (1969)
7. Bandura, A. Principles of Behavior Modification (Holt, Rinehart, and Winston, New York, 1969)
8. Bartlett, A. C. Changing behavior as a means to increased efficiency. J. Appl. Behav. Sci., 3 (3), 381-403 (1967)
9. Bass, B. M., Vaughan, J. A. Training in Industry: The Management of Learning (Wadsworth, Belmont, Calif., 1966)
10. Baum, B. H., Sorenson, P. F. Jr., Place, W. S. Organizational effect of supervisory human relations training: An evaluative technique. Personnel J., 45 (3), 148-152 (1966)
11. Becker, S. W. The parable of the pill. Admin. Sci. Quart., 15, 94-96 (1970)

12. Beer, M. A Systems Approach to Organizational Development (Paper presented at the meeting of the American Psychological Association, Washington, D. C., September, 1969)

13. Belasco, J. A., Trice, H. M. Unanticipated returns of training. Train. Develpm. J., 23 (7), 12-17 (1969)

14. Benedict, B. A., Calder, P. H., Callahan, D. M., Hornstein, H. A., Miles, M. B. The clinical-experimental approach to assessing organizational change efforts. J. Appl. Behav. Sci., 3 (3), 347-380 (1967)

15. Berglund, G. W. The effect of partial reinforcement in programmed instruction. Progr. Learn. Educ. Technol., 6, 102-108 (1969)

16. Berrien, K. E. General and Social Systems (Rutgers University Press, New Brunswick, N. J., 1968)

17. Blake, R. R., Mouton, J. S. Corporate Excellence Through Grid Organization Development (Gulf, Houston, 1968)

18. Blake, R. R., Mouton, J. S. OD--Fad or fundamental. Train. Develpm. J., 24 (1), 9-17 (1970)

19. Blake, R. R., Mouton, J. S., Barnes, J. S., Greiner, L. E. Breakthrough in organization development. Harv. Bus. Rev., 42, 133-155 (1964)

20. Blum, M. L., Naylor, J. C. Industrial Psychology: Its Theoretical and Social Foundations (Harper & Row, New York, 1968)

21. Bonjean, C. M., Vance, G. G. A short-form measure of self-actualization. J. Appl. Behav. Sci., 4 (3), 299-312 (1968)

22. Boyd, J. B., Elliss, J. D. Findings of Research into Senior Management Seminars (The Hydro-Electric Power Commission of Ontario, Toronto, 1962)

23. Briggs, G. E., Johnston, W. A. Stimulus and response fidelity in team training. J. Appl. Psychol., 50 (2), 114-117 (1966)

24. Briggs, G. E., Naylor, J. C. Team versus individual training, training task fidelity, and task organization effects on transfer performance by three-man teams. J. Appl. Psychol., 49 (6), 387-392 (1965)

25. Brinkman, E. H. Programmed instruction as a technique for improving spatial visualization. J. Appl. Psychol., 50 (2), 179-184 (1966)

26. Buchanan, P. C. Laboratory training and organization development. Admin. Sci. Quart., 14, 466-479 (1969)

27. Buchanan, P. C., Schindler-Rainman, E. Facilitating personal growth. Train. Develpm. J., 23 (9), 29-33 (1969)

28. Buehler, R. E. Job related behavior rating scale. Train. Develpm. J., 23 (3), 14-21 (1969)

29. Bumstead, R. A. Don't kid yourself, hardware comes first. Train. Bus. Industry, 7 (2), 30-35 (1970)

30. Bunker, D. R. Individual applications of laboratory training. J. Appl. Behav. Sci., 1, 137-147 (1965)

31. Bunker, D. R., Knowles, E. S. Comparison of behavioral changes resulting from human relations training laboratories of different lengths. J. Appl. Behav. Sci., 3 (4), 505-524 (1967)

32. Burcin, W. A. General skills training program. Train. Develpm J., 21 (12), 9-11 (1967)

33. Burke, R. J. A plea for a systematic evaluation of training. Train. Develpm. J., 23 (8), 24-29 (1969)

34. Burris, R. Programmed learning. In The International Encylopedia of the Social Sciences (MacMillan & The Free Press, New York, pp. 182-188, 1968)

35. Byars, L. L., Crane, D. P. Training by objectives. Train. Develpm. J., 23 (6), 38-49 (1969)

36. Cahoon, D. D., Peterson, L. P., Watson, C. G. Relative effectiveness of programmed text and teaching machine as a function of measured interests. J. Appl. Psychol., 52 (6), 454-456 (1968)

37. Campbell, D. T. Proof? No evidence? Yes. The significance of tests of significance. Am. Soc., 4, 140-143 (1969)

38. Campbell, D. T. Considering the case against experimental evaluation of social innovations. Admin. Sci. Quart., 15, 110-113 (1970)

39. Campbell, D. T., Stanley, J. C. Experimental and Quasi Experimental Designs for Research (Rand McNally, 1963)

40. Campbell, J. P. Assimilating Simulation. (Paper presented at the American Psychological Association, San Francisco, September, 1968)

41. Campbell, J. P., Dunnette, M. D. Effectiveness of T-group experiences in managerial training and development. Psychol. Bull., 70, 73-104 (1968)

42. Campbell, J. P., Dunnette, M. D., Lawler, E. E., Weick, K. E. Managerial Behavior, Performance, and Effectiveness. (McGraw-Hill, New York, 1970)

43. Campbell, R. D. United States military training for cross cultural interaction. (Alexandria, Va., Matrix Corp., 1969)

44. Carey, A. The Hawthorne studies: A radical criticism. Am. Soc. Rev., 32, 403-416 (1967)

45. Catalanello, R. F., Kirkpatrick, D. L. Evaluating training programs--the state of the art. Train. Develpm. J., 22 (5), 2-9 (1968)

46. Cavanagh, P., Jones, C. An evaluation of the contribution of a program of self instruction to management training. Progr. Learn. Educ. Technol., 5, 294-301 (1968)

47. Chaney, F. B., Teel, K. S. Improving inspector performance through training and visual aids. J. Appl. Psychol., 51 (4), 311-315 (1967)

48. Chemers, M. M. Cross-cultural training as a means for improving situational favourableness. Hum. Relat., 22 (6), 531-546 (1969)

49. Chernick, J., Smith, G. Employing the disadvantaged. In P. B. Doeringer (Ed.) Programs to Employ the Disadvantaged (Prentice-Hall, Englewood Cliffs, N. J., 1969)

50. Clark, J. V., Culbert, S. A., Bohele, H. K. Mutually therapeutic perception and self-awareness under variable conditions. J. Appl. Behav. Sci., 5 (1), 65-74 (1969)

51. Common, C. A. The managerial surface. Train. Develpm. J., 23 (10), 12-19 (1969)

52. Connor, D. V. Teaching engineering students by machine and text. Progr. Learn. Educ. Technol., 5, 129-136 (1968)

53. Cook, C. Programmed instruction in selling. Train. Develpm. J., 21 (7), 34-40 (1967)

54. Cooper, G. L. The influence of the trainer on participant change in T-groups. Hum. Relat., 22 (6), 515-530 (1969)

55. Cronbach, L. J. How can instruction be adapted to individual differences? In R. M. Gagne (Ed.) Learning and Individual Differences. (Merrill, Columbus, Ohio, 1967)

56. Culbert, S. A. Trainer self-disclosure and member growth in two T-groups. J. Appl. Behav. Sci., 4 (1), 47-74 (1968)

57. Delbecq, A. L. Sensitivity training. Train. Develpm. J., 24 (1), 32-35 (1970)

58. Denova, C. C. Training evaluation causes change in behavior. Personnel Admin., 32 (5), 54-56 (1969)

59. Dick, W., Lotta, R. Comparative effects of ability and presentation mode in computer assisted instruction and programmed instruction. (Technical memo, Computer-Assisted Instruction Center, Floride State Univ., 1969)

60. Dickerman, A. B., Davis, R. G. Training managers in Latin America--A survey of company practice. Personnel , 43 (3), 57-61 (1966)

61. Doeringer, D. B. (Ed.) Programs to Employ the Disadvantaged (Prentice-Hall, Englewood Cliffs, N. J., 1969)

62. Dunphy, D. C. Phases, roles, and myths in self-analytic groups. J. Appl. Behav. Sci., 4 (2), 195-226 (1968)

63. Duncan, K. D. Computer assisted instruction. Aspects of Educ., 1, 113-121 (1968)

64. Eddy, W. B., Glad, D. D., Wilkins, D. D. Organizational effects on training. Train. Develpm. J., 21 (2), 15-23 (1967)

65. Ferguson, W. C. Quantitative evaluation of training using student reaction. Train. Develpm. J., 22 (11), 36-43 (1968)

66. Finston, H. V. Impact of T-group training within an R & D environment. Personnel J., 48 (2), 108-114 (1969)

67. Fishbein, M. A. (Ed.) Readings in Attitude Theory and Measurement (Wiley, New York, 1967)

68. Flaugher, R. L., Campbell, J. T., Pike, L. W. Ethnic group membership as a moderator of supervisor's ratings. (Report No. PR-69-5, Educ. Testing Service, Princeton, N. J., 1969)

69. Fleishman, E. A. .Individual differences and motor learning. In R. M. Gagne (Ed.) Learning and Individual Differences (Merrill, Columbus, Ohio, 1967)

70. Fleiss, J. L. Estimating the magnitude of experimental effects. Psychol. Bull., 72, 273-276 (1969)

71. Folley, J. D. Jr. Determining training needs of department store sales personnel. Train. Develpm. J., 23 (7), 24-27 (1969)

72. Foreman, W. J. Management training in large corporations. Train. Develpm. J., 21 (5), 11-17 (1967)

73. Foster, R. J. Dimensions of training for overseas assignment. (Human Resources Research Office, George Washington University, 1969)

74. Frank, H. E., Smith, P. J. A British impression of the American training scene. Train. Develpm. J., 23 (1), 20-23 (1969)

75. French, J. R. P., Sherwood, J. J., Bradford, D. L. Changes in self-identity in a management training conference. J. Appl. Behav. Sci., 2, 210-218 (1966)

76. Friedlander, F. A comparative study of consulting processes and group development. J. Appl. Behav. Sci., 4 (4), 377-400 (1968)

77. Gagne, R. M. Military training and principles of learning. Am. Psychol., 17, 83-91 (1962)

78. Gagne, R. M. (Ed.) Learning and Individual Differences (Merrill, Columbus, Ohio, 1967)

79. Glaser, R. Some implications of previous work on learning and individual differences. In R. M. Gagen (Ed.) Learning and Individual Differences. (Merrill, Columbus, Ohio, 1967)

80. Glickman, A. S., Vallance, T. R. Curriculum assessment with critical incidents. J. Appl. Psychol., 42, 329-335 (1958)

81. Goldstein, L. S., Gotkin, L. G. A review of research: Teaching machines vs. programmed textbooks as presentation modes. J. Progr. Instruc., 1, 29-36 (1962)

82. Golembiewski, R. T., Blumberg, A. Confrontation as a training design in complex organizations: Attitudinal changes in a diversified population of managers. J. Appl. Behav. Sci., 3 (4), 525-547 (1967)

83. Golembiewski, R. T., Blumberg, A. Training and relational learning: The confrontation design. Train. Develpm. J., 21 (11), 35-43 (1967)

84. Golembiewski, R. T., Carrigan, S. B. Planned change in organization style based on the laboratory approach. Admin. Sci. Quart., 15, 79-93 (1970)

85. Gomersall, E. R., Myers, M. S. Breakthrough in on-the-job training. Harv. Bus. Rev., 44 (4), 62-72 (1966)

86. Goodman, P. S. Hiring and training the hard core unemployed: A problem in system definition. Hum. Organ., 28 (4), 259-269 (1969)

87. Graves, G. P. Initial sales training. Train. Develpm. J., 22 (8), 26-30 (1968)

88. Greiner, L. E. Antecedents of planned organization change. J. Appl. Behav. Sci., 3 (1), 51-86 (1967)

89. Grimsley, D. L. Acquisition, retention, and retraining: Effects of high and low fidelity in training devices. (Hum Resour. Res. Off., George Washington Univ., 1969)

90. Hall, J. Williams, M. S. Group dynamics training and improved decision making. J. Appl. Behav. Sci., 6, 39-68 (1970)

91. Hallstein, R. W. We know where to start. Train. Develpm. J., 23 (7), 32-33 (1969)

92. Hammerton, M., Tickner, A. H. Visual factors affecting transfer of training from a simulated to a real control situation. J. Appl. Sci., 51 (1), 46-49 (1967)

93. Hannon, J. W. How companies look at training. Train. Develpm. J., 22 (1), 32-34 (1968)

94. Harmon, P. A classification of performance objective behaviors in job training programs. Educ. Technol., (1968)

95. Harris, W. A., Vincent, N. L. Comparison of performance of sales training graduates and non graduates. J. Appl. Psychol., 51 (5), 436-441 (1967)

96. Harrison, R., Hopkins, R. L. The design of cross cultural training: An alternative to the university model. J. Appl. Behav. Sci., 3 (4), 431-460 (1967)

97. Harrison, R., Lubin, B. Personal style, group composition, and learning. J. Appl. Behav. Sci., 1, 286-301 (1965)

98. Hartley, J. Some factors affecting student performance in programmed learning. Progr. Learn. Educ. Tech., 5, 206-218 (1968)

99. Hausknecht, J. L. Jr. Hard core and minority group training activities surveyed in Detroit. Train. Develpm. J., 23 (11), 50-51 (1969)

100. Hedberg, R., Steffen, H. Baxter, B. Insurance fundamentals--A programmed text versus a conventional text. Personnel Psychol., 18 (2), 165-172 (1965)

101. Hellervik, L. Project 250: An Evaluation (Personnel Decisions, Inc., Minneapolis, Minn., 1969)

102. Hersey, P., Blanchard, K. H. Life cycle theory of leadership. Train. Develpm. J., 23 (5), 26-35 (1969)

103. Hersey, P., Kellner, C. A. A behavioral approach to training the sales force. Train. Develpm. J., 22 (11), 1-9 (1968)

104. Hinrichs, J. R. Ability correlates in learning a psychomotor task. J. Appl. Psychol. (In Press)

105. Hodgson, J. D., Brenner, M. H. Successful experience: Training hard core unemployed. Harv. Bus. Rev., 46 (5), 148-156 (1968)

106. House, R. J. Management Development: Design, Evaluation, and Implementation (Bureau of Industrial Relations, Univ. of Michigan, Ann Arbor, 1967)

107. Hulin, C. L., Alvarez, K. Changing task structure and changing subjects: A comparison of two explanations of changing correlations (mimeographed paper, Univ. of Illinois, Urbana, 1970)

108. Humphreys, L. G. Investigations of the simplex. Psychometrika, 4, 313-323 (1960)

109. Hutson, R. H., Smith, J. R. A community wide approach to training the hard core. Personnel J., 48 (6), 428-433 (1969)

110. Jaffee, C. L., Friar, L. Use of simulation in training d sadvantaged employees for secretarial positions. Train. Develpm. J., 23 (8), 30-37 (1969)

111. Jensen, A. R. Varieties of individual differences in learning. In R. M. Gagne (Ed.) Learning and Individual Differences (Merrill, Columbus, Ohio, 1967)

112. Johnson, K. A. The effect of topic distribution within programmed instructional booklets. U. S. Govt. Research Develpm. Reports, 68 (6), p. 30 (1968)

113. Johnston, W. A. Transfer of team skills as a function of type of training. J. Appl. Psychol., 50 (2), 102-108 (1966)

114. Kennedy, J. B. Use of audio visual techniques in training the hard core. Train. Develpm. J., 24 (2), 30-33 (1970)

115. Kiesler, C. A., Collins, B. E., Miller, N. Attitude Change (Wiley, New York, 1969)

116. Klaus, D. J., Grant, L. D., Glaser, R. Increasing team proficiency through training: Supervisory furnished reinforcement in team training. U. S. Govt. Research Develpm. Reports, 67 (6), p. 22 (1967)

117. Kline, B. W. Mind, Inc. system approach to training hard-core employables. Train. Develpm. J., 23 (9), 18-21 (1969)

118. Kohn, V., Parker, T. C. Some guidelines for evaluating management develpment seminars. Train. Develpm. J., 23 (7), 18-23 (1969)

119. Kolb, D. A., Winter, S. K., Berlew, D. E. Self-directed change: Two studies. J. Appl. Behav. Sci., 4 (4), 453-472 (1968)

120. Konwin, V. A motivational appraoch to training. Train. Develpm. J., 21 (3), 26-31 (1967)

121. Lawler, E. E. Job attitudes and employee motivation. (Paper presented at the Midwestern Psychol. Assoc., Chicago, May, 1969)

122. Lee, J. A. Developing managers in developing countries. Harv. Bus. Rev., 46 (6), 55-65 (1968)

123. Lefkowitz, J. Effect of training on the productivity and tenure of sewing machine operators. J. Appl. Psychol., 54, 81-86 (1970)

124. Likert, R. The Human Organization: Its Management and Value (McGraw-Hill, New York, 1967)

125. Locke, E. A. A closer look at level of aspiration as a training procedure: A reanalysis of Fryer's data. J. Appl. Psychol., 50 (5), 417-420 (1966)

126. Locke, E. A. The motivational effect of knowledge of results: Knowledge or goal setting? J. Appl. Psychol., 51, 324-329 (1967)

127. Locke, E. A. The relationship of satisfaction to performance: A theoretical model. (Paper presented at the Midwestern Psychol. Assoc., May, 1969)

128. Locke, E. A., Bryan, J. F., Kendall, L. M. Goals and intentions as mediators of the effects of monetary incentives on behavior. J. Appl. Psychol., 52, 104-109 (1968)

129. Lord, F. M. Statistical adjustment when comparing pre existing groups. Psychol. Bull., 72, 336-337 (1969)

130. Lubin, B., Zuckerman, M. Level of emotional arousal in laboratory training. J. Appl. Behav. Sci., 5 (4), 483-490 (1969)

131. Lundberg, C. C. Management development refocused. Personnel Admin., 29 (1), 39-48 (1966)

132. Lundberg, C. C. On plotting individual change in human relations training. Train. Develpm. J., 22 (6), 50-57 (1968)

133. Lykken, D. T. Statistical significance in psychological research. Psychol. Bull., 70, 151-159 (1968)

134. Lynton, R. P., Pareek, U. Training for Development (Irwin-Dorsey, Homewood, Ill., 1967)

135. Main, E. D. A nationwide evaluation of M.D.T.A. institutional job training. J. Hum. Res., 3 (2), 159-170 (1968)

136. Mangham, L., Cooper, G. The impact of T-groups on managerial behavior. J. Management Studies, 6 (2), 53-72 (1969)

137. Mayo, G. D. Programmed instruction in technical training (Research report, Naval Personnel Research Activity, San Diego, 1969)

138. Mayo, G. D., Longo, A. A. Training time and programmed instruction. J. Appl. Psychol., 50 (1), 1-4 (1966)

139. McCord, H. S. Jr. The universality of learning principles. Train. Develpm. J., 22 (9), 48-51 (1968)

140. Mehrabian, A. Tactics of Social Influence (Prentice Hall, Englewood Cliffs, N. J., 1970)

141. Miles, M. B. Changes during and following laboratory training: A clinical experimental study. J. Appl. Behav. Sci., 1, 215-242 (1965)

142. Miller, R. D. A systems concept of training. Train. Develpm. J., 23 (4), 4-15 (1969)

143. Mollenkopf, W. G. Some results of three basic skills training programs in an industrial setting. J. Appl. Psychol., 53 (5), 343-347 (1969)

144. Moore, L. F. Business games versus cases as tools of learning. Train. Develpm. J., 21 (10), 13-23 (1967)

145. Morrison, J. H. M-scale: Encounter with reality. Train. Develpm. J., 23 (10), 20-21 (1969)

146. Murphy, J. P. Minority group training in smaller companies. Train. Develpm. J., 23 (1), 10-13 (1969)

147. Myers, G. E., Myers, M. T., Goldberg, A., Welch, C. E. Effect of feedback on interpersonal sensitivity in laboratory training groups. J. Appl. Behav. Sci., 5 (2), 175-186 (1969)

148. Nadler, E. B., Fink, S. L. Impact of laboratory training on socio-political ideology . J. Appl. Behav. Sci., 6, 79-92 (1970)

149. Naylor, J. C., Briggs, G. E. Team training effectiveness under various condition . J. Appl. Psychol., 49 (4), 223-229 (1965)

150. Neidt, C. O., Meredith, T. F. Changes in attitudes of learners when programmed instruction is interpolated between two conventional instruction experiences. J. Appl. Psychol., 50 (2), 130-137 (1966)

151. Noble, G. A study of the relationships between ability, performance, attitudes, inclinations, and speed of progress using intrinsic programmed instruction. Progr. Learn. Educ. Techniques. 6, 109-121 (1969)

152. Nord, W. R. Beyond the teaching machine: The neglected area of operant conditioning in the theory and practice of management. Org. Behav. Hum. Perform., 4 (4), 375-401 (1969)

153. O'Rourke, P., Castelli, J. A. A follow-up study on supervisor training. Train. Develpm. J., 23 (10), 32-41 (1969)

154. Overall, J. E. Classical statistical hypotheses testing within the context of Bayesian theory. Psychol. Bull., 71, 285-292 (1969)

155. Patten, T. H. Jr., Clark, G. Jr. Literacy training and job placement of hard core unemployed Negroes in Detroit. J. Hum. Res., 3 (1), 25-46 (1968)

156. Patten, T. H. Jr., Stermer, E. P. Training foremen in work standards. Train. Develpm. J., 23 (11), 25-37 (1969)

157. Pikas, A. Comparison between traditional and programmed learning as a function of the contents of the comparison test. Progr. Learn. Educ. Tech., 4, 270-283 (1967)

158. Porter, L. W. Personnel management. In P. R. Farnsworth (Ed.) Annual Review of Psychology (Annual Reviews, Inc., Palo Alto, 395-422, 1965)

159. Porter, L. W., Lawler, E. E. Managerial Attitudes and Performance (Dorsey, Homewood, Ill., 1968)

160. Purcell, R., Webster, R. 196 men find a chance. In P. B. Doeringer (Ed.) Programs to Employ the Disadvantaged (Prentice Hall, Englewood Cliffs, N. J., 1969)

161. Quakenboss, T. C. White-collar training takes many forms. Train. Develpm. J., 23 (4), 16-27 (1969)

162. Raia, A. P. A study of the educational value of business games. J. Bus., 39, 339-352 (1966)

163. Rawls, J. R., Ferry, O., Timmons, E. O. A comparative study of conventional instruction and individual programmed instruction in the college classroom. J. Appl. Psychol., 50 (5), 388-391 (1966)

164. Rawls, J. R., Rawls, D. J. Evaluation of closed circuit television in teaching educational psychology. Psychol. Reports, 22, 1041-1044 (1968)

165. Reddin, W. J. The 3-D management style theory. Train. Develpm. J., 21 (4), 8-17 (1967)

166. Reddin, W. J. The 3-D organizational effectiveness program. Train. Develpm. J., 22 (3), 22-29 (1968)

167. Reddin, W. J. What's wrong with style theories? Train. Develpm. J., 23 (8), 14-17 (1969)

168. Reeves, E. T. Management development--A conceptual continuum. Train. Develpm. J., 22 (9), 29-35 (1968)

169. Roberts, K. H. On looking at an elephant: An evaluation of cross cultural research related to organizations. Psychol. Bull. (In Press)

170. Rock, R. T., Duva, J. S., Murray, J. E. Training by television, television recordings, and conventional classroom procedures. U. S. Govt. Res. Develpm. Reports, 67 (1), p. 16 (1967)

171. Rodgers, C. R. P. Management development in overseas branches--One company's program. Personnel , 43 (3), 62-66 (1966)

172. Rokeach, M. Beliefs, Attitudes, and Values (Jossey-Bass, San Francisco, 1968)

173. Rosen,H. On-the-job orientation of unemployed Negro skill center trainees and their supervisors. (Unpublished paper, Dept. of Psychol., Wayne State Univ., 1968)

174. Rosen, N. A., Williams, L. K., Foltman, F. F. Motivational constraints in an industrial retraining program. Personnel Psychol., 18 (1), 65-80 (1965)

175. Rubin, I. The reduction of prejudice through laboratory training. J. Appl. Behav. Sci., 3 (1), 29-50 (1967)

176. Schramm, W. The research on programmed instruction: An annotated bibliography. (Bulletin 1964, No. 35, Dept. of Health, Educ., Welfare, Washington, D. C., 1964)

177. Schuster, D. H. Evaluation of a new hybrid in programmed instruction. J. Appl. Psychol., 52 (4), 309-312 (1968)

178. Schwartz, F. C., Stilwell, W. P., Scanlan, B. K. Effects of management development on manager behavior and subordinate perception. Train. Develpm. J., 22 (5), 24-30 (1968)

179. Schwartz, F. R., Stilwell, W. P., Scanlan, B. K. Effects of management development on manager behavior and subordinate perception. Train. Develpm. J., 22 (4), 38-50 (1968)

180. Schwartz, H. A., Haskell, R. J. Jr. A study of computer-assisted instruction in industrial training. J. Appl. Psychol., 50 (5), 360-363 (1966)

181. Schwartz, H. A., Long, H. S. A study of remote industrial training via computer-assisted instruction. J. Appl. Psychol., 51 (1), 11-16 (1967)

182. Scott, L. C. The economic effectiveness of on-the-job training: The experience of the Bureau of Indian Affairs in Oklahoma. Industrial and Labor Relations Review, 23 (2), 220-236 (1970)

183. Seidel, R. J., Hunter, H. G. The application of theoretical factors in teaching problem solving by programmed instruction. U. S. Govt. Res. Develpm. Reports, 68 (14), p. 24 (1968)

184. Shaw, M. E., Wright, J. M. Scales for the Measurement of Attitudes (McGraw-Hill, New York, 1967)

185. Slocum, J. W. Jr. Sensitivity and self-awareness changes: An empirical investigation. Train. Develpm. J., 22 (9), 38-47 (1968)

186. Smith, J., Hutson, R. A community wide approach to training the hard core. Personnel J., 48, 428-433 (1969)

187. Smith, P. C., Kendall, L. Retranslation of expectations: An approach to the construction of unambiguous anchors for rating scales. J. Appl. Psychol., 47 149-155 (1963)

188. Solie, R. J. Employment effects of retraining the unemployed. Indust. Labor Relat. Rev., 21 (2), 210-225 (1968)

189. Sommer, R. Hawthorne dogma. Psychol. Bull., 70, 592-595 (1968)

190. Steele, F. I. Personality and the "laboratory style". J. Appl. Behav. Sci., 4 (1), 25-46 (1968)

191. Steinmetz, L. L., Patten, R. J. Enthusiasm, interest, and learning: The results of game training. Train. Develpm. J., 21 (4), 26-36 (1967)

192. Stoller, F. Use of video tape (focused feedback) in group counseling and group therapy. J. Res. Develpm. in Educ., 1 (2), 20-43 (1968)

193. Stolurow, L. M. Some factors in the design of systems for computer aided instruction, In R. C. Atkinson and H. A. Wilson (Ed) Computer Assisted Instruction: A Book of Readings (Academic Press, New York, 1969)

194. Stromsdorfer, E. W. Determinants of economic success in retraining the unemployed: The West Virginia experience. J. Hum Res., 3 (2), 139-158 (1968)

195. Sykes, A. J. M. Economic interest and the Hawthorne researches: A comment. Hum Relat., 18 (3), 253-264 (1965)

196. Thoresen, C. E. Video in the college classroom: An exploratory study. Personnel Guidance J., 45 (2), 144-149 (1966)

197. Thorley, S. Evaluating an in-company management training program. Train. Develpm. J., 23 (9), 48-51 (1969)

198. Ullmann, L. P., Krasner, L. (Ed.) Case Studies in Behavior Modification (Holt, Rinehart, and Winston, New York, 1965)

199. Underwood, W. J. Evaluation of laboratory method training. Train. Directors J., 19 (5), 34-40 (1965)

200. Utgaard, S. B., Dawis, R. V. The most frequently used training techniques. Train. Develpm. J., 24 (2), 40-43 (1970)

201. Valiquet, M. I. Individual change in a laboratory program. J. Appl. Behav. Sci., 4, 313-326 (1968)

202. Van Brunt, R. E. Unexpected results when training the disadvantaged. Train. Develpm. J., 23 (10), 22-27 (1969)

203. Vaughan, G. M., Corballis, M C. Beyond tests of significance: Estimating strength of effects in selected ANOVA designs. Psychol. Bull., 72, 204-213 (1969)

204. Viteles, M. S. Long Range Impact on Managerial Attitudes and Behavior: A Follow-up Survey (Bell of Pennsylvania, Philadelphia, 1969)

205. Weiss, R. S., Rein, M. The evaluation of broad aim programs: Experimental design, its difficulties, and an alternative. Admin. Sci. Quart., 15, 97-109 (1970)

206. Welsh, P., Antoinetti, J. A., Thayer, P. W. An industry wide study of programmed instruction. J. Appl. Psychol., 49 (1), 61-73 (1965)

207. Werts, C. E., Linn, R. L. Lord's paradox: A generic problem. Psychol. Bull., 72, 423-425 , (1969)

208. Whitlock, G. H. Programmed learning: Some non-confirming results. Train. Develpm. J., 21 (6), 11-13 (1967)

209. Wiener, E. L., Attwood, D. A. Training for vigilance: Combined cueing and knowledge of results. J. Appl. Psychol., 52 (6), 474-479 (1968)

210. Wilson, J. E., Mullen, D. P., Morton, R. B. Sensitivity training for individual growth--Team training for organization development. Train. Develpm. J., 22 (1), 47-53 (1968)

211. Wool, H., Flyer, E. S. Project 100,000. In P. B. Doeringer (Ed.) Programs to Employ the Disadvantaged (Prentice-Hall, Englewood Cliffs, N. J., 1969)

212. Zand, D. E., Steele, F. E., Zalkind, S. S. The impact of an organizational development program on perceptions of interpersonal, group, and organization functioning. J. Appl. Behav. Sci., 5 (3), 393-410 (1969)

213. Zaner, T. Action research in management development. Train. Develpm. J., 22 (6), 28-33 (1968)

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