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ABSTRACT

An extensive evaluation was conducted of a training program on industrial safety that was designed to change employee attitudes and behaviors in relation to energy control and power lockout (ECPL), i.e., closing down an assembly line while completing diagnostic or repair tasks. The research question was aimed at determining the effects of entry perceptions of organizational climate factors on training outcomes. Materials for the professionally designed and developed program consisted of eight modules, a videotape, an instructor's manual, a participant's workbook, and a portable pocket manual. Participants, consisting of both hourly personnel and salaried and supervisory personnel, completed a questionnaire prior to and within 30-90 days after the training. The training outcomes used were gain scores calculated from pre- and posttest measures of knowledge of ECPL procedures, attitudes toward safety on the job, on-the-job application of general safety precautions, and on-the-job applications of specific behaviors related to ECPL procedures. Organizational climate factors were measured by employee perceptions of 20 different climate elements. The results support only one of four hypotheses; i.e., organizational climate variables influence specific on-the-job behavior directly related to the training content. It is concluded that designers of industrial training programs need to consider all of the factors that affect the learning process--with emphasis on the principles of adult learning--as well as the systematic procedures of designing programs, materials, and media. Six figures, 5 tables, and 14 references are included. (BBM)

Title:

The Effects of Organizational Climate Factors on Industrial Training Outcomes

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Foundations of the Study

Theoretical Framework

Winn (1989) has called upon instructional designers to "reason from basic principles of learning and instruction rather than simply following design models" (p.36). This tact requires adherence to a broader, and more intricate, scheme of conceptual considerations than has been incorporated into the typical set of design procedures advocated. It is an approach that demands study of a wide range of variables, such as those which were proposed in a framework for use in the construction of a comprehensive theory of instructional design. The model is conceptual, rather than procedural in nature; it encompasses clusters of variables related to the learner, the content, the delivery, and the environment (Richey, 1986). The validity and utility of such a model, however, are dependent upon data, preferably data which has been replicated in various settings.

The present study highlights the role of environmental factors in the learning process. Such factors have been found to be instrumental in learner achievement in a variety of pre-adult schooling situations (Brookover, et.al. cited in Good and Brophy, 1986; Anderson, 1982; Randhawa and Fu, 1973). Walberg (cited in Randhawa and Fu, 1973) even argues that environmental factors play the most important role in learner achievement next to general aptitude. The research reported here represents an attempt to identify similar effects in adult training situations.

In general, few critical interactions between environment and adult learning have been empirically demonstrated. Cookson (1986) notes that "external context variables have been largely ignored in the adult education literature" (p. 133). In spite of this, many believe in the general proposition that "learning is not just a psychological process that happens in splendid isolation from the world in which the learner lives, but that it is intimately related to that world and affected by it" (Jarvis, 1987, p. 11).

Environment has been described in terms of setting and climate. The settings (with respect to instructional design) are structural, describing varying education and training contexts. In this study the setting was that of industrial training in a large manufacturing company. Climate relates to qualitative variables. Climate can be a function of external influences, physical materials and arrangements, the participant characteristics, and the atmosphere of the organization itself (Richey, 1986). Here, varying types of organizational climate factors are considered.

Research Framework

The general model for this research is shown in Figure 1. This model, basically an input-process-output model, shows multiple outcomes of training. It is a model that includes variables which are hypothesized to influence effectiveness of the instructional design process. It is a model which suggests causal relationships. Finally, it is a model that suggests transfer of training effects.

Training Framework

The training program in this study related to industrial safety -- energy control and power lockout. (ECPL). The topic emerged as a result of previous research and an examination of company accident records. The training was jointly sponsored by a major automobile manufacturer and an automotive union in an effort to change employee attitudes and behaviors in relation to power lockout. Locking out involves shutting down the assembly line while completing diagnosis and/or repair tasks. Failure to lock out has resulted in serious injury and death. The locking out process, however, is expensive since it completely stops production.

The ECPL training program was professionally designed and developed. The instructional materials consisted of:

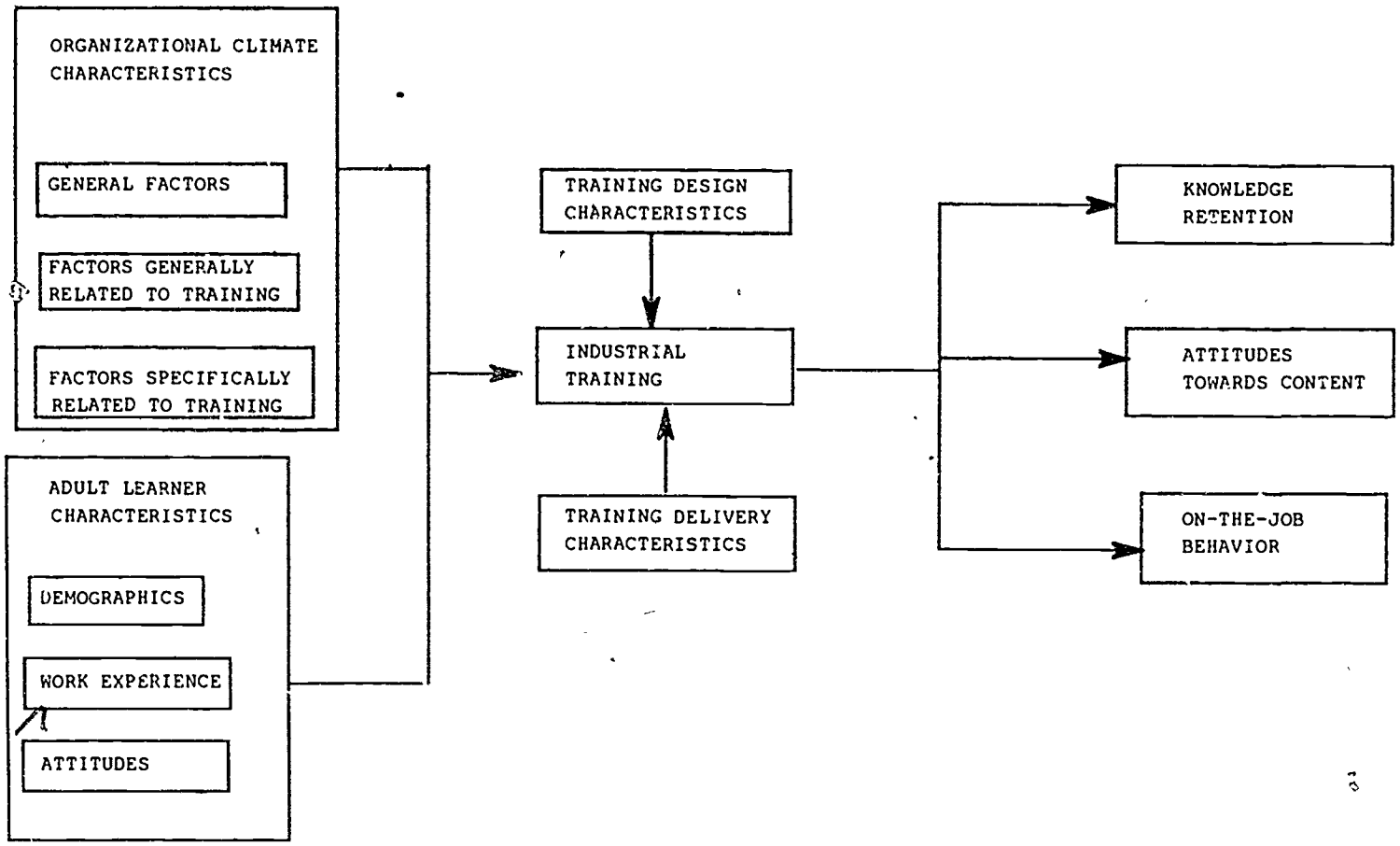
a. eight modules,
b. a videotape,
c. an instructor's manual
d. a participant's workbook, and
e. a portable pocket manual.

The first module in the series was a leadership commitment module for local plants and union management. The remaining seven were directed towards employees who are expected to follow lockout procedures on their jobs. They dealt with behavior change and skill development.

Classes were conducted at each manufacturing plant by nonprofessional trainers with less than 25 persons in a class. The trainers presented the program content, led the discussion, and demonstrated the ECPL procedures. Each training period consisted of seven two hour sessions spanning two work weeks; the courses were repeated in each plant until all participating personnel had attended.

The trainers were salaried and hourly employees whose duties included either lockout or supervision of employees who needed to lock out. The trainers received four days of training to prepare themselves to serve as instructors. They were on temporary assignment until the program was completed.

FIGURE 1
A MODEL OF AN INDUSTRIAL
TRAINING RESEARCH EFFORT



Procedures

Research Design

Design Summary. The research was conducted within the context of an extensive evaluation of the safety training program. The study was structured as a pre-test and post-test design. Participants completed a questionnaire prior to the training and within 30-90 days after training. Current knowledge, behavior patterns, beliefs and attitudes were determined; in addition, standard demographic data were collected.

Dependent Variables. The research question is one of determining the effects of entry perceptions of organizational climate factors on training outcomes. The training outcomes used are gain scores calculated from the pre- and post-test measures of:

1. Knowledge (based upon performance on a 22 item ECPL content knowledge test),

2. Attitudes towards safety on the job (based upon self-report),

3. On-the-job application of general safety precautions (based upon self-report), and

4. On-the-job application of specific behaviors taught (based upon self-report of recent use of ECPL procedures).

Independent Variables. The organizational climate factors were measured by employee perceptions of 20 different climate elements. These measures were replications, to a great extent, of those used in previous industrial research. The perceptions were measured prior to training. The variables were clustered into four groups:

General Organizational Climate Factors

a. Cooperative working conditions
b. Involvement in decision making
c. Physical working conditions
d. Ratings of overall quality of work
e. Supervisor ratings
f. Encouragement to be innovative
g. Degree to which working conditions promote productivity

Organizational Climate Factors Generally Related to Training

a. Union/company support safety
b. Supervisors quick correction of safety hazards

c. Extent to which management is informed of safety issues
d. Pressure from colleagues to follow safety procedures

Organizational Climate Factors Specifically Related to Training

a. Company/union want workers to lockout
b. Operation more important than lockout
c. Employees accountable for not locking out
d. Physical conditions promote easy lockout
e. Lock availability
f. Frequency of lock use into next shift or longer
g. Employee authority to lockout
h. Work makes lockout impossible
i. Lockout not a common practice

Population and Sample

There were two trainee populations -- hourly personnel, and salaried and supervisory personnel. The samples were selected on a stratified basis. The samples came from five plants representative of the entire company in terms of plant type, size, location in the Metropolitan Detroit area, and previous involvement in research projects. All participating plants were approved by representatives of the union and the company management. There were over 5300 employees in the five selected plants, and a total of approximately 50,000 employees were trained throughout the corporation. The pre-test sample consisted of 389 employees, with 284 of these retained for post-testing.

Simple random selection of trainees was not possible, but random selection of classes was permitted. All classes were randomly formed, and each group consisted of employees from a large number of departments within the plant. The trainee sample represented a broad spectrum of adult learners. Table 1 describes the trainees in the study in terms of sex, race, age, educational level, and employment experience.

Data Analysis

The model shown in Figure 2 provides the initial hypotheses for this study. (The variables in this model are derived from the general research framework presented in Figure 1.) The model suggests that attributes of the general organizational climate determine specific organizational climate characteristics; and, climate, as a whole, effects training outcomes.

Path analysis was used to evaluate and to estimate the dimensions of this model. The technique enables one to estimate the causal influence of a number of variables considered simultaneously. The initial models are formulated on the basis of theoretical expectations and then

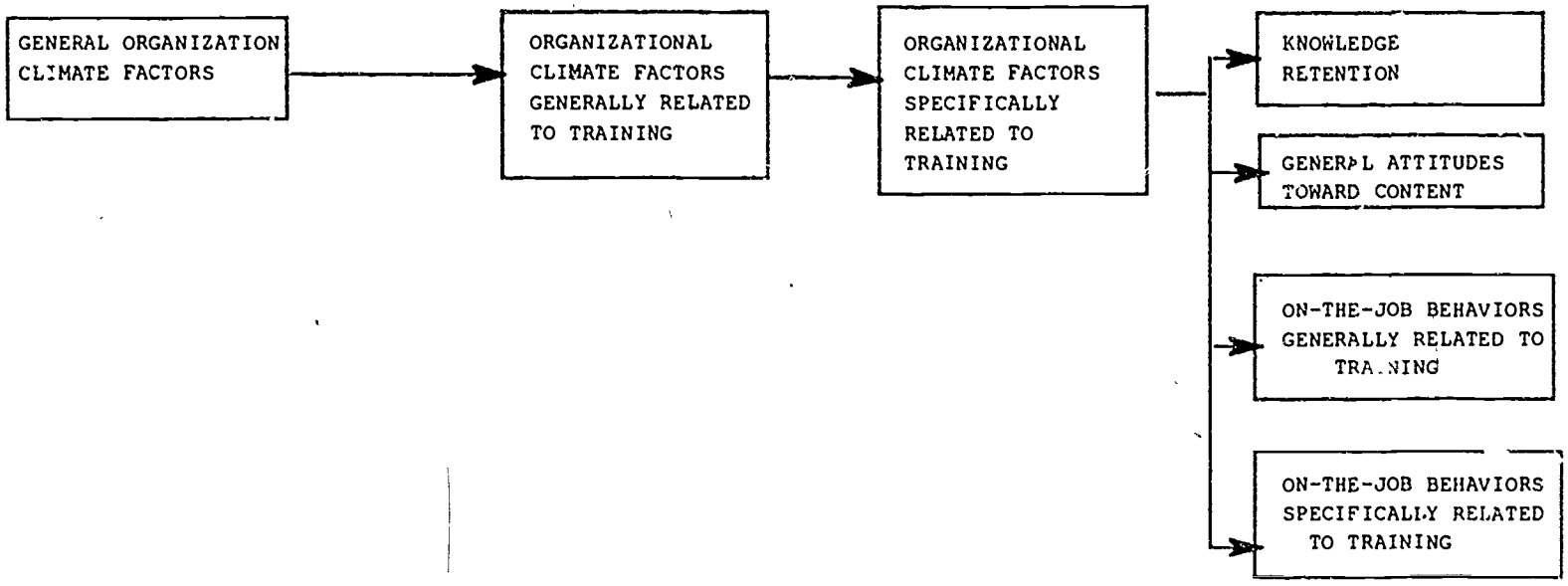
Table 1

A Comparison of Hourly and Salaried
ECPL Trainee Characteristics Using
Pre-Test Data

Characteristic	Hourly N	Hourly %	Salaried N	Salaried %	Combined N	Combined %
Total Respondents	307	100.0	73	100.0	380	100.0
Sex						
Male	287	93.5	68	93.2	355	93.4
Female	20	6.5	5	6.8	25	6.6
Race						
White	250	80.1	62	19.9	312	80.2
Black	43	81.1	10	18.9	53	13.6
Other	14	93.3	1	6.6	15	3.9
Age						
under 35	66	82.5	13	16.3	80	20.6
36-45	122	79.7	31	20.2	153	39.3
46-55	76	75.2	25	24.8	101	26.0
56 +	46	92.0	4	8.0	50	12.9
Education						
Less Than High School	61	98.4	1	1.6	62	15.9
High School	99	90.8	10	9.2	109	28.0
Trade School/ Some College	133	77.8	38	22.2	171	44.0
College Degree or more	9	26.5	25	73.5	34	8.7
Years on Present Job						
0 - 5	139	79.0	37	21.0	176	45.2
6 - 10	51	89.5	6	10.5	57	14.7
11- 15	36	75.0	12	25.0	48	12.3
16- 20	36	90.0	4	10.0	40	10.3
21	45	75.0	15	25.0	60	15.4
Years at Company						
0 - 5	10	58.8	7	41.2	17	4.4
6 - 10	18	69.2	8	30.8	26	6.7
11- 15	70	84.3	13	15.7	83	21.3
16- 20	74	90.2	8	9.8	82	21.1
21	137	78.3	38	21.7	175	45.0

FIGURE 2

A MODEL OF THE HYPOTHESIZED RELATIONSHIPS BETWEEN ORGANIZATIONAL CLIMATE VARIABLES AND TRAINING OUTCOMES



evaluated empirically. McDonald and Elias have recommended the use of path analysis in relating teaching performance data to student achievement, proposing such techniques as tools in building instructional theory (McDonald and Elias, 1976 cited in Gage, 1977).

Results

The results support the general notion that organizational climate variables influence training outcomes. However, only one of the four models constructed yield results that are worthy of extensive comment. This was the model showing the role of organizational climate variables in relation to on-the-job behavior directly related to the training content. The other three models (relating to general on-the-job behavior, attitude change, and knowledge retention) indicate that organizational climate has only a very small role.

A Model Relating Organizational Climate Factors to Specific On-the-Job Behavior After Training

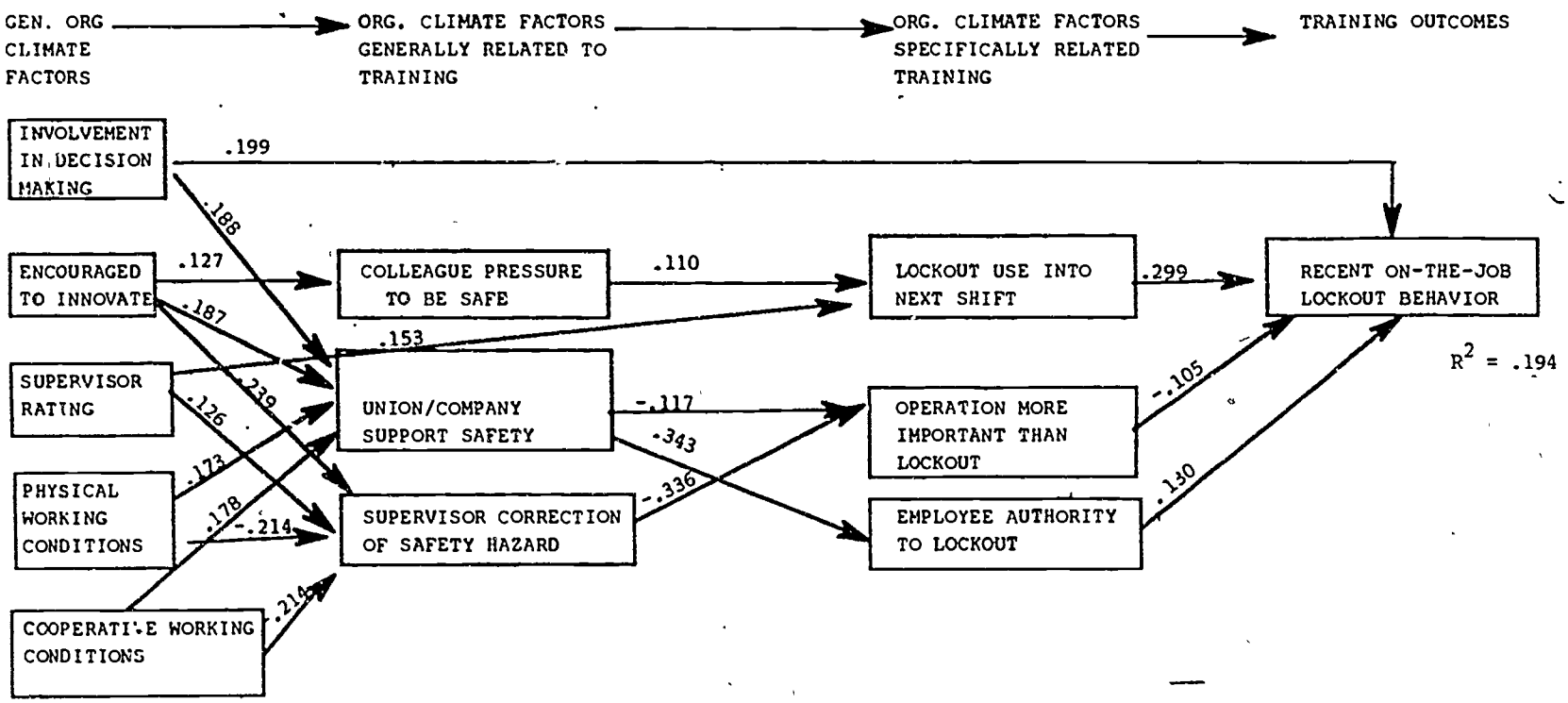
The path diagram shown in Figure 3 is the basis of this discussion. Supporting data is displayed in Table 2.

The model shows a complex network of interrelated organizational climate factors which explain nearly 20% of the variance in the training outcomes; it supports the hypothesized pattern of general factors predicting the more specific factors, with the major effects produced by the most specific climate measures -- those directly related to the training content. The direct causal influences of recent on-the-job lockout behavior relate to employee perceptions of management actions, and to the extent to which employees feel they are empowered to be involved in plant operations. An examination of those variables which have both direct and indirect relationships to training-specific on-the-job behavior not only shows the continued influence of these two types of variables, but also of the influence of colleagues and physical working conditions.

Employee Perceptions of Management Actions. There are five variables in the model related to how the employees perceive management -- lockout use into next shift, operation more important than lockout, union/company support safety, supervisor's quick correction of safety hazards, and the general rating of the supervisor's performance. The first four speak to management credibility when it comes to safety and lockout. Do management actions really demonstrate that supervisors think safety matters?

These variables concerned with management are interrelated. Employees who think supervisors really are more concerned with production "when push comes to shove" are less likely to think the company and the union really support safety and are less likely to think their

FIGURE 3
A MODEL OF THE EFFECTS OF ORGANIZATIONAL CLIMATE FACTORS ON SPECIFIC ON-THE-JOB BEHAVIOR OUTCOMES OF TRAINING*



*PATH COEFFICIENTS ARE INDICATED ON EACH PATH

Table 2
Hypothesized Organizational Climate
Causes of Specific On-The-Job
Behavior Outcomes of Training

Endogenous Variable	Causal Variable	B	SE B	T	Prob.
	Constant	3.105	.249		
Lockout Use Into Next Shift	Supv. Rating	.196	.064	3.052	.002
	Colleague Pressure to be Safe	.188	.086	2.202	.028
Mean = 3.977 SD = 1.740	R Square = .38		N = 389		
	Constant	4.156	.175		
Operation More Important Than Lockout	Supv. Correction of Safety Hazards	-.421	.065	-6.434	.000+
	Union/Company Support Safety	-.156	.070	-2.244	.025
Mean = 2.771 SD = 1.080	R Square = .117		N = 389		
	Constant	1.206	.106		
Employee Authority To Lockout	Union/Company Support Lockout	.341	.048	7.178	.000+
Mean = 1.874 S.D. = 1.080	R Square = .117		N = 389		
	Constant	1.999	.101		
Colleague Pressure To Be Safe	Encouraged To Innovate	.093	.037	2.514	.012
Mean = 2.219 S.D. = 1.018	R Square = .016		N = 389		

Table 2 Cont.

Endogenous Variable Prob	Casual Variable	B	SE B	T	
	Constant	1.145	.122		
	Involvement in Decision Making	.133	.041	3.231	.001
Union/Company Support Safety	Encouraged to Innovate	.146	.051	2.867	.004
	Physical Working Conditions	.134	.048	2.812	.005
	Cooperative Working Conditions	-.099	.050	-1.985	.048
Mean = 1.959 SD = 1.086	R Square = .160		N = 389		
	Constant	1.892	.133		
	Encouraged to Innovate	.198	.052	3.787	.000+
Supervisor Correction of Safety Hazards	Physical Working Conditions	.147	.051	2.878	.004
	Cooperative Working Conditions	-.194	.056	-3.454	.000+
	Supervisor Ratings	.107	.049	2.194	.029
Mean = 2.563 SD = 1.157	R Square = .125		N = 389		

Table 2 Cont.

Dependent Variable	Casual Variable	B	SE B	T	Prob
	Constant	1.923	.546		
	Lockout Use Into Next Shift	.462	.084	5.500	.000+
Gains in Recent Job Lockout Behavior	Involvement in Decision Making	.346	.096	3.591	.000+
	Employee Authority to Lockout	.323	.137	2.354	.019
	Operation More Important than Lockout	-.194	.101	-1.925	.055

Mean = .884
SD = 2.684 R Square = .194 N = 284

supervisors correct safety hazards when they are pointed out. Correspondingly, a belief that there is general support of safety relates to the belief that employees are given the authority to lockout.

The fifth significant variable in this category is a more general rating of the supervisor. This is the only measure in this grouping not related to the topic of the training; but, this partially explains two of the oth more training-specific measures in this group -- lockout use into the next shift and supervisor correction of safety hazards. Supervisors received higher ratings if employees felt that the supervisors 1) quickly corrected hazards which were brought to their attention, and 2) shut down production -- for a long time, if necessary -- by locking out to insure safety.

Employee Empowerment. The next most influential group of variables related to the extent to which employees were given rights and responsibilities. These factors were the extent to which trainees felt they had the authority and responsibility to lockout, were involved in decision making in the plant, and were encouraged to devise new and better ways of doing things in the plant. Two of the three factors are general climate issues, not related to the training content. The importance of this group of variables is shown by the fact that two of the three measures in the group directly influence employee lockout behavior.

Collegial Relationships. Variables relating to the influence of other workers also play a role in this model. If workers not following safe practices generally irritate others, even if no one gets hurt, there is a tendency for supervisors to permit use of lockout techniques into the next shift.

The effects of a general cooperative atmosphere among workers shows a different pattern; these data show increased collegiality relates to a more negative perception of supervisors' safety attitudes and behaviors. This finding is difficult to explain. Perhaps there is a bonding among workers which leads to increased cooperation when employees feel there is not a genuine support of safety in the plant.

Physical Working Conditions. Finally, the degree of satisfaction one has with the physical working conditions does have an indirect role in predicting on-the-job behaviors effects of training. Better physical conditions, as might be expected, predict more positive perceptions of climate factors generally related to the training content.

Other Models of Organizational Climate Influences on Training Outcomes

The data analyses with respect to the other dependent variables -- general on-the-job behavior outcomes, general attitude outcomes, and knowledge retention -- also show that organizational climate variables play a role in explaining training outcomes; however, it is so small that little

discussion is warranted. (See Figures 4, 5, and 6 and the supporting data in Tables 3, 4, and 5 in Appendix A.) Next to specific behavioral outcomes, organizational climate factors seem to have the most influence on general attitude changes, accounting for nearly eight per cent of the variance. There are negligible effects in the other models.

Perhaps one result that should be noted is that the climate variables specifically related to training tend to disappear when the training outcome being considered is general in nature.

Conclusions

The major conclusion of this study is that if one is intent on designing an effective industrial training program, consideration needs to be given to more than systematic procedures for designing programs, materials and media. One must consider all factors that affect the learning process. In an adult industrial training program, in particular, where the goal is not simply knowledge acquisition, but knowledge application, dimensions of the larger system must be taken in account.

On-the-job application of training content involves elements of transfer of training, elements of motivation, and elements of information retrieval. What is the nature of the role of organizational climate in all of these processes? Inherent in one's perception of an organization is the picture of the extent to which the organization (both colleagues and supervisory personnel) value the behaviors which are being promoted. These values are typically inferred through daily performance, or modeling. Another major factor suggested by the results of the present study is the perceived influence of the individual within the organization. Both modeling and perceived influence appear to have a substantial bearing on the application of training content. The physical working conditions have far less impact on behavior changes which occur after a systematic training experience.

Behavior Modeling Effects

Killen and Robinson (1988) have cited the major influence of "social-environmental modeling" (p. 175), especially in situations related to health behaviors. Their conclusions were based primarily on research relating to children; the present study suggests that modeling is important for adults, as well. Transfer of knowledge to workplace practice was clearly promoted by general adherence to safety principles by both colleagues and supervisory personnel, as well as specific demonstration of lockout procedures by supervisors. Overall, the most influence comes from supervisors rather than co-workers.

These behavior patterns are consistent with The Health Belief Model which explains health behavior in terms of

one's perceptions of 1) the severity of a condition, 2) the benefits of the preventive action minus the barriers to the action, and 3) the presence of action cues (Maiman and Becker, 1974, as cited in Murphy, 1989). Each of these characteristics can be explained in terms of modeling behaviors within the organization, but especially by management. If one's supervisor locks out, the message is sent that the lockout benefits are greater than the inconveniences it causes. Seeing one's supervisor lock out may also serve as a reminder, a cue to action. Modeling behaviors among co-workers are also important, since they create a climate in which the supervisors tend to enforce the lockout procedures (n.b. "colleague pressure to be safe" leads to "lockout use into next shift").

Role of the Individual within the Organization

The mere presence of model behavior is insufficient in itself to promote on-the-job application of the training content. The modeling provides external stimulation to apply the content of the training, but the trainee must also perceive that he or she has a role of some influence in plant operations. These attitudes apparently provide at least part of the internal motivation necessary to follow the prescribed safety procedures. Such results are interesting in light of the energies being placed upon employee involvement and union-management cooperation in many companies as an avenue towards improved production quality.

Health and safety topics often involve behavior in which knowledge of correct procedures is not the issue. Rather, the problem is one of forming habits of known procedures. Even when survival issues are at stake (i.e. serious injury), habits are not forthcoming without internal beliefs that provide a motivating basis for action. The present study supports this conclusion; there was a correlation between a number of attitudinal factors and on-the-job behavior, but not between knowledge of procedures and their use. (Knowledge retention showed no correlation in the preliminary analysis with the on-the-job behavior dependent variable and was dropped from the model.)

Stimulating New On-the-Job Behavior

Industrial safety behavior changes, therefore, seem influenced not so much by knowledge but by a climate in which supervisors and co-workers value the desired actions and by the perceptions that employees are valued themselves in the organization. As previously noted, the Health Belief Model also indicates the need for a cue to action; the modeling behavior of others was suggested as a possible environmental stimulus. Other situations can also serve this function. For example, if an employee is injured on the job, this could also serve as a cue to action. The cues

can be planned. In the context of this study, posters were placed in the plants as reminders to lock out.

The need for specific action stimuli is also supported by previous research and theory of human information processing and transfer of training. Some cue is required to facilitate information retrieval. The cue is typically embedded in the instruction, and consequently one's long-term memory. Reminders are needed to retrieve the knowledge, in this instance the lockout procedures, and use it in the proper manner. Repetition of this retrieval-use process then promotes automaticity, or habit. Such habits, however, are dependent first on having the correct information stored and working in an environment which is supportive of attending to the cue.

Implications for Instructional Design

Well-designed materials, courses, and programs influence knowledge acquisition and retention. If knowledge is only an intermediate goal and the ultimate aim is to change behavior, then the designer must be guided by a model more complex than the typical instructional systems design framework. The new model must encompass the nature of the organization in which the behaviors are to be exhibited. This present study suggests that the more important organizational characteristics relate to social-psychological dimensions rather than physical properties.

Design procedures should be expanded, as well. Specifically, this study has implications for design aspects such as the needs assessment, the types of examples incorporated into instructional materials, and the follow-up. The most useful needs assessment should include more than trainee needs and organizational technical needs. Employee perceptions of the work environment and their roles within that context should be determined. Instructional materials should be constructed to include those cues which one expects to stimulate the desired performances. For example, in this case videos could emphasize the average worker locking out, and include situations in which lockout is enforced by the supervisor and plant management. These cues are obvious; however, other cues could also be identified and portrayed.

Finally, designers can make efforts to promote organizational support of the desired behavior. They can recommend that supervisors and plant management be included in the training, and suggest periodic follow-up instruction for everyone. In addition, follow-up studies should assess not only the continued use of the training content, but the organizational climate most directly related to the training. In summary, these suggestions provide support for the integration of both the cognitive and affective domains into complex instructional sequences, thus supporting the work of Martin and Briggs (1986).

Implications for Adult Learning

The findings of this study speak not only to design practice, but also to principles of adult learning, and how it differs from learning of pre-adults. Adult learning is usually work-related. The National Center for Education Statistics found that almost 49% of adult education content in the United States is concerned with one's work (cited in Darkenwald and Merriam, 1982). This present study indicates that one's perceptions of his or her workplace accounts for almost 20 percent of the variance in the behavioral effects of work-related training. This is reminiscent of Bloom's (1976) finding from studies of children that "affect toward the school... will account for as much as 20 percent of the variation in school achievement" (p. 92).

Bloom's findings were minimal in relation to children in grades 1-5 and more pronounced for subjects in junior and senior high school. He concludes that attitudes towards school become more influential as one's experience in the school setting increases. At the adult level, the perceptions of one's environment continue to be influential.

Bloom's pre-adult findings and the adult findings in this study differ in the nature of the dependent variable. Bloom's findings concern cognitive academic achievement reflected in grade point averages and composite scores on achievement tests, measures generally comparable to the knowledge retention scores in this study. Here the organizational climate variables are influential primarily in relation to on-the-job behavior, an indication of transfer of training.

For adults, the transfer task seems to encompass a wider range of predictor variables than the knowledge recall task. While transfer of training is viewed primarily from the theory of common elements (Butterfield and Nelson, 1989), this study proposes the addition of other factors in explaining the transfer process. The organizational climate factors seem to provide a motivation to use the learned procedures. Transfer appears to be dependent upon not only capability, but inclination.

Summary and Next Steps

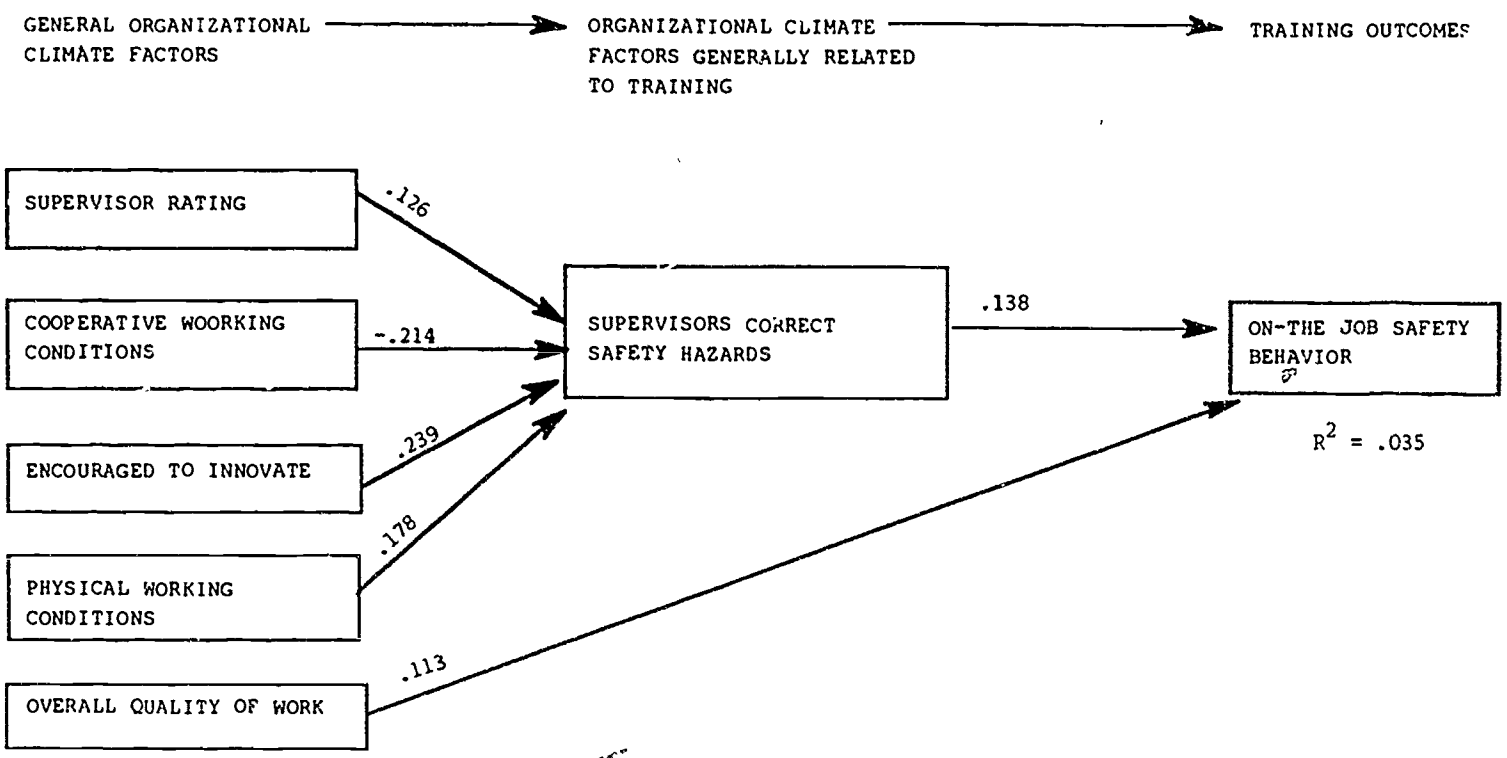
Organizational climate and its role in adult learning is often discussed, but the discussions have produced little data to support opinions. This study has identified a role organizational climate plays in industrial training; it is not known if the pattern is consistent for other adult learning situations, both formal and informal. Not only could the setting in this study produce unique findings, but the findings may be influenced by the fact that the study was concerned with required training on a topic with high risk implications. The population involved, however, was a comprehensive group with a broad range of demographic characteristics; it was not an exceptional group of adults.

Not only should studies of organizational climate be repeated in other settings, but climate effects should be studied in relation to critical learner characteristics. The measures here were all employee perceptions. Such attitudes may vary for different age cohorts, or for persons with different experiential backgrounds, for example. Organizational climate perceptions may also be dependent upon the employee's job satisfaction. This latter issue leads a researcher into considering the interrelations between various types of attitudes, and their effects on the learning process.

Ultimately, the question arises as to the extent instructional design interventions can effect the influence of organizational climate perceptions on the learning process. Superior design can counteract, to a certain degree, the effects of many adult learner characteristics -- age, ability, and interest for example. Once, the full role of organizational climate is known, do we simply adjust to its effects, or can we modify the instruction to remove climate-induced barriers to learning and transfer of training?

APPENDIX A

Figure 4
A MODEL OF THE EFFECTS OF ORGANIZATIONAL CLIMATE FACTORS ON GENERAL ON-THE JOB BEHAVIOR OUTCOMES OF TRAINING *



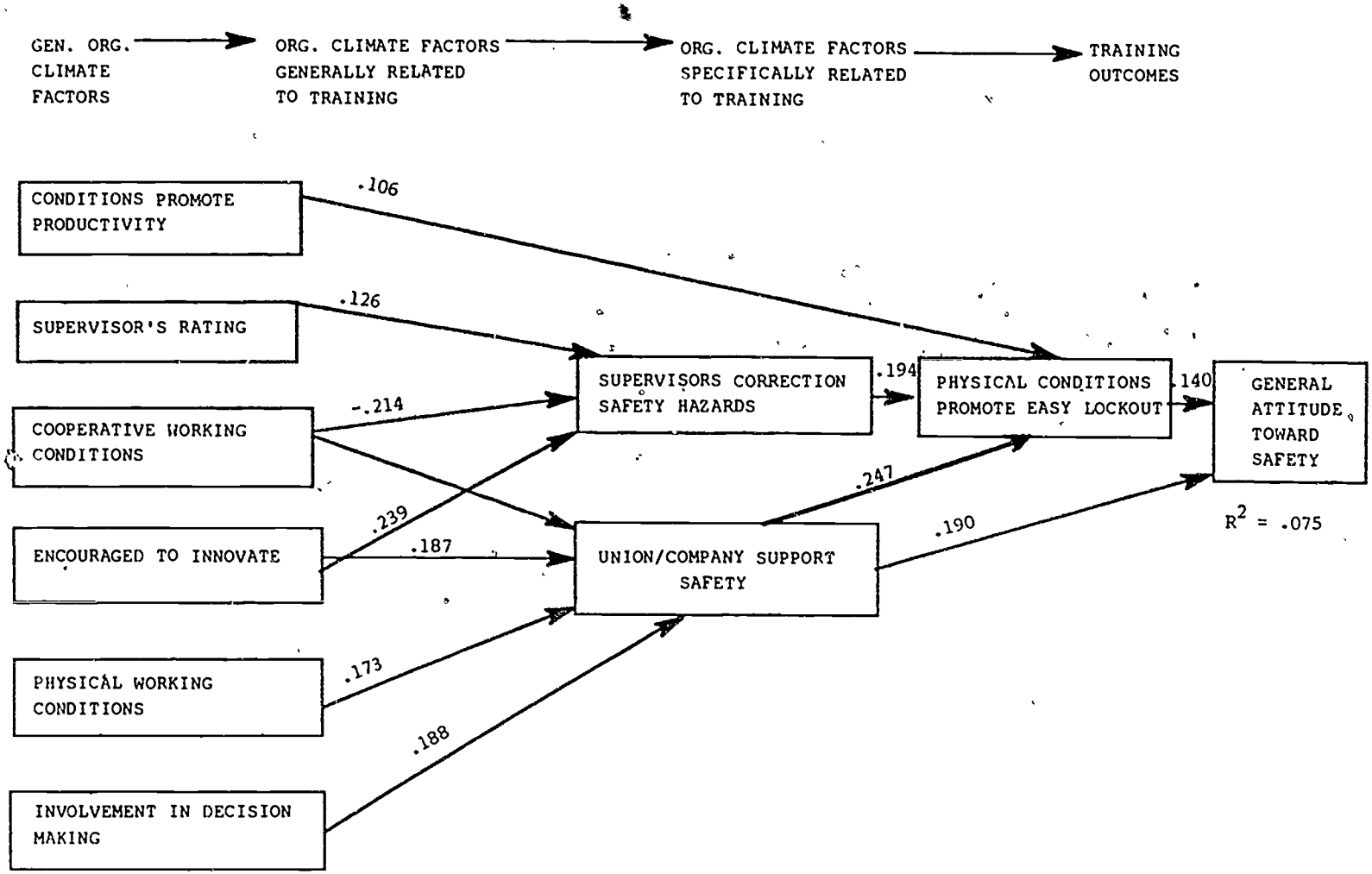
*PATH COEFFICIENTS ARE INDICATED ON EACH PATH.

Table 3
Hypothesized Organizational Climate
Causes of General On-The-Job Behavior
Outcomes of Training

Endogenous Variable	Casual Variable	B	SE B	T	Prob
	Constant	1.892	.133		
	Encouraged to Innovate	.198	.052	3.787	.000+
Supervisor Correction of Safety Hazards	Physical Working Conditions	.147	.051	2.878	.004
	Cooperative Working Cond.	-.194	.056	-3.454	.000+
	Supervisor Rating	.107	.049	2.194	.029
Mean = 2.563 SD = 1.157	R Square = .125		N = 389		

Dependent Variable	Casual Variable	B	SE B	T	Prob
	Constant	.445	.267		
	Supervisor Correction of Safety Hazards	.202	.087	2.336	.020
Gains in On-the-job Safety Behavior	Overall Quality of Work	.139	.073	1.911	.057
Mean = .356 SD = 1.701	R Square = .035		N = 284		

FIGURE 5
A MODEL OF THE EFFECTS OF ORGANIZATIONAL CLIMATE FACTORS ON GENERAL ATTITUDINAL OUTCOMES OF TRAINING *



* PATH COEFFICIENTS ARE INDICATED ON EACH PATH

Table 4
Hypothesized Organizational Climate Causes of General Attitudinal Outcomes of Training

Endogenous Variable	Casual Variable	B	SE B	T	Prob
	Constant	1.124	.138		
	Union/Company Support Safety	.233	.050	4.681	.000+
Physical Conditions Promote Easy Lockout	Supervisors Correction of Safety Hazard	.172	.046	3.722	.000+
	Conditions Promote Productivity	.077	.035	2.228	.026
Mean = 2.213 SD = 1.025	R Square = .171		n = 389		
	Constant	1.892	.133		
Supervisor Correction of Safety Hazards	Encouraged to Innovate	.198	.052	3.787	.000+
	Physical Working Conditions	.147	.051	3.878	.004
	Cooperative Working Conditions	-.194	.056	-3.454	.000+
	Supervisor Rating	.107	.049	2.194	.029
Mean = 2.563 SD = 1.157	R Square = .125		N = 389		

Table 4 Cont.

Endogenous Variable	Casual Variable	B	SE B	T	Prob
	Constant	1.145	.122		
Union/Company Support Safety	Involvement in Decision Making	.133	.041	3.231	.001
	Encouraged to Innovate	.146	.051	2.867	.004
	Physical Working Conditions	.134	.048	2.812	.005
	Cooperative Working Conditions	-.099	.050	-1.985	.048
Mean = 1.959 SD = 1.086	R Square = .160		N =389		

Dependent Variable	Casual Variable	B	SE B	T	Prob
	Constant	.577	.155		
Gains in General Attitudes Toward Safety	Union/Company Support Safety	.184	.060	3.089	.002
	Physical Conditions Promote Easy Lockout	.144	.063	2.275	.024
Mean = .102 SD = 1.053	R Square = .075		N = 284		

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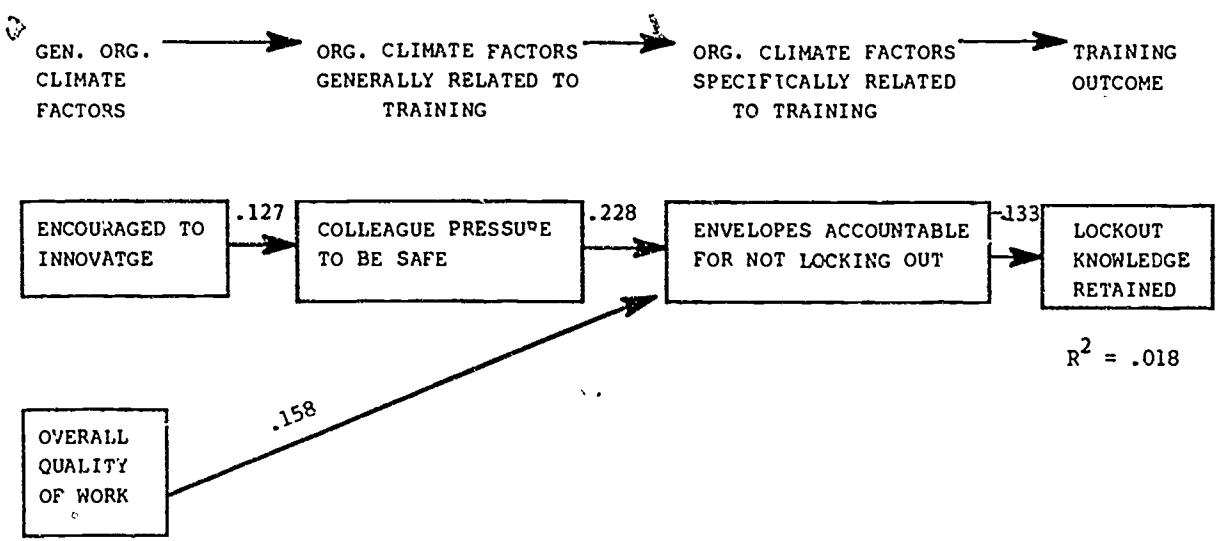
FIGURE 6
A MODEL OF THE EFFECTS OF ORGANIZATIONAL CLIMATE FACTORS ON KNOWLEDGE RETANTION OUTCOMES OF TRAINING



*PATH COEFFICIENTS ARE INDICATED ON EACH PATH

Table 5
Hypothesized Organizational Climate
Causes of Knowledge Retained After Training

Endogenous Variable	Casual Variable	B	SE B	T	Prob
	Constant	1.342	.142		
Employees Accountable for Not Locking Out	Colleague Pressure to be Safe	.237	.051	4.662	.000+
	Overall Quality Of Work	.121	.037	3.241	.001
Mean = 2.116 SD = 1.060	R Square = .081		N =389		
	Constant	1.999	.101		
Colleague Pressure to be Safe	Encouraged to Innovate	.093	.037	2.514	.012
Mean = 2.219 SD = 1.018	R Square = .016		n = 389		

Dependent Variable	Causal Variable	B	SE B	T	Prob.
	Constant	1.502	.473		
Gains in Lockout Knowledge Retained	Employee Accoutable for Not Locking out	.463	.206	2.254	.025
Mean = 2.482 SD = 3.691	R Square = .018		N = 284		

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