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FACTORS THAT INFLUENCE TRANSFER OF HAZARDOUS MATERIAL TRAINING:
THE PERCEPTION OF SELECTED FIRE-FIGHTER TRAINEES AND SUPERVISORS

by

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A dissertation submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy
in the department of Department of Educational Research, Technology & Leadership
in the College of Education
at the University of Central Florida
Orlando, Florida

Fall Term

2007

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ABSTRACT

This study examined the influence of factors on transfer of training and was based on the work of Broad and Newstrom (1992). For the purpose of this study the Broad and Newstrom (1992) transfer of training barriers are rephrased into positive statements. The nine transfer of training factors are: (1) reinforcement on the job; (2) little interference from immediate (work) environment; (3) supportive organizational culture; (4) trainees' perception of training programs being practical; (5) trainees' perception of relevant training content; (6) trainees' being comfortable with change and associated effort; (7) trainer being supportive and inspiring; (8) trainees' perception of training being well designed/delivered, and (9) peer support. This study explored the degree to which these factors influenced transfer of training in terms of on-the-job application.

The study found supportive organizational culture to be the strongest predictor of transfer of training to on-the-job application. In addition, the degree of influence of Broad and Newstrom's (1992) nine factors varied with the thirteen locations. The study also found perception gaps between fire fighter trainees and their supervisor on factors influencing transfer of training. They differed on four factors: Supportive organizational culture, Perception of training programs being practical, Trainer being supportive and inspiring, and Perception of training being well designed/delivered.

Dedicated

to

my parents, Manjulika and Sukhpal Singh Bhati,

for continuing to encourage me in my career

and for instilling in me the value of education.

I also dedicate this in memoriam to my grandmother, Krishna Singh,

who always believed in me and whose blessing made me achieve this milestone.

ACKNOWLEDGMENTS

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LIST OF ACRONYMS/ABBREVIATIONS

ANOVA   Analysis of variance

ASTD   American Society for Training and Development

BEST   Group of organizations that won ASTD BEST Awards

BMF   Benchmarking Forum

BMS   Benchmarking Survey

CCE   Trainees being comfortable with change and associated efforts

CI   Confidence Interval

DD   Trainees' perception of training being well designed/delivered

DOD   US Department of Defense

EA   Evaluation-Audit

HazMat   Hazardous Material

HMT   Hazardous Material Training

HPT   Human Performance Technology

IAFF   International Association of Fire Fighters

IRB   Institutional Review Board

ISD   Instructional Design

IWE   Interference from the immediate (work) environment

LTSI   Learning Transfer System Inventory

NBC   Nuclear, Biological, or Chemical

NFPA   National Fire Protection Association Standards

OSHA   Occupational Safety & Health Administration

PCP   Primary-care physicians

PIBI	Performance Improvement by Incentives Model
PS	Peer Support
PTP	Trainees' perception of practical training programs
RJ	Reinforcement on the Job
ROI	Return on Investment
RTC	Trainees' Perception of Relevant Training Content
SI	Trainer being Supportive and Inspiring
SOC	Supportive Organizational Culture
TOT	Transfer of Training
WLP	Workplace Learning and Performance
WMD	Weapons of Mass Destruction

CHAPTER 1: INTRODUCTION

The purpose of this formative study was to investigate the factors that affect transfer of training on fire-fighter trainees and their supervisors using a nine-factor transfer of training framework. Broad and Newstrom (1992) have proposed nine critical factors that facilitate transfer of training These are: (1) Reinforcement on the job; (2) Interference from the immediate (work) environment; (3) Supportive organizational culture; (4) Trainees' perception of practical training programs; (5) Trainees' perception of relevant training content; (6) Trainees being comfortable with change and associated efforts; (7) Trainer being supportive and inspiring; (8) Trainees' perception of training being well designed/delivered; and (9) Peer support.

In spite of huge expenditures on training, little evidence is present to show that training programs transfer to the job and result in improved performance in the workplace (Baldwin & Ford, 1988; Gist, Bavetta, & Stevens, 1990). For transfer to take place, trainees must apply, generalize, and maintain new knowledge and skills across different situations, resulting in improved performance in the workplace (Baldwin & Ford, 1988; Broad & Newstrom, 1992; Ford & Weissbein, 1997; Lim & Morris, 2006; Rouiller & Goldstein, 1993). Although limited research has been conducted in the field, the study of two sets of factors has dominated transfer of training research: trainee characteristics (Foxon, 1993; Kontoghiorghes, 2002; Lim & Morris, 2006; Mathieu, Tannenbaum, & Salas, 1992; Noe, 1986; Noe & Schmitt, 1986; Quinones, Ford, Sego, & Smith, 1995; Tai, 2006; Tannenbaum, Mathieu, Salas, & Cannon-Bowers, 1991; Tracey, Hinkin, Tannenbaum, & Mathieu, 2001) and environmental factors (Bates & Khasawneh, 2005; Cheng & Ho, 1998; Clarke, 2002; Lim, 2000; Lim & Morris, 2006; Mathieu et al., 1992; Mathieu & Martineau, 1997; Nijman, 2004; Quinones et al., 1995). The emerging viewpoint acknowledges that training is a multifaceted, complex process influenced by both

environmental and individual factors; therefore, a more in-depth understating of factors that influence transfer is required.

Background of Study

Training, now a multi-billion-dollar industry, has been a constant focus area for managers of most of the organizations worldwide and is viewed as a powerful vehicle to improve performance (Baldwin & Ford, 1988). For example, in the United States, 90 percent of private organizations offer some form of formal employee training costing more than $56 billion per year (Kornik, 2006). If we include informal on-the-job training activities, over the years, the investment on training can probably be increased to $200 billion annually (Awoniyi, Griego, & Morgan, 2002; Rodríguez & Gregory, 2005). For this investment, managers of organizations expect increased productivity, greater profits, improved safety, reduced error, and greater market share (Salas & Cannon-Bowers, 2001). In order to determine the cost effectiveness of such large investments, studies of the transfer of training to on-the-job application of what is taught must be conducted.

Leaders of organizations are often under the impression that over time, performance improvement is a natural result following the training. The evidence accumulated by researchers, however, does not substantiate this assumption. In an Evaluation-Audit (EA) report examining the performance capability of plant technical personnel worldwide following an intense and expensive training initiative, it was found that even though competency profiles had been updated and made more specific, those personnel that were reviewed in this audit appeared to emphasize "memory knowledge" rather than "application capability." The report also concluded that there was lack of systematic follow-up, post training and on-the-job support (Stolovitch,

2004). Little evidence of on-the-job application post-training was found despite general satisfaction with the training itself. This echoes the findings of a similar study conducted at Intel Corporation on the most highly rated management course taken by more than 600 participants in which the investigators found that less than one percent of the trainees applied what they had learned to the job (Esque & McCausland, 1997).

Changes due to training are affected by many factors, and improved performance may occur as a result of individual or environmental factors or a combination of both (Subedi, 2004). Hence, it is difficult to establish reliable relationships between individual, organizational, and contextual variables on one hand, and training transfer on the other, especially when the latter is measured inconsistently (Putra, 2004). This problem is worsened by the fact that common measurements of transfer may be too broad to sufficiently reveal any relationships that may exist among the variables in question (Arthur, Bennett, Edens, & Bell, 2003). These considerations influenced the direction of this study which focused on the influence of a defined group of factors on transfer of training and developed an instrument to measure the perception of trainees and supervisors to Broad and Newstrom's (1992) nine factors and to gauge whether some factors are more influential than others. The study also investigated whether the relative impact of the factors varies with the training situation.

Purpose of Study

The scientific purpose of the study was to examine the perception of trainees and supervisors related to factors affecting transfer of training. One hundred and eighty one trainees and one hundred supervisors were surveyed with respect to factors facilitating transfer. Perceptions were measured according to Broad and Newstrom's nine factors (1992) framework.

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The result of the study revealed opportunities to improve job performance through training and organizational strategies.

The investigator chose to study the population of fire fighters, with a focus on transfer of skills and knowledge to on-the-job application because; fire fighters are the first respondents in any emergency situations and, often the lives of the public as well as their own and the lives of their colleagues are at risk. Daily, they are at risk as they are called upon to save others. Therefore, in training related to handling of hazardous materials, with which they are frequently in contact, it is imperative that fire fighters transfer skills and knowledge they learn in their training back on the job. Moreover, there has been an increase in the number of fire fighters on-duty deaths, which is a matter of concern for families, society, and the fire-fighters associations. The U.S. Department of Labor, Bureau of Labor Statistics census 2006 on fatal occupational injuries reported 44 fire-fighter fatalities, which included 17 due to transportation incidents, three due to contact with objects, and 20 from fire and explosion ("Fatal occupational injuries by occupation and event or exposure", 2006).

Additionally, in the wake of domestic terrorist attacks on 11 September 2001 and ensuing bioterrorist events involving anthrax, there is no longer any debate about the possibility of attacks employing Nuclear, Biological, or Chemical (NBC)/Weapons of Mass Destruction (WMD). In a concerted effort to mitigate the effects of possible future domestic NBC/WMD terrorist attacks, the US Department of Defense (DOD) and other US governmental agencies have intensified their efforts to provide Domestic Preparedness Training for First Responders in urban centers throughout the US. Acknowledging this long-standing threat, the International Association of Fire fighters (IAFF) has invested resources in developing an extensive Hazardous Material (HazMat) training program for fire and emergency personnel. The IAFF HazMat

Training for First Responders Program and Emergency Response to Terrorism Operations

Programs have successfully trained tens of thousands of first responders in the U.S. to a

recognized level of response (Stolovitch & Condly, 2006).

Consistently, independent evaluations of IAFF HazMat training strongly indicate that

learning and retention of course content occurs (Cohen, 2004; 2005; Stolovitch & Condly, 2006).

These evaluations provide data that the training is relevant to the fire fighter's job, is well

designed and delivered, and results in significant increases in fire fighters' confidence, learning

and retention (even eight months after training). However, the data also suggest that transfer of

knowledge and skills acquired during training (i.e. on-the-job application of what is taught) is

limited. The purpose of the current study was to identify factors that facilitate or inhibit transfer

of training to the fire-fighter job. IAFF, its funding partners and fire departments as well as fire

fighters themselves all have a highly vested interest in translating training-generated learning to

on-the-job performance. Despite this, reports of transfer to the job of what fire-fighter trainees

are supposed to do as a result of the training indicate a gap between desired and actual

application (Stolovitch & Condly, 2006).

This study identified a well-documented set of variables that have been found to affect

transfer of training to the job, measured their degree of presence or absence in the fire-fighter

environment as judged by the fire fighters themselves and their immediate supervisors, and

verified the extent to which they affect on-the-job application of hazardous material (HazMat)

learning. To obtain acceptance for this research project, the investigator presented the rationale

for the research by identifying what was known, what the gap was, the importance of the study,

the hypotheses, limitations, and methodology. The following sections discuss all of this in detail.

Rationale for the Study

One problem that many organizations face today is that trainees are not applying to the workplace what they have learned during their training. Therefore, the investment on training is often perceived as a waste of time, resources, and money (Baldwin & Ford, 1988; Baldwin & Magjuka, 1997; Broad & Newstrom, 1992; Burke, 2001) and in some instances, this training may even have a negative impact on performance and productivity (Clark, 1989; Morrow, Jarrett, & Rupinsky, 1997).

Training programs assume that transfer occurs, but there are very few instances of evaluations of training at Kirkpatrick's level three (Transfer/Behavior) and level four (Impact or Organizational Performance) of the Kirkpatrick Evaluation Model (Kirkpatrick, 1996). The American Society for Training and Development (ASTD) State-of-the-Industry Report (2005) declared that survey results from benchmarking organizations (those that are industry leaders in training) revealed that 91.3 % use reaction measures, compared with 53.9% for learning, 22.9% for behavior/transfer, and only 7.6% for results (Sugrue & Rivera, 2005). These figures show that a large percentage of organizations evaluate the effectiveness of their training program by "smile sheets" and rarely look at behavior or transfer. Moreover it is self-reported data and tends to inflate the actual figures. Arthur, Bennett, Edens & Bell (2003), in a rigorous meta-analytic study that examined over 600 field-based training evaluation studies, found that only four percent of training evaluation studies offered any evidence of evaluating impact of training to the job and only a limited number tracked post-training application of learning to the job.

It is important to evaluate transfer as it would help eliminate unproductive approaches to performance issues and thereby assist in identification of effective training techniques and

provide management with information on how to solve performance issues (Sugrue & Kim,

2004). It would also be useful to examine the training's contribution, credibility, and value to the

organization (Arthur et al., 2003). Such concerns triggered the current study, which identified

key facilitators for transfer to take place and the degree of actual transfer, by activity that occurs

as a result of HazMat training. It also discovered indicators of what can be done to

encourage/increase transfer rates with respect to HazMat training. In addition, it found

interesting gaps between supervisory and trainee perceptions with respect to the degree of

presence of facilitating factors to transfer.

This study's findings have the potential to assist IAFF to bring to the attention of Fire

Department managers issues concerning on-the-job application of HazMat and other learning

and thereby lead to improved on-the-job HazMat performance and reduction of incidents,

accidents, injuries and fatalities. It also has implications for other organizations that invest in

training to improve workplace human performance.

<center>The Gap</center>

The literature on workplace transfer of training overwhelmingly suggests that the

majority of what is taught during training frequently does not show up back on-the-job in terms

of changed behavior and results. This is the conclusion of a large number of studies despite the

enormous amounts of money invested in structured training efforts by business and industry

(Baldwin & Ford, 1988; Broad & Newstrom, 1992; Clark, 2003; Lim & Morris, 2006; Rodríguez

& Gregory, 2005; Yamnill & McLean, 2005). Many causes have been attributed to this gap

between training events to on-the-job application. Most fall into three categories: trainee

characteristics, characteristics of the training itself and work environment variables (Baldwin &

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Ford, 1988; Bates & Khasawneh, 2005; Lim & Morris, 2006; Parry & Proctor-Thompson, 2003).

Most research evidence suggests that the work environment variables have the greatest impact on

actual transfer (Baldwin & Ford, 1988; Bates & Khasawneh, 2005; Clarke, 2002; Lim &

Johnson, 2002; Mathieu & Leonard, 1987; Mathieu & Martineau, 1997). To date, there remains

much we do not know regarding how certain factors influence transfer of training (Baldwin &

Ford, 1988; Broad & Newstrom, 1992; Lim & Johnson, 2002; Lim & Morris, 2006; Yamnill &

McLean, 2005).

Research Questions/ Problem Statement

Training is one of the most commonly employed human resource development (HRD)

strategies to improve employee and organizational performance (Dean, Dean, & Rebalsky,

1996). If the management of an organization is not satisfied with the work or product from its

employees, it must then decide to either look for people who can meet organizational needs or

improve the performance of its existing workforce (Stolovitch & Keeps, 2004). Training is often

the intervention of choice. "Education only seems to get truly valued by the top when something

goes wrong. Then it's 'Quick, do something; they all need training'" (Yantis, 2006). Even if

training is a viable and desirable option, often there is little to no evaluations of performance at

the behavior or results level (level 3 and level 4) of Kirkpatrick's 1959, 1976, and 1996 four-

level model of training evaluation (Arthur et al., 2003).

Sugrue and Kim (2004), in the ASTD State of the Industry Report (2004), stated that in

2003 the percentage of organizations conducting level 3 (behavior/transfer) evaluations was very

low; only 14% of organizations were evaluating behavior and 8% were evaluating results or

impact on human outcomes(Sugrue & Kim, 2004). Moreover, the ASTD State of the Industry

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Report (2005) affirmed that only 4% of companies reported measuring any return on investment (ROI) from training (Sugrue & Rivera, 2005).

The literature suggests that a significant portion of investment in organizational training and development is wasted as much of the knowledge and skills gained in training are not utilized by employees on the job (Broad & Newstrom, 1992; Salas & Cannon-Bowers, 2001; Tracey et al., 2001; Yamnill & McLean, 2005). To a large extent, research in the area of transfer of training/behavior has been hindered by the conceptual lack of clarity, i.e. what constitutes transfer (Baldwin & Ford, 1988; Bates, 2003). There is little evidence in the research or anecdotal training literature to convincingly show that training programs transfer knowledge or skills to the job as evidenced by significantly changed behaviors (Baldwin & Ford, 1988; Holton & Baldwin, 2003; Salas & Cannon-Bowers, 2001). The failure to translate training expenditures into high-yield improvements in on-the-job behavior and performance is a serious problem for organizations that spend billions of dollars each year on training and development (Awoniyi et al., 2002; Baldwin & Ford, 1988; Salas & Cannon-Bowers, 2001; Subedi, 2004, 2006). In a yet-to-be-published study, Bersin (in press) finds that there is an inverse relationship between the most valued measures sought from training and what is actually measured. Bersin (2006, p. 22) states that the common lack of integration between training and job performance makes it almost impossible to obtain any meaningful data on the business impact of training (Bersin, 2006). The question arises: how should administrators of organizations approach this problem?

Performance technologists and trainers are unable to estimate with any degree of certainty what percentage of training really transfers (Foxon, 1993). Some researchers have suggested that even when training is necessary, there are inhibiting factors that hinder transfer initiation and impact the degree of transfer that eventually occurs (Baldwin & Ford, 1988). In an

attempt to clarify the transfer issue, Broad and Newstrom (1992) examined variables inhibiting transfer. Broad and Newstrom (1992) used surveys to study individual and environmental factors in a systemic way and identified nine inhibiting ones. These are: (1) lack of reinforcement on the job; (2) interference from immediate (work) environment; (3) non-supportive organizational culture; (4) trainees' perception of impractical training programs; (5) trainees' perception of irrelevant training content; (6) trainees' discomfort with change and associated effort; (7) separation from inspiration or support of the trainer; (8) trainees' perception of poorly designed/delivered training; and (9) pressure from peers to resist changes. Hence, what Broad and Newstrom (1992) discovered through their international investigation were both individual and environmental inhibitory factors. Their approach, through empirical activities involving training specialists, practitioners, trainees, and organizational management, has led to identification of nine key factors that appear to have a strong influence on the degree of occurrence of transfer. For the purpose of this study, these factors have been changed into positive statements. A careful review of literature revealed that there were hardly any follow-up empirical studies on Broad and Newstrom (1992) transfer of training findings. Hence, this study examined the relationship between Broad and Newstrom's (1992) nine factors and transfer of what was learned by fire fighters in HazMat training to the actual workplace. In particular the general question investigated in this study included the following:

The Research Question

The two research questions were:

1. Do the nine individual Broad and Newstrom (1992) factors vary in their degree of influence on transfer of training?

2. Does the degree of influence of the nine individual Broad and Newstrom (1992) factors on transfer of training vary with the work context?

Significance of This Study

Training is an intervention directed at improving an employee's knowledge, skills, and attitudes in the workplace. Awoniyi et al. (2002) stated that it is used to achieve a 'fit' between the person and the requirements of a job. Broad and Newstrom (1992) confirmed that most investments in training and development are wasted because the knowledge and skills gained in training are not fully applied on the job.

Performance technologists and trainers are also not able to estimate with any degree of certainty what percentage of training really transfers (Foxon, 1993). Many researchers believe it is extremely low and that much of it is extinguished over time (Broad & Newstrom, 1992; Georgenson, 1982; Holton & Baldwin, 2003). Bates (2003) acknowledged that there is very little known about how factors and processes work together to facilitate or inhibit training transfer (Bates, 2003). Based on his research, Marx (1986) concluded that transfer failure may be as high as 90% for some training courses (Foxon, 1993). From surveys of American, British, and Indian managers who attended management education programs, Baumgartel, Reynolds, and Pathan (1984) reported that no more than 50% reported any significant attempt to transfer the training to the job environment. In another similar study, only 35% of the trainees attempted to apply the learning on the job, and the degree of transfer maintenance was considerably lower than that of transfer initiation, which itself was very low (Huczynski & Lewis, 1980). Practitioners have tried to explain this low level of transfer in terms of inhibiting factors that are a hindrance to transfer initiation and impact the degree of transfer that eventually occurs.

Even though a number of individual and situational variables considered to influence transfer have been identified, a limited number of strategies that influence transfer have been advocated, and there are few documented empirical examples of improved transfer in corporate training settings (Tannenbaum et al., 1991; Tannenbaum, Cannon-Bowers, Salas, & Mathieu, 1993). Despite this dearth of examples, there continues to be a scarcity of information for discussions in organizations on how to manage the training process to maximize transfer (Burke & Baldwin, 1999).

In their review of literature, Salas and Cannon-Bowers (2001) concluded that improved training comes at a cost, and the interest in not only training but also in learning technologies and performance-improvement processes, services, and practices has grown over the years. There is a growing concern among organizations that the investment made in training should be justifiable in terms of enhanced organizational performance such as increases in productivity, profit, or safety; reduced error; and improved market share (Salas & Cannon-Bowers, 2001). As the interest grows for more specific information to increase transfer of learned skills and knowledge coupled with the performance implications, it appears that this study can make a useful contribution to the growing, but still weak, body of knowledge regarding transfer.

Design and Methodology

Two groups, consisting of fire-fighter trainees and their supervisors, were surveyed. The fire-fighter trainee participants completed two questionnaires. The first questionnaire required the trainees to rate the degree of presence/absence of each of the nine Broad and Newstrom (1992) factors. The second one required reporting on the degree to which trainees actually applied to the job what they had learned during the training. The supervisors also replied to a

questionnaire rating the presence/absence of each of the nine Broad and Newstrom (1992) factors. The supervisor and trainees' questionnaires generated data for both groups. Quantitative methods were used to analyze the responses of fire-fighter trainees and their supervisors. There was no manipulation of the variables, as the investigation focused on the extent to which the variables were related. Multiple Regression and Correlation analysis was used to analyze the data.

Study Limitations

There are several limitations to this research study. First, the sample was one of convenience and, therefore, not as strong as using random sampling procedures. Second the access to a variety of fire departments was not easy. Fire departments were invited to participate based on the number of recent participants to the Hazardous Materials training program delivered by the IAFF. Both local unions and management had to accept participation in the study. Availability of resources to support the study had to be present to make appropriate fire fighter and supervisor subjects available and for security purposes. Third, the study's findings were based on supervisors' and trainees' self-reported perceptions, which is unavoidable as it impossible to observe application on the job and, as with any self-report approach, the subjects may have overestimated or underestimated the perception of factors influencing transfer of training. Fourth, it could be possible that there are other unknown factors not identified by Broad and Newstrom (1992) that might have affected the degree of transfer. Fifth, the results of the study may be generalized only to those trainees and supervisors with similar characteristics held by participants. Finally, validity of the study relies on participants' honest responses to the questionnaires.

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Assumptions

The assumptions of the study were that the sample participants answered honestly; the participants' responses were based on their beliefs and knowledge and not influenced by work context or social pressures; the respondents did not have any ulterior motive for answering, other than that their responses would contribute to the growing body of research on performance and productivity.

Definition of Terms

For this study, the following definitions were used:

Behavior: an action in response to internal and external simulation. Behavior in an organizational setting is a function of an individual's ability, his/her motivation, and the constraints inherent in the situation (Barrick & Mount, 2004).

Benchmarking: the process of identifying exceptionally successful practices in use by other individuals, units, or organizations and using those ideas to upgrade one's own practices (Broad & Newstrom, 1992).

Far Transfer: when prior learning is applied to a new situation in which there does not appear to be any clear similarity with the original setting (Barnett & Ceci, 2002).

Feedback: systematic and constructive provision of performance-related information to trainees on the quantity and quality of their use of newly gained knowledge and skills (Broad & Newstrom, 1992; Kuchinke, 2000).

Horizontal Transfer: transfer across different settings or contexts at the same level. It occurs when trainees can apply what has been learned in the training environment to a similar work situation (Kozlowski, Brown, Weissbein, Cannon-Bowers, & Salas, 2000).

Human Resource Development: profession that helps organizations to enhance workforce effectiveness and productivity through learning and other performance improvement activities (Broad & Newstrom, 1992).

Human Performance Technology: systematic, systemic, and scientific approach to attaining desired accomplishment from human performers by determining the gaps in performance and designing cost-effective and efficient interventions (Broad, 2005; Harless, 1995).

Interference from Immediate (work) Environment: obstacles (real or imagined) preventing trainees from applying skills and knowledge in the workplace (Kozlowski & Salas, 1997).

Instruction: structured activities that aim at learners being able to generalize beyond the specifics of what has been taught (Stolovitch & Keeps, 2004).

Near Transfer: extent to which individuals apply what was acquired in training to situations very similar to those in which they were trained (Barnett & Ceci, 2002; Broad & Newstrom, 1992).

Negative Transfer: situation in which prior learning interferes with the acquisition of new knowledge or skills (also known as proactive interference) (Broad & Newstrom, 1992).

Organizational Climate: includes work and environmental factors that inhibit, reduce, or promote training transfer (Lim, 2006).

Peer: person of equal standing to another; for this study, a coworker (Cromwell, 2000).

Peer Support: extent to which coworkers reinforce and encourage the use of learning on the job (Cromwell, 2000).

Perception: cognitive event by which a person gives meaning to each situation/stimulus accordingly to his/her values, beliefs, and attitudes (Klimoski & Donahue, 2001).

Performance: improved competence and productivity of individuals, teams, and organizations, which result in an increase in the levels of satisfaction for clients, customers, and community members; more profits and/or cost effectiveness; and higher quality of products and services (Broad, 1997).

Positive Reinforcement: process by which a favorable consequence is systematically provided to a trainee or is contingent upon the demonstration of a desired behavior (Broad & Newstrom, 1992; Clarke, 2002).

Positive Transfer: extent to which individuals use on the job what they learned in a training situation (Wexley & Baldwin, 1986; Wexley & Latham, 1981).

Return on Investment: monetary value of organizational results due to training compared with costs (Broad, 2005).

Self-efficacy: belief in one's ability to master and apply back to the job skills and knowledge gained in training sessions (Brown & Morrissey, 2004).

Supervisor: an individual in an organization with authority and responsibility for accomplishing an objective or mission through the efforts of others (Broad & Newstrom, 1992).

Supervisor Support: defined as the degree to which the trainee's supervisor helps set performance goals, provides opportunities to use newly learned skills, and recognizes and rewards the use of the skills on the job (Foxon, 1993; Short, 1997).

Supportive Organizational Culture: extent to which supervisors/management, work groups, and trainers behave in a way that optimizes trainee's use of knowledge, skills, and attitudes gained in training on the job (Lim & Morris, 2006).

Trainee: the learner, usually an employee, whose training, education, and development are sponsored by the organization to improve organizational functioning and productivity (Broad & Newstrom, 1992). For the purpose of this study, this individual is a participant of a skill-based specialized hazardous material training program conducted by the International Association of Fire fighters (IAFF), a union organization of which all of the trainees are members.

Trainer: human resource development professional, either internal or external to the organization, who analyzes performance problems and designs and delivers, evaluates, manages, and /or supports training in a variety of ways (Broad & Newstrom, 1992).

Training: made up of structured learning experiences provided primarily by employers for employees and designed to develop new skills and knowledge for use on the job (Broad, 2005).

Transfer Climate: general construct that has been used to describe those features of the work environment that directly influence the generalization and maintenance of knowledge and skills learned during training (Baldwin & Ford, 1988).

Training Evaluation: system for measuring changes due to training interventions; most important to determine whether trainees have achieved desired learning outcomes (Goldstein & Ford, 2002).

Transfer of Training: effective and continued application, by trainees to their job, of knowledge and skills gained in training–both on and off the job (Broad & Newstrom, 1992; Subedi, 2004).

Transfer of Training to Performance: full application of new knowledge and skills to improve individual and group performance in an organization or community (Broad, 2003).

Work Environment Factors: refers to factors in the workplace that may affect individual application and maintenance of new skills learned in training (Dodson, 2004).

Validity: most important aspect to analyzing the psychometric properties of an instrument, "what" a test measures, using the relationship between performance and an observable fact as a method to determine test validity (Fraser, 1981).

Vertical Transfer: refers to transfer upward across different levels of the organizational system (Kozlowski & Salas, 1997). It is concerned with the link between individual training outcomes and outcomes or results at higher levels of the organizational system (Kozlowski et al., 2000).

Summary

The purpose of the study was to examine the influence of the nine Broad and Newstrom (1992) factors on transfer of training. The study included fire-fighter trainees and their supervisors. The problem exists when what trainees learn in training does not actually transfer to on-the-job application. In this particular instance, the implications of non-transfer carry serious consequences for both fire fighters and the public with respect to health, safety and potential fatalities. The study focused on what factors facilitate transfer of training. The hypothesis is that positive presence of the nine individual Broad and Newstrom (1992) factors relates positively to the degree to which transfer of training occurs.

In addition, although many studies have been conducted to examine the concept of transfer of training, there are very few empirical studies that have examined both individual and

environmental factors associated with transfer of knowledge and skills. Equally important, there was virtually no research that empirically verified whether the nine factors identified by Broad and Newstrom (1992) influence transfer of training. Further, studies examining the perceptions of trainees and supervisors regarding the determinants associated with lack of transfer have focused on difference in perceptions, for example, studies on perception of supervisors and trainees related to all factors (Dodson, 2004) and not at a specific group of factors such as Broad and Newstrom (1992) nine factors that might influence transfer, which is the focus of this study. By examining the impact of a specific group of factors, this research study has expanded the knowledge base on transfer of training.

CHAPTER TWO: LITERATURE REVIEW

This chapter includes a review of the research related to transfer of training, factors influencing transfer, and the importance of perceptions in the transfer of training process. It begins with performance and transfer of training along with concerns related to these. It includes a large number of research studies and other writings related to transfer of training. However, its main focus is on Broad and Newstrom's (1992) nine transfer of training factors. The chapter concludes with a summary of the contents that have been has reviewed.

Performance and Transfer of Training

Technological advances and evolving job requirements have resulted in corporations spending millions of dollars on training, expecting that the outcome of this enormous investment will be a work force that is fully capable of meeting organizational requirements. However, researchers have concluded that, while training, in general, can be useful, it does not necessarily lead to increased job performance nor does it guarantee that trainees will meet organizational goals (Bates, Holton, & Seyler, 1997). This realization has caused the effectiveness of training to become a significant corporate issue. Researchers have determined that there are a number of reasons why training often has a minimal impact on job performance. One of the main reasons is the inability or the unwillingness of the employee to transfer the knowledge and skills gained in training to the actual job. This transfer failure has led to a demand for further research to identify factors that inhibit or, at the least, mitigate the successful transfer of training to the workplace (Baldwin & Ford, 1988). That is the focus of this study.

An examination of the literature on this subject immediately discloses a concern about the effectiveness of the investment in training with respect to its actual return (Kontoghiorghes,

2001). Some researchers estimate that less than 30% of workplace learning translates into improved job performance (Broad & Newstrom, 1992). The literature also suggests that there could be a host of reasons for such a low transfer rate, including unclear reasons for the training, training the wrong people, lack of organizational support, lack of reinforcement on the job, interference from the immediate work environment, and peer pressure (Baldwin & Ford, 1988; Baldwin & Magjuka, 1991; Broad & Newstrom, 1992; Hicks, 2006; Lim & Morris, 2006; Salas & Cannon-Bowers, 2001; Subedi, 2006; Taylor, 2000; Yamnill & McLean, 2005).

The concept of transfer is a most perplexing one when related to learning and performance. A recent resurgence in the fields of instructional technology, educational psychology, learning, and human performance has brought this concept back into the limelight (Haskell, 2001). One must understand the definition of the transfer of training to effectively research it. Although there are many definitions of transfer of training, it is generally agreed that it is the degree to which individuals effectively apply the skills and knowledge gained in a training situation to the work setting (Baldwin & Ford, 1988). Transfer requires that the trainees apply, generalize, and maintain new knowledge and skills across different work-related situations (Baldwin & Ford, 1988; Ford & Weissbein, 1997). Goldstein (1986) defines training as the systematic acquisition of skills, rules, concepts, and attitudes that result in improved performance in another environment. The main goals of training are to help trainees gain knowledge, develop positive attitudes, and apply what they learned to real-life situations. To summarize, transfer of training is the effective and continued application on the job of the knowledge and skills gained in training both on and off the job (Broad & Newstrom, 1992). The implications of this definition are that several factors influence effective transfer of knowledge and skills to the workplace setting (Cromwell, 2000). This study attempts to identify the relevant

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factors whose presence or absence helps predict the degree to which transfer takes place and

their roles as well as their relative importance in the transfer process. This study also attempts to

expand the overall understanding of the impact of these relevant factors on the transfer.

One of the factors that affect the transfer of training is the organizational process in

which different stakeholders, from higher management to trainees' peers, manifest their vested

interests in the outcomes of training programs (Broad & Newstrom, 1992; Kim, 2004). There is

an implicit organizational partnership that requires an equal distribution of concern for the

trainees and adequate involvement of trainees, their managers or supervisors, peers, and trainers

at all stages of the process—before, during, and after a training program (Broad & Newstrom,

1992). Transforming newly acquired knowledge and bridging the "knowing-doing" gap is

essential to organizational success because growth and survival depends on adaptation to

environmental and organizational changes (Pfeffer, 2000; Pfeffer & Sutton, 1999; Zander &

Kogut, 1995).

In addition to being an organizational process, transfer of training can be viewed and

categorized in a variety of ways. Near transfer, sometimes referred to as lateral transfer, occurs

when the stimulus conditions in a new context resemble, but are not identical to, those

encountered in a prior learning experience. Far transfer, on the other hand, occurs when prior

learning is applied to a new situation in which there does not appear to be any obvious similarity

with the original learning setting (Subedi, 2004). Some researchers have classified transfer as

horizontal transfer and vertical transfer. Horizontal transfer refers to transfer across different

settings or contexts at the same level. It has been the primary focus in measuring effectiveness in

traditional training models. Vertical transfer refers to transfer across different levels of the

organizational system. It is concerned with the link between individual training outcomes and

outcomes or results at higher levels of the organizational system (Kozlowski et al., 2000; Kozlowski & Salas, 1997). This study focuses on horizontal transfer and relies on the perception of trainees and supervisors as a means to measure whether nine individual factors identified by Broad and Newstrom (1992) influence the degree to which trainees apply their knowledge and skills in the workplace.

<div align="center">Importance of Perception</div>

Perception, as an aggregation of information from a group, can be taken as a legitimate measure of transfer because group decisions are often better than decisions made by an individual (Surowiecki, 2004). Surowiecki (2004) in his book *The Wisdom of Crowds* argues that large groups of people are smarter than an elite few, no matter how brilliant—large groups are better at solving problems, fostering innovation, coming to wise decisions, and even predicting the future. Surowiecki states that for such decisions to be made, the crowd needs to be diverse, decentralized, and independent. His volume presents numerous case studies and research findings to illustrate its argument and touches on several fields, primarily economics and psychology. Based on Surowiecki's (2004) arguments and the constraints of the firefighting context in which this study takes place, trainees' and supervisors' perceptions are used as measured and quantified indicators of transfer.

In this study, because group perceptions consist of individual opinions, individuals were first polled to assess the overall view of the group. Research literature suggests that individuals respond to particular environments based on how they perceive them (James & McIntyere, 1996). According to Holton, E. F., Bates, R. A., and Ruona, W. E. A. (2000), it is most appropriate to assess individual perceptions of the transfer environment because those

perceptions will mold individual behaviors which ultimately define group behavior. The results

of the study performed by Tziner, Haccoun, and Kadish (1991) showed that the trainee's

perception could be used as a measure of transfer of knowledge and skills and could help

determine the extent of transfer occurrence.

Concerns in Transfer of Training

Due to emerging technologies, new competitive markets, globalization, and work-force

diversity, the workplace has experienced massive changes (Hicks, 2006). As a result, consumers

now have more choices with greater convenience, businesses have more competition, and whole

communities have a better quality of life (Druckman & Bjork, 1991). These types of changes

have required organizations to increase their training expenditures to meet the new demands

(Sugrue & Rivera, 2005). Annually, U.S. corporations spend billions of dollars on training and

development interventions targeted at improving employee performance (Baldwin & Ford, 1988;

Broad & Newstrom, 1992; Noe 1986). Even though American industries spend $56 billion a year

on formal employee training (Kornik, 2006), some studies suggest that not more than 10% of

these expenditures actually result in transfer to the workplace (Baldwin & Ford, 1988; Ford &

Weissbein, 1997; Georgenson, 1982). Stolovitch and Maurice (1998) found that selecting the

wrong persons to attend training, not enunciating clear expectations from supervisors, not

providing on-the-job support, not ensuring post-training monitoring, not providing the resources

to implement new skills, and ignoring incentives to apply new skills and knowledge were the

primary causes of wasted training expenditures. These results were similar to what Newstrom

(1985) also discovered: lack of reinforcement on the job; interference from the immediate work

environment; non-supportive organizational culture; trainees' discomfort with change; separation

from trainer "inspiration;" trainees' perception of poorly designed training; and peer pressure to resist applying new skill and knowledge (Stolovitch, 2000).

There are some estimates that organizational investment in training activities has recently reached $200 billion annually when one includes informal on-the-job training (Awoniyi et al., 2002; Bassi & Van Buren, 1998; Van Buren & Erskine, 2002). Investing in on-the-job training has not only created a growing interest in training but also in a renewed interest in learning technologies and performance-improvement processes, practices, and services. The American Society for Training & Development (ASTD) study that tracks training expenditures annually shows that the push toward spending more on training and development has been consistent for a decade. The ASTD data are presented from three samples against which workplace learning and performance (WLP) professionals can benchmark learning and investment practices in their organizations. The Benchmarking Survey (BMS) sample is the largest and includes the broadest range of U.S. organizations in terms of size and industry. The Benchmarking Forum (BMF) sample represents very large, mostly U.S.-based corporations. The third sample represents the group of organizations that won ASTD BEST Awards; this award recognizes organizations that demonstrate a significant link between learning and performance (Sugrue & Rivera, 2005). According to ASTD's State of the Industry Report 2006, annual spending on formal training and development by organizations is now at $56 billion. This increase is approximately 7% above the $51.1 billion that was spent on training in 2005 (Kornik, 2006):

- The average annual expenditure per employee in ASTD's BMF organizations was $1,424 per employee in 2005, an increase of 4% from the previous year. The average expenditure per employee for BEST organizations increased 3.7% to $1,616 in 2005.

For BMFs in 2005, the payroll expenditure percentage did not change from the previous year, remaining at 2.20 % of payroll.

- The average expenditure as a percentage of payroll among 2005 BEST Award winners was lower in 2005, at 2.72 %, than in 2004 (2.86 %). The average number of hours of formal learning per employee in BMFs increased from 35 hours annually per employee in 2004 to 41 hours per employee in 2005. In the BEST organizations, the average number of learning hours per employee rose from 36 in 2004 to 43 in 2005.

- In 2005, the average cost per learning hour delivered fell to $1,101 per hour in the BMF sample, down from $1,113 in 2004. For BMF organizations, the average cost per learning hour received decreased from $54 in 2004 to $42 in 2005. BEST winners' average cost per learning hour received also fell, from $58 to $48. However, the average cost per learning hour provided in BEST organizations increased from $1,092 in 2004 to $1,403 in 2005 (Rivera & Paradise, 2006).

To summarize, these figures indicate that organizations allocate enormous amounts of resources to workforce training, obviously in anticipation of high returns. Yet, the literature suggests that there is a low rate of transfer to the workplace of skills and knowledge purportedly acquired from this extensive training effort. How does one explain this apparent paradox?

Low Rate of Transfer

The investments made on training are huge, yet evidence of positive training transfer in the workplace remains minimal. Even well-designed and well-delivered training often leads to no change in employee behavior or performance (Broad & Newstrom, 1992). Esque and McCausland (1997) investigated the transfer of a skill used to train 600 managers at Intel Corporation. After the managers were trained on the Breakthrough System, Esque and

McCausland asked the Intel Corporation managers to provide examples of how they used the application. Approximately 20% said that they had used the Breakthrough System skill set in their work. However, when Esque and McCausland investigated more deeply to confirm the reported use, they found only four examples of managers that actually applied the Breakthrough System; this number equaled less than 1% of the managers who had been trained (Esque & McCausland, 1997).

On the other hand, some studies do show a few instances of trainees actually using the skills and knowledge they learned to a large degree; in one case, significant transfer occurred when the training was provided when the trainees were given the appropriate time on the job to apply what they had learned (Curry, Caplan, & Knuppel, 1994; Georgenson, 1982). In their study, Huczynski and Lewis (1980) found that 35% of the trainees attempted to apply the learning acquired as a result of a training program to the job, although the degree of transfer maintenance was considerably lower than the transfer initiation, which was still relatively low. In another study, Baumgartel, Reynolds, and Pathan (1984) found that approximately 50% of the trainees reported significant attempts to transfer the training to the job environment. Over the years, there have been studies showing substantial rates of transfer. In one interesting report, researchers stated that the transfer of training rate in a Canadian organization was 62% immediately after training, 43% six months later, and 34% one year after attending a training program (Saks & Belcourt, 1997). It is important to note that the studies cited here are by far the exceptions rather than the rule; the preponderance of studies indicates far lower transfer rates.

Lack of Measurement of Training and Low ROI

Given the sizeable cost to provide training, the constant emphasis on organizational efficiency, and the lack of application on the job, it is important for organizations to measure the

impact of their training efforts. Researchers and business owners alike are worried about what they can do to increase the return on their investment (ROI) (Broad & Newstrom, 1992; Broad, 2005). Over the last several decades, numerous theoretical frameworks and models have been offered and the training field has been energized by these. This has led to a limited number of empirical studies (Salas & Cannon-Bowers, 2001).

Organizations usually use some form of Kirkpatrick's (1959a, 1959b, 1960a, 1960b) four-level training evaluation model. The Kirkpatrick model categorizes training outcomes into the following four "levels (Kirkpatrick, 1996):"

- Trainees' *reaction* (Level I) refers to how well trainees liked a training program and found it useful.

- Trainees' *learning* (Level II) refers to facts, principles, and techniques that were acquired by the trainees.

- Trainees' *behavior* (Level III) refers to change in behavior on-the-job observed or reported as a result of training.

- Trainees' *results* (Level IV) refer to improvement in organizational profits, sales, production, and turnover due to training.

Most of the training evaluations conducted in organizational settings take place at Kirkpatrick's Level, I the reaction level.

The ASTD State of the Industry Report (2004) reported that the percentage of organizations doing Level I (reaction) evaluation remained relatively steady: 77% in 1999 and 74% in 2003. Because most of the data were based on self reports, it was likely that the percentages were somewhat overstated. The percentage of organizations assessing Level II (learning), Level III (behavior/transfer), and Level IV (results/impact) evaluations declared in

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2003 were: 31% evaluated post-training learning, 14% evaluated behavior, and 8% evaluated results or impact on organizational results (Sugrue & Kim, 2004). The results did not improve in the following year.

The ASTD State of the Industry Report (2005) affirmed that only 4% of companies reported measuring any return on investment (ROI) from training. For instance, the ASTD (2005) report revealed that 91.3% of benchmarking organizations used reaction measures, compared with 53.9% that used learning, 22.9% that used behavior/transfer, and 7.6% that used results to measure their ROI. The effort to calculate projected ROI for those organizations was a low 3.2%, and those measuring actual ROI was 2.1% (Sugrue & Rivera, 2005).

In their review of past data, Sugrue and Rivera (2005) indicated that most companies conduct Kirkpatrick Level I (reaction) evaluations, which rarely show variance because most trainees react positively to all training experiences, and that such measures are essentially unrelated to the other levels of training success such as Level II (learning) and Level III (behavior). In their study, Tan, Hall, and Boyce (2003) collected measures of reaction, learning, and behavior to determine the degree to which various deliveries of a training program were effective. They examined the relationship among the three different types of evaluation criteria. The results showed that trainees who disliked the training program showed higher levels of learning; there was also a positive correlation between pre-training knowledge and the negative evaluation dimension. A meta-analysis by Alliger, Tannenbaum, Bennett, Traver, and Shotland (1997) examined the association between reactions to training received, learning attainment, and subsequent job behavior, the first three levels of Kirkpatrick's (e.g. 1959, 1987) model of evaluation. In this study, they found that the mean (sample-size weighted) correlation between reactions and immediate learning was only .07. This result confirms Alliger and Janak's (1989)

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findings that immediate training reactions should not be used blindly as a substitute for assessing training content retention. Using positive reactions alone to assess learning transfer correlated, on average, just about zero with immediate learning (Alliger & Janak, 1989). Thus, training evaluations that rely only on positive reaction measurements are not reliable estimates of training success (Haccoun & Saks, 1988, 1998). It is more important to determine whether behavioral skills are displayed by trainees within the training environment and on the job (Alliger et al., 1997).

In their transfer-of-training meta-analysis, Salas and Cannon-Bowers (2001) found that progress had been made since Ford and Weissbein's (1997) review of literature because more studies existed that used complex tasks with diverse samples that actually measured transfer over time as suggested by Broad and Newstrom (1992). However, they also found that most studies used surveys as the preferred method for measuring transfer. The researchers suggested that other methods need to be developed and used to evaluate training effectiveness. In addition, more vertical transfer level studies are necessary to strengthen the links between learning outcomes and organizational effectiveness (Salas & Cannon-Bowers, 2001).

Human performance technologists (HPTs) have suggested that inadequate front-end analyses (Stolovitch & Keeps, 1999; 2004) and the lack of proper training measurements are major causes of improper training selected to improve performance and of the inability to detect the impact of training. While analysis and measurement are legitimate issues, the main focus of this study is to understand why results are not being obtained from training when it is implemented and why there is a seemingly poor application of training in the workplace.

Factors Influencing Transfer

Holton, Bates, and Ruona (2000) concluded that organizations eager to enhance their ROI from training must understand all of the factors that influence transfer. However, transfer of training still lacks a coherent and uniform research framework (Haskell, 2001); therefore, it is necessary to identify one in order to validate further research in this field (Ford & Weissbein, 1997). This framework is difficult to conceptualize since there is an ongoing argument about the nature, terminology, theoretical basis, types and focus of transfer; the argument includes the extent of application, and the role and relative importance of the trainee/trainer/context variables (Baldwin & Ford, 1988; Broad & Newstrom, 1992; Ford & Weissbein, 1997; Gist et al., 1990). Increasingly, there have also been industry demands for training, and education entities to develop a framework that will ensure a more successful transfer of training to improve performance and productivity in the workplace (Haskell, 2001).

Transfer of knowledge and skills from the training environment to the workplace also involves a host of training-related factors such as trainee characteristics, work environment variables, design, content, and curriculum (Baldwin & Ford, 1988; Brinkerhoff & Montesino, 1995; Noe, 1986). Before 1984, the focus of most training research studies was instructional design, with very little attention placed on individual and situational training transfer factors (Hicks, 2006). Over the past 20 years, researchers have uncovered factors equally important, if not more important, than design in obtaining training transfer results (Baldwin & Ford, 1988; Broad & Newstrom, 1992; Broad, 2005; Salas & Cannon-Bowers, 2001).

Several previous studies investigated the impact of individual and work environment characteristics on training effectiveness (Huczynski & Lewis, 1980; Mathieu et al., 1992; Van

der Klink, Gielen, & Nauta, 2001). Baldwin and Ford (1988) conducted a comprehensive review of the literature on transfer of training and developed a model consisting of trainees' characteristics (ability and aptitudes, personality, and motivation) and work environment variables (supportive organizational climate, discussion with supervisor, opportunity to use knowledge and skills, and post-training goal setting and feedback) that may support transfer of training. Trainee characteristics included their abilities and aptitudes, personality, and motivation. Work environment variables included supportive organizational climate, discussions with supervisors, opportunity to use knowledge and skills, and post-training goal setting. Empirical studies after Baldwin and Ford's (1988) review have contributed to improving knowledge about transfer of training, but these studies do not provide a broad perspective of the subject as all the factors are not accounted for. Some researchers have worked on individual factors while others have looked at environmental factors. Ford and Weissbein (1997) reviewed 20 publications and found that some progress had been made to understand the influence of work-environment variables on transfer outcomes. However, after their review, they concluded that the studies they had focused on variables in only one of three areas of training input: training design, trainee characteristics, or work environment. Other research studies have attended to such variables as trainee characteristics, e.g. skills and ability (Tannenbaum & Yukl, 1992), motivation (Noe & Schmitt, 1986) or the work environment management support (Broad & Newstrom, 1992; Tannenbaum & Yukl, 1992). Tannenbaum & Yukl (1992) have suggested that more work is needed in developing strategies to actively intervene to change environmental factors in the workplace and to examine their impact on learning and transfer.

In another literature review, Axtell and Maitlis (1997) identified major predictors of successful transfer of training. They found that these predictors were supported by studies done by other researchers (Axtell & Maitlis, 1997). The predictors included:

- General transfer of training climate (Tracey, Tannenbaum, & Kavanagh, 1995)

- Principles of learning used (Decker & Nathan, 1985)

- Relevance or usefulness of the course to the trainee's job or course characteristics (Axtell & Maitlis, 1997; Baldwin & Ford, 1988; Goldstein, 1986)

- Self-efficacy (Ford, Quinones, Sego, & Sorra, 1992; Gist et al., 1990; Tannenbaum et al., 1991)

- Motivation (Mathieu et al., 1992; Noe, 1986; Tannenbaum et al., 1991)

- Job involvement (Mathieu et al., 1992; Noe & Schmitt, 1986)

- Ability (Robertson & Downs, 1979), managerial support (Ford, Quinones, Sego, & Sorra, 1992; Huczynski & Lewis, 1980)

- Amount of control or autonomy available in an employee's job (Huczynski & Lewis, 1980; Vandenput, 1973)

Even though these predictors had been identified by researchers as being influential, there is still very little work that studies these factors empirically. In addition, very few studies focus on the multiple influences that factors related to the work environment and trainee characteristics have on the transfer process (Tracey et al., 1995). To date, most of the studies have concentrated only on course factors (Axtell & Maitlis, 1997; Baldwin & Ford, 1988).

Traditional studies on training transfer have examined trainee characteristics, training design, and work climate variables as separate influences on training transfer. At the same time, these studies have attempted to validate the influence of each of these independent variables on

training transfer (Baldwin & Ford, 1988; Ford & Weissbein, 1997; Holton, Ruona, & Leimbach, 1998). Mathieu, Tannenbaum, and Salas (1992) examined a model that portrayed the relationship between individual and situational influences on both training motivation and effectiveness. The results of the study showed a link between learning and performance but only provided minimal support in linking individual and situational characteristics and training motivations. In addition, Bates, Holton, Seyler, and Carvalho (2000) investigated the effect of content validity, the opportunity to use learning, and four interpersonal support factors on the supervisory ratings of how trainees applied standard operating procedures learned from computer-based training. The subjects of the study were 73 production operators in two production departments that manufactured highly hazardous chemical products. In the full regression model, content validity, peer support, change resistance, and supervisor sanctions emerged as significant predictors of performance ratings, i.e. R^2 was 0.43. The findings highlight the value of setting up valid training content and cultivating supervisor and coworker support for the transfer of workplace learning (Bates, Holton, Seyler, & Carvalho, 2000).

Few researchers have investigated integrated approaches, studied the empirical assessment of cross-relationships, or considered the influence of trainee characteristics, work and job experiences, position, and organizational climate on transfer outcomes (Tracey et al., 2001). Research suggests that transfer system factors may operate together as a group to influence transfer (Lim & Morris, 2006; Yamnill & McLean, 2005). Some elements might be interchangeable or compensate for missing elements. Holton, Chen, and Naquin (2003) suggest that a strong reward system might compensate for poor peer support or transfer design. The need to identify the mechanisms that link related elements to influence training transfer has been of vital concern among researchers for many years (Kozlowski & Farr, 1988).

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In an attempt to clarify the transfer issue, two researchers, Broad and Newstrom, (1992) investigated factors that inhibit transfer. They used surveys to examine individual and environmental factors in a systemic way and identified nine inhibiting factors. They determined that these are: (1) lack of reinforcement on the job; (2) interference from the immediate (work) environment; (3) non-supportive organizational culture; (4) trainees' perception of impractical training programs; (5) trainees' perception of irrelevant training content; (6) trainees' discomfort with change and associated the effort; (7) separation from the inspiration or support of the trainer; (8) trainees' perception of poorly designed/delivered training; and (9) pressure from peers to resist changes. This study focuses on the presence of these nine factors and the degree to which they influence transfer.

Broad and Newstrom Transfer of Training Factors

While the research literature contains many studies directed at training strategies and methodologies, there are comparatively few studies about the perceptions of supervisors and trainees on factors that influence the transfer of training. Researchers have argued that trainee characteristics and trainees' perceptions of training should be studied more extensively (Tannenbaum & Yukl, 1992). Understanding how the trainees' perceptions of these factors influence their application of knowledge and skills in the workplace can help an organization invest more appropriately for a greater return on training investment. This knowledge would allow organizations to more effectively manipulate and control the environmental factors that affect the transfer of training, such as supervisor, job, and organizational support (Baldwin & Ford, 1988; Baldwin & Magjuka, 1991; Clarke, 2002; Dean et al., 1996; Facteau, Dobbins, Russell, Ladd, & Kudisch, 1995; Klimoski & Donahue, 2001; Lim & Johnson, 2002; Russell,

Terborg, & Powers, 1985). It is important to examine the individual factors that mold a person's attitude and affect his behavior as well as facilitate and inhibit elements in the environment that can potentially affect whether or not transfer occurs. To this end, what follows is a more thorough study of each of the nine Broad and Newstrom (1992) factors.

Reinforcement on the Job

Reinforcement on the Job occurs when the management/supervisors provide recognition or rewards in the form of incentives, praise, advice, coaching, and references for promotion for those who demonstrate on-the-job application. Most organizations spend huge amounts of money to increase employee productivity. However, investing money in the productivity of employees is not effective if the supervisor/manager does not recognize or reward those who apply what they have learned. When workers receive recognition or a reward from the supervisor/manager for applying newly learned knowledge and skills, they are likely to become more motivated to apply what they learned in the training environment to the workplace. Moorhead and Griffin (1992) found that when trainees are content and think that rewards are attainable, they value the reward system and may transfer learning from training to a greater degree than those without such a reward system (as cited by Lim & Morris, 2006; Moorhead & Griffin, 1992).

Employees are motivated by both intrinsic and extrinsic rewards. Intrinsic rewards are non-monetary rewards for accomplishments that are valued internally; extrinsic rewards are externally administered rewards. Stolovitch, Clark and Condly (2002), in their Performance Improvement by Incentives (PIBI) model, suggest that the greater the utility value a performer attributes to a task, the more strongly the intrinsic reward plays a role in reinforcing accomplishment. The less utility value the performer attributes to a task, the more extrinsic rewards play a role in eliciting performance (Stolovitch, Clark, & Condly, 2002). In this study,

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the focus is on intrinsic rewards. Employees want to feel that they are performing well and to feel that they are recognized and valued for their ability to apply newly learned skills and knowledge. When a supervisor recognizes a worker's accomplishments and coaches the worker to apply newly learned skills in ways the worker values, performance improves and the skill and knowledge transfer have a higher probability of increasing. For example, Andrzejewski, Kirby, Morral, & Iguchi (2001) examined the effects of feedback and positive reinforcement interventions on drug treatment counselors' behavior. Initially, counselors were provided with detailed feedback about how well they adhered to the prescribed counseling protocols. Subsequently, the same counselors participated in a random drawing for cash prizes. The counselors' protocol adherence performance measures increased to 71% during the feedback intervention and to 81% following the drawing for cash. Each counselor's performance improved during both intervention conditions (Andrzejewski, Kirby, Morral, & Iguchi, 2001).

In another study, Kontoghiorghes (2001) concluded that environmental factors, such as the opportunities for advancement and rewards for teamwork, were predictors of an increase in worker motivation. Moreover, the expectation of using new knowledge and skills, job importance, growth opportunities, and organization commitment was found to correlate significantly with the motivation to transfer learning to the workplace (Egan, Yang, & Bartlett, 2004; Kontoghiorghes, 2002).

Two studies shed additional light on the impact of lack of reinforcement. Taylor (2000) identified the common types of transfer strategies used by the key stakeholders in 11 different workplace education programs in Canada. The results of the study revealed that trainers considered the lack of reinforcement as the most significant barrier to motivating trainees to apply training to their jobs (Taylor, 2000). Clarke (2002) examined the work environment factors

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that influenced training transfer in a United Kingdom social services agency. He conducted semi-structured interviews of workers six months after they had received training. The study reported that most of the trainees indicated that a lack of reinforcement from supervisors and peers impeded their motivation to apply the recently taught skills to their jobs. The trainees reported that they found supervisors' feedback to be general; the feedback did not focus on applying the training to improve or enhance any specific skills. To support his findings, Clarke (2002) cited others studies where supervisors did give follow-up feedback and encouragement that was specific to the training; in such cases, trainees reported greater transfer rates of skills and knowledge to the workplace (Clarke, 2002).

The work of Condly, Clark, and Stolovitch (2003) establishes the importance of team-directed incentives. In their meta-analysis, the researchers reviewed 45 empirical studies on the effects of incentives on workplace performance. They concluded that team-directed incentives had a greater positive effect on performance compared to individually-directed incentives. In addition, tangible incentives such as gifts and travel and monetary rewards resulted in higher performance gains than non-monetary rewards (Condly, Clark, & Stolovitch, 2003).

The research studies cited above indicate that reinforcement on the job motivates the trainees to use newly learned skills in the workplace. The offer of rewards, special acknowledgments, and promotional preference to trainees who demonstrate new behaviors appear to lead to transfer and improved performance.

Little Interference from Immediate (work) Environment

Workplace interference is an externally generated, randomly occurring, discrete event that breaks the continuity of cognitive focus on a primary task (Corragio, 1990). This definition means that an interruption is created by another person or event, and the timing of an interruption

is not in the control of the individual. A normal work environment is made up of fragmented activities that occur at an unrelenting pace (Mintzberg, 1973) and as a series of disjointed activities and interruptions throughout the work day (Carlson, 1951; Stewart, 1967). For example, interruption could be in the form of telephone calls or drop-in visitors (Dahms, 1988) that take priority over other activities (Jones & McLeod, 1986).

Interruptions break a trainee's attention to a task and force him to focus on the interrupting event, even if only for a moment (Speier & Valacich, 1996). Parker and Coiera (2000) reviewed studies on communication behavior from a cognitive psychological perspective; the review focused on understanding how human memory functions and on the potential consequences of interruptions on the ability to work effectively. The researchers concluded that those who work in an interruption-driven environment are likely to suffer failures of working memory. This inevitably interferes with what is to be done and generates new tasks for the interrupted worker, causing prospective plans to be partially or fully forgotten (Parker & Coiera, 2000).

Taylor (2000) concluded from his study that the second most important factor in the transfer process is the degree of interference from the workplace. He recruited participants from three types of stakeholders: instructors, trainees, and supervisors (N=90) and scheduled interviews based on Broad and Newstrom's (1992) role and time model of transfer of training. The result indicated that according to the trainer one of the most significant barriers was interference by the immediate environment: time pressures, insufficient authority, ineffective work processes, or inadequate equipment. Therefore, interruptions affect job involvement and act as barriers to transfer of knowledge and skills.

Job Involvement

Interruptions in the workplace impact job involvement and training transfer. Job involvement is the degree to which employees are mentally engaged in their jobs, which, in turn, affects transfer of training to the workplace. If a trainee is frequently interrupted during training, he can lose concentration and may no longer be involved with the task at hand; this lapse in concentration can, in turn, affect his or her interest in the training as well as the acquisition of knowledge and skills, which ultimately affects transfer. In general, an employee who is highly involved with his job continuously seeks ways to improve his effectiveness; one way for him to do this is to accurately transfer the skills and knowledge acquired during training to the actual job (Mohan & Elangovan, 2006). A study by Noe and Schmitt (1986) showed that employees high in job involvement are more motivated to learn and transfer skills to the workplace. Brown and Leigh (1996) conducted a study on employee perception of an organizational environment and how it is related to effort, job involvement, and performance and came up with similar results. What they showed is that employee effort influenced the relationship between job involvement and performance and that an employee's perception of his involvement in the job had an effect on his ultimate performance (Brown & Leigh, 1996).

In an effort to determine the effect of the numbers and types of workplace interruptions on workers in related work environments, Chisholm, Dornfeld, Nelson, & Cordell (2001) conducted a study to identify the number of interruptions that occur in a work day and to characterize the tasks workers performed. The study compared tasks performed in emergency medical departments with those performed in primary-care medical offices. A task-analysis was conducted in five non-teaching community hospitals and 22 primary care offices in five central Indiana cities. Twenty-two emergency physicians and 22 office-based primary-care physicians

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(PCPs) were observed at work. The number of interruptions, tasks, simultaneous tasks, and

patients concurrently managed were recorded in one-minute increments during 150- to 210-

minute observation periods. The results of the study showed the following:

- Emergency physicians were interrupted an average of 9.7 times per hour compared with 3.9 times per hour for primary care physicians (PCPs), for an average difference of 5.8 times per hour (95% confidence interval [CI] 4.2 to 7.4).

- PCPs spent an average of 11.4 minutes per hour performing simultaneous tasks compared with 6.4 minutes per hour for emergency physicians (average difference, 5.0 minutes; 95% CI 1.2 to 8.8).

- Emergency physicians spent an average of 37.5 minutes per hour managing three or more patients concurrently, compared with 0.9 minutes per hour for PCPs.

- PCPs spent significantly more time performing direct patient care, and emergency physicians spent significantly more time in analyzing data, charting, and taking reports on patients.

This study shows that emergency physicians experienced more interruptions, thus

requiring them to spend more time managing patients concurrently than PCPs who had higher

work efficiency (Chisholm, Dornfeld, Nelson, & Cordell, 2001). The results appear to suggest

that interruptions in the workplace affected efficiency to do work and thereby reduced output.

Research shows that context in which the interruption occurs determines whether the

interruption is beneficial or detrimental. Mark, Gonzalez, and Harris (2005) examined the nature

of fragmented work. The researchers described work fragmentation as a break in continuous

work activity. They presented detailed observations of 24 information workers who experienced

work fragmentation as common practice. They divided the study into two components: the length

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of time spent on an activity and the frequency of the interruptions. They then examined work fragmentation along three dimensions: effect of collocation, type of interruption, and resumption of work. The researchers found work to be highly fragmented; workers averaged little time in working areas before switching to another, and 57% of the workers were interrupted. Collocated people worked longer before switching activities but had more interruptions. Most internal interruptions were due to personal work, whereas most external interruptions were due to some type of common work. The researchers found that interruptions occurring outside of the context of an employee's current working sphere were disruptive as they led the employee to shift his thinking. In contrast, interruptions that concerned an employee's current working sphere were considered helpful. However, most participants in the study reported that they preferred to complete one task before moving to another (Mark, Gonzalez, & Harris, 2005). More research is needed to clarify this issue.

In summary, interference from the immediate (work) environment plays a significant role in the transfer process. Supervisors and management play a vital role in the authorization of released time and altered work schedules to minimize workplace disruptions. If the trainee expects to have to spend long hours on the first day back in the office after training to clear the backlog of work, he may be less likely to use the training; also if the trainee anticipates that the supervisor and/or colleagues will oppose new ideas, the trainee may lose his desire to actually use the training (Foxon, 1993). Therefore, supportive organizational culture may help trainees implement newly learned knowledge and skills Studies suggest that a Supportive organizational culture increases transfer (Broad & Newstrom, 1992; Clarke, 2002; Foxon, 1993; Nijman, 2006). Therefore it appears essential for management to support the training and promote the worker to use the training in the workplace.

Supportive Organizational Culture

Supportive organizational culture (SOC) includes the external environment, organization's structure, culture, job supervisor, and upper management of the firm(Broad & Newstrom, 1992). Supervisors have more influence than coworkers on the learner's decision to implement training. They are responsible for encouraging and setting a model for desired work-related behaviors.

Baldwin and Ford (1988) divided the work environment factors into (a) a supportive organizational climate, (b) a pre-training discussion with the boss (supervisor or manager), (c) the opportunity to use knowledge and skills, and (d) post-training goal setting and feedback. Researchers have focused on different factors of this work environment. Previous studies indicate that practitioners examined the environment first when evaluating transfer problems (Hicks, 2006). They suggest that the effort and success in the application of workplace learning is greater in environments characterized by high levels of supervisor and coworker support (Bates, Holton, Seyler, & Carvalho, 2000; Bates et al., 2000). Rouiller and Goldstein (1993) and Tracey et al. (1995) found that management trainees in supportive, compared to non-supportive, workplaces were more likely to demonstrate trained behaviors.

A number of subsequent studies have substantiated these findings and highlighted the importance of organizational support. For example, Montesino (2002) found that there was a significant correlation between the variables "perceived presence of practices to support usage of training" and "perceived alignment of training with the strategic direction of the organization" (trainees: $r=.29$, $p<.001$, managers: $r=.38$, $p<.03$)(Montesino, 2002).

Researchers have often cited organizational support as an important factor in the transfer process, but very little research has been done to find out how support mechanisms work to

facilitate transfer. Ford et al., (1992) stressed three factors affecting transfer: supervisory attitude towards trainee, peer support, and pace of workflow.

Supervisor support is considered by many researchers to be the key to the application of workplace learning (Bates et al., 2000). Despite the suggestion that supervisor support plays a vital role, the current research offers mixed results. Several studies have provided evidence that supervisor support is a significant factor in the transfer process (Belling, James, & Ladkin, 2004; Broad & Newstrom, 1992; Chiaburu & Tekleab, 2005; Nijman, 2006; Nijman & Matthias, 2004; Salas & Cannon-Bowers, 2001), but there are studies that have offered contradictory evidence (Branderhorst & Wognum, 1995; Fitzgerald & Kehrhahn, 2003; Nijman, 2004). A detailed review of supervisor support follows in an effort to clarify this issue.

Supervisor and Managerial Support

Supervisor support is defined as the extent to which supervisory behavior occurs to optimize the trainee's use of the knowledge, skills, and attitudes gained in workplace training. This support can be in the form of encouragement to use newly learned skills, assistance in identifying situations where the skills can be applied, guidance in the proper application of the trained skills, positive feedback, and positively reinforcing new applications and performance improvements, all of which help the positive transfer of training (Brown, 2005; Nijman & Matthias, 2004).

Existing literature on the importance of supervisory support in the workplace does indicate a link between supervisory reinforcement and the transfer of training. However, one of the greatest challenges in verifying the importance of a supervisor's support to the transfer of knowledge and skills is providing empirical evidence of its contribution to the transfer process. In their meta-analysis, Baldwin and Ford (1988) examined major studies on organizational

training. The researchers reviewed seven studies that examined the relationship between environmental characteristics and the transfer of training. They concluded that supervisory support is a key environmental variable. Fifty years ago, Mosel (1957) was the first researcher to suggest the relationship between an unsupportive organizational climate and transfer failure. He concluded that training will only transfer to the degree that supervisors support and practice the same behaviors that the workers learn in the training environment (Mosel, 1957).

Research also suggests that supervisors play a vital role in transfer of training by arranging work schedules for trainees to attend training and offering positive reinforcement for using the skills learned (Baldwin & Ford, 1988; Richman-Hirsch, 2001; Salas & Cannon-Bowers, 2001; Smith-Jentsch, Salas, & Brannick, 2001). To reinforce this, we may turn to Huczynski and Lewis (1980), who also investigated supervisory influence on transfer of training. Their study included two groups of participants: a university group (n=17) and a company group (n=32). The researchers used structured interviews and descriptive statistics as the methodology for this study. They concluded that 35% of participants tried to transfer what they had learned from the training environment to their work. Researchers also found that the number of participants who discussed the content of the course with their supervisor before the course was twice as likely to attempt to transfer skills and knowledge after training as those who did not discuss the content of the course with their supervisor before the course. Through their interviews with the participants, the researchers found that those who had not discussed the course with their supervisors before attending did not understand why they were even enrolled in the course. However, participants who had discussed the training with their supervisors appeared to have a clear understanding of the goals and objectives of the course. They found that supervisors influenced transfer by facilitating openness, listening skills, and empowerment. The

opposite was true as well. Supervisors could weaken the transfer through inhibitors such as an excessive workload, unplanned work, and a high rate of change. This suggests that a supervisor's influence can have negative or positive effects on transfer of training (Huczynski & Lewis, 1980).

Ford, Quinones, Sego, and Sorra (1992) investigated factors affecting the opportunity to perform trained tasks on the job and looked at it from three dimensions: breadth, activity level, and type of tasks performed. The sample population consisted of graduates from an Air Force technical training program and their supervisors. They responded to questionnaires that were designed to measure the three dimensions; the questionnaires also measured a variety of other organizational, work context, and individual factors. The results indicated that the airmen in the study experienced inconsistent opportunities to perform trained tasks; the results also showed that these differences were related to supervisory attitudes and workgroup support as well as the trainee's self-efficacy and cognitive ability (Ford et al., 1992). This study shows that supervisors' attitudes and peer support do play a role in trainees finding opportunities to apply new skills and knowledge to the workplace.

When examining different approaches to the transfer, Foxon (1993) found that the negative effect of an unsupportive organizational climate on the transfer process accounted for 42% of the recognized restraining factors. The supervisor's failure to encourage and reinforce application of the work-related training was one of the most commonly cited factors inhibiting transfer. Other frequently mentioned factors that inhibit transfer include organizational demands and pressures, the lack of opportunity to apply the learning, and the failure to provide the resources or technology necessary for application (Foxon, 1993). This is yet another study

supporting the claim that the organizational culture plays a significant role in the transfer process.

Further empirical evidence that supports the central role a supervisor has in transfer was demonstrated by Brinkerhoff and Montesino (1995). They studied a management training program to determine the impact that supervisors have on transfer. They compared the transfer level of trainees for supervisors who discussed pre-training expectations and had post-training follow-up discussions with employees to supervisors who did not. The study participants belonged to a Michigan-based Fortune 200 pharmaceutical company. The result of the study showed that out of a group of 91 trainees, 35 had had a pre-training expectations discussions and post-training follow-up with their managers while 35 had not. Those who received management support demonstrated significantly higher transfer and a more positive perception of the forces in the work environment encouraging transfer (Brinkerhoff & Montesino, 1995).

Further evidence on the impact of supervisory involvement was provided by Hastings, Sheckley, and Nichols (1995), who in their study found that supervisory involvement was the only independent variable to significantly impact performance when age was included as a covariate. The results also suggest that the impact of the supervisory involvement variable is mediated by five factors. First, supervisors as trainers are most credible if their technical skills are augmented by strong presentation, facilitation, and communication skills generally required by trainers. Second, the self-efficacy of training supervisors might influence the trainer's delivery of the course material. Third, supervisors as trainers may inhibit full participation of those who directly report to them in the classroom training more than they inhibit the participation of other employees due to employees' concerns for favorable assessments. Fourth, encouraging voluntary attendance in training programs might remove some of the negativity

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expressed by participants while increasing goal commitment. Finally, the goal commitment of the participants is influenced by the perceived goal commitment of the training supervisors (Hastings, Sheckley, & Nichols, 1995).

Another study supporting supervisory support as crucial for transfer was performed by Xiao (1996). The study investigated the influence of organizational factors on the transfer of training and found supervisory and peer support to be the most influential ones. The researcher developed a survey measuring five areas that influence training transfer: orientation, knowledge and skill acquisition, rewards, supervision, and peer relationships. The study results showed that the largest influences on training transfer were supervisor and peer support (16% of the variance). The conclusion drawn was that participant-perceptions of receiving a significant degree of supervision acts as an important positive predictor of transfer outcomes (Xiao, 1996). Somewhat in the same vein, a study by Seyler, Holton, Bates, Burnett, & Carvalho (1998) supports Xiao's (1996) conclusion. Seyler et al. (1998) also investigated several factors influencing the motivation to transfer learning to the job. The most noteworthy finding to emerge from their study was that environmental factors, such as the defined value of what was learned, supervisor sanctions, and peer and supervisor support, explained more than one-fourth of the variance in the motivation to transfer. To add to the position that supervisory support can significantly affect transfer, Gielen (1996) developed a transfer of training model based on an in-depth review of literature. The transfer model was then tested in a corporate setting provided by a large international Dutch banking organization. The results revealed that trainees' self-efficacy and supervisory support were important factors in training transfer.

Several additional empirical studies support the position that supervisory involvement is instrumental in the transfer process. Gumuseli and Ergin (2002) investigated the impact that a

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managers' reinforcement has on the transfer of training. They studied the participants' job

attitudes, productivity, effectiveness, and satisfaction during the process of transferring the

knowledge, skill, and attitudes acquired through training. The subjects consisted of a group of

sales representatives who were enrolled in a Basic Sales training program for sales

representatives and their supervisors. The training was provided by the Coca-Cola Bottlers of

Turkey. The results of the study indicated that the experimental group, which was supported and

oriented by the training department and managers, showed a more significant change in behavior

than the control group. The researchers concluded that if employees are supported, the trained

behaviors are likely to be gradually put into practice. On the other hand, a lack of support may

result in little more than "basic performance," or performance at a very rudimentary level. They

also found that without orientation and support, post-training performance actually decreased.

Van der Klink, Gielen, and Nauta (2001) conducted an experimental study with two

groups employed by a German bank. The researchers applied Baldwin's (1987) assumptions

regarding supervisors who set behavioral goals that required trainees to apply specific training

content to their jobs. They also employed Broad and Newstrom's (1992) principles of

supervisory support and hypothesized that a higher degree of supervisory involvement would

result in higher rates of trainee job performance. Both groups received similar assistance from

the trainer and formed action plans that addressed the transfer intentions, required supervisor

support after training, and potential barriers. Supervisors for the experimental group received

letters from the training department encouraging them to conduct discussions and engage in

action planning and other transfer activities with their employees after the training. The results

showed that the experimental group rated their supervisors significantly higher than the control

group (p<.05); however, the post-training performance results between both groups did not differ significantly.

According to a study by Belling, James, and Ladkin, (2004) managers perceived several barriers to transfer of knowledge and skills, included the following:

- Lack of managerial support

- Time and workload issues

- Resistance to new ideas

- Lack of opportunity and responsibility

- Physical structure of the organization

- Performance and reward

- Organizational politics and hidden agendas

They explored how organizations can become more sophisticated at supporting the transfer of learning. They identified potential barriers and facilitators to transfer of learning by examining a range of individual characteristics and workplace features associated with these barriers and facilitators. They then related these barriers and facilitators to the type of programs that managers undertook. The data were collected at three points: before the managers' program, immediately after the program, and at a follow-up stage three to six months after the program. More than 200 managers from 17 different organizations received questionnaires at these three stages. Data were analyzed with the help of a paired t-test and factor analysis. The results revealed that the managers perceived lack of managerial support; time and workload issues; resistance to new ideas; lack of opportunity and responsibility; physical structure of the organization; performance and reward; organizational politics and hidden agendas affecting transfer of training.

Chiaburu and Tekleab (2005) agree that both supervisor support and training motivation are important factors in transfer. These researchers investigated the individual and contextual conditions of learning, transfer of learning, training generalization, and training maintenance in a work context. The hypotheses were tested using hierarchical regression analysis on data obtained from 119 employees who attended training programs. The data for this longitudinal study was collected at three different times. Based on guidelines from the conceptual literature analyzing multiple dimensions of transfer (i.e., learning, transfer, maintenance and generalization, Baldwin and Ford, 1988) and on similar studies focusing on transfer (e.g. Axtell and Maitlis, 1997; Tracey et al., 1995), the researchers collected data on transfer, maintenance, and generalization of knowledge between six and 12 weeks after the training programs were completed (Time 3). A total of 71 trainees returned surveys, for a response rate of 59.6%. The results revealed that there was a relationship between a continuous-learning culture defined as "an organization wide concern, value, belief, and expectations that general knowledge acquisition and application is important" (Tracey et al., 1995, p. 245), supervisor support, and training motivation impacts a trainee's desire to apply and use newly learned skills in new situations (Chiaburu & Tekleab, 2005).

Another study by Nijman (2006) reviewed studies on the factors that affect the transfer of training with a specific focus on the effects of supervisor support. From this review, Nijman developed a research model of the transfer process. All components of the model were measured by questionnaires given to former trainees and their supervisors. Stepwise regression analyses were performed to examine the relationships in the model. The results of the study revealed an indirect relationship between supervisor support and the transfer of training. The indirect effect of supervisor support on transfer of training is only slight, however. Learning results were shown

to be the strongest predictor of the transfer of training (Nijman, 2006). The results revealed that supervisor support that is intended to enhance the transfer of training can be best directed at improving the transfer climate at the workplace.

Most recently, Lim and Morris (2006) analyzed and synthesized the factors that a group of experts from an international human resources department (HRD) considered to be essential not only for learning but also for the transfer of learning. The purpose of this analysis was to identify cross-relationships and the influence of the transfer variables in three transfer constructs that influence the trainees' learning and learning transfer: trainee characteristics, instructional factors, and organizational climate. Their work incorporated a systematic model of training evaluation proposed by Kirkpatrick (1998) using evaluation levels 1 through 3 and recommended strategies to improve training transfer. The sample consisted of 181 employees from the 15 sister companies of a Korean conglomerate. The results showed that trainees seemed to experience significant increases in perceived learning and application and that there are certain distinct variables in trainee characteristics that strongly correlate or influence either or both of the trainees' perceived learning and learning transfer collectively and independently (Lim & Morris, 2006). The following distinct variables were identified:

- Job function: the years in the related job experience and immediate training needs

- Instructional factors: overall satisfaction, job helpfulness, content satisfaction, satisfaction with the instructor, and instructional level

- Organizational climate: responsiveness to change, educational support, transfer opportunities, and peer or supervisor feedback regarding application of newly learned knowledge and skills.

They also concluded that for people-related factors, several research studies confirmed that support from supervisors, coworkers, and peers (Baldwin & Ford, 1988; Ford & Weissbein, 1997; Foxon, 1993; Foxon, 1997; Huczynski & Lewis, 1980), availability of a mentor (Richey, 1990), and positive personal outcomes (Holton et al., 2000) are three major transfer-enhancing factors.

Although the perception of support for transfer of training from supervisors and coworkers has been shown in many studies to play a significant role in the transfer process, there are other studies that do not support this position; they actually disagree on the degree of influence the supervisor has in improving transfer. Branderhorst and Wognum (1995) conducted an experimental study to judge the effectiveness of supervisor support. Trainees were assigned to control and experimental groups. The experimental group was given supervisors who guided them before, during, and after the training; the control group had no supervisory guidance. Questionnaires and semi-structured interviews were used to test the influence of the supervisor in improving transfer. The researchers used the Mann-Whitney test to analyze the data. The results of the study indicated that the transfer of training did not differ significantly across the two groups. These results show that supervisors may not necessarily influence transfer as significantly as some studies have suggested and there were factors like lack of tangible support from top and middle management as a barrier for transfer (Branderhorst & Wognum, 1995).

In another experimental study, trainees of an oil company took part in a training program on information handling, problem analysis, and decision making. While trainees in the experimental group received guided support from their supervisors before, during, and after training, the results of the study show no difference in transfer outcomes between the experimental and the control groups (Nijman, 2004).

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The diverse results of the research studies presented to this point underline the need for further research and inquiry into the extent of the influence of the supervisor-subordinate relationship as it relates to training. The diversity of the research outcomes cited thus far in this study also support the premise that the single relevant factor or combination of relevant factors that inhibit or mitigate the successful transfer of training to the workplace have not yet been validated. Therefore, further study into factors in addition to the supervisory influence in the transfer of training is warranted.

In addition to supervisor support, peer support has emerged as possibly having a similar impact on the transfer of knowledge and skills. The following activities are related to the influence that both supervisors and peer groups have on the transfer of training: feedback, workload, opportunities to use the training (Russ-Eft, 2002). These factors are explored further in the next section of this study.

Feedback

Feedback, in the context of this study, refers to information provided to trainees about their performance (Baldwin & Ford, 1988). A large body of research on knowledge of results, knowledge of performance, and feedback interventions suggests that feedback given to a person who is learning or carrying out a task results in performance improvement (Stolovitch, 2001). Research on feedback has suggested three sources of information for seeking feedback in work situations (Kuchinke, 2000):

- Constituencies: supervisors, coworkers, customers, and subordinates
- Systems: tasks, work systems, and job aids
- Self: one's own thoughts and feelings.

Nevertheless, the importance of each source has not been yet established. Greller's (1980) seminal study on feedback sources concluded that employees ranked their supervisors as the most important source. However, a study by Hanser and Muchinsky (1978) concluded that employees rated their own thoughts and feelings as the most important feedback source. The literature suggests that feedback on process and successful outcomes improves performance and has more of an effect on cognitive tasks than physical tasks; however, feedback can also negatively affect trainees if it threatens self-esteem (as cited by Stolovich, 2001).

Kluger and Denisi (1996) did a meta-analysis on the effects of feedback on performance. They rigorously examined 2,500 studies dating back to the 1890s on feedback and its effects on learning and performance. They included 607 effect sizes and 23,663 observations. They concluded that there is a need for a consistent and comprehensive theory of feedback interventions to support action. As they found in their comprehensive work, there have been contradictory reports from different studies, which make it important to empirically examine the phenomena of feedback specifically from the supervisors (Kluger & Denisi, 1996). Therefore, feedback and workload which is discussed in the next section appear to impact trainee's desire to transfer knowledge and skills.

Workload

Trainees need time and energy to facilitate learning and transfer. If they have a workload or pending work because of the time they have spent in training, they may become less motivated to use the new skills and knowledge they have just acquired (Russ-Eft, 2002). In their study on response to social learning theory, Porras and Hargis (1982) found a negative correlation between on-the-job skill use and factors such as role conflict, overload, and job-generated stress. Decker and Nathan (1985) concluded that the individual's workload was an

important factor affecting training success; however, they reviewed some of the literature on workload and stress and determined that further efforts are needed to solve the complex relationships between workload and transfer of training.

Opportunities to Use

"Opportunities to use" refers to supervisors and managers providing trainees with tasks and resources that allow them to apply newly acquired skills and knowledge on the job (Russ-Eft, 2002). Several researchers have suggested that the extent of opportunities given to trainees to apply their newly learned knowledge and skills can influence transfer. For example, Baldwin and Ford (1988) found this element to be important to transfer and included it in their model. Pentland (1989) discovered that if trainees practiced newly learned skills immediately upon returning to the job, they were able to retain the information learned in training for longer periods of time than those who did not have early opportunities to use what they had learned.

Empirical evidence shows that the opportunity to use skills and knowledge learned affects the transfer of knowledge and skills from the training environment to the workplace. Lim and Johnson (2002) examined perceptions of trainees regarding factors influencing transfer. The results showed that among the relevant factors, lack of opportunity to use new learning affected transfer.

The review of literature indicates that a lack of opportunity to use new learning can be a barrier in transfer of skills to the workplace. However, most studies have made the untested assumption that trainees have relatively similar opportunities to practice newly learned skills back on the job (Ford et al., 1992). Further research is needed to test this assumption. In addition to the trainees having the opportunity to use newly acquired skills and knowledge on the job,

another important factor in the transfer process is whether trainees' perceive training programs to be practical.

Trainees' Perception of Training Programs Being Practical

Cognitive psychological theory defines perception as "the cognitive event by which a person gives meaning to each situation/stimulus according to his values, beliefs, and attitudes" (Bates & Khasawneh, 2005; Klimoski & Donahue, 2001). A careful review of literature revealed that there was a paucity of empirical studies on trainees' perception of training programs being practical, which means "easily applicable and worthwhile in the work setting."

Clark, Dobbins, and Ladd (1993) explored the effects of several contextual factors on training motivation. Two hundred individuals from twelve organizational training groups were given surveys to measure the transfer climate, trainee involvement in the decision to be trained, and decision-maker credibility. Structural equation modeling indicated that the trainees' perceived usefulness of the training significantly predicted training motivation; trainee involvement in the decision to be trained resulted in a higher perception of job and career development; decision-maker credibility affected the trainee's job and career attitude; and the supervisor training transfer climate affected anticipated transfer.

In another study, Cannon-Bowers, Salas, Tannenbaum, and Mathieu (1995) found that participation of trainees in decision-making and goal-setting, as well as providing trainees with correct information about the nature of the training program helped them to develop realistic expectations regarding the training. It facilitated higher levels of motivation, self-efficacy, and organizational commitment.

Empirical evidence shows that positive attitudes toward training motivate trainees to use newly learned skills in their everyday work. For example, Rodríguez and Gregory (2005) study

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results revealed that the participants showed positive attitudes toward training, regarding it as useful and necessary, as long as they perceived that the training was hands-on and directly related to the job and that its content was relevant to the work. Bates and Khasawneh (2005) examined the relationship between organizational learning culture, learning transfer climate, and organizational innovation. The results suggest that the values and beliefs connected with organizational learning culture can indeed influence organizational progress.

To summarize, the review of past studies shows that there have been very few empirical studies that focused specifically on the trainee perceptions of training programs as being useful in the workplace. Nevertheless, the few studies conducted on trainee perception revealed that values and beliefs connected with learning affect the trainee's motivation to transfer newly learned skills to the workplace. A trainee's involvement in the decision to participate in training resulted in the trainee having a better perception of job and possible career advancement (Clark et al., 1993). Another significant factor identified by researchers in the transfer process is the trainees' perception of whether the training is relevant to the job. The trainee's perception of relevance to the job is discussed in detail below.

Trainees' Perception of Relevant Training Content

The trainees' perception of whether the training is relevant refers to the views of trainees' about whether course content is related to their work needs (Bates et al., 2000). Several researchers have suggested that the issue of content validity is important for transfer of skills and knowledge (Baldwin & Ford, 1988; Garavaglia, 1993), but there have been very few empirical studies that verify these results (Bates et al., 2000). A study by Axtell and Maitlis (1997) examined multiple factors that exert an influence on the application of interpersonal skills at work. The researchers studied trainees who participated in training to improve interpersonal

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work skills. Trainees were evaluated at intervals of one month and one year after training took place; the results of the study suggested that the trainees' perceptions of the significance and usefulness of the course and their motivation to transfer skills were the main variables in the level of transfer. The results also indicated that the trainees felt that, for the course to be relevant to their jobs, their organization must also be committed to encouraging the trainees to apply what they learned. In his study, Lim (2000) found that the most common reasons for low transfer included: the lack of opportunity to apply the learning on the job (64%); no direct relationship of the learning with their job (15%); and lack of understanding of the training content (9%). In another study Yamnill and McLean (2005) replicated Holton, Bates, and Ruona's study (2000) to validate the Learning Transfer System Inventory (LTSI) in Thailand and found perceived content validity as the most important factor for transfer of training.

In summary, results of previous studies have shown that training-related motivation is possibly related to the trainees' perception of whether training is well designed and delivered. If trainees perceive that the training is well-designed and delivered, it will lead to improvement in job performance. However, in addition to the trainees' perception of training content and delivery, it is equally important for trainees to be comfortable with the change training may cause in the workplace and the effort associated with the transfer.

Trainees' Being Comfortable with Change and Associated Effort

In spite of the fact that training content validity is of critical importance (Bates et al., 2000), most training research appears to assume the relevance of training content to the job (Baldwin & Ford, 1988; Baldwin & Magjuka, 1991). This is a dangerous assumption, as the research indicates that thorough, systematic needs assessments are not typically conducted before designing the training (Bates et al., 2000; Saari, Johnson, McLaughlin, & Zimmerle, 1988).

Research shows that a work group's beliefs about the organization, the group members, and the members' beliefs about themselves can dictate the level of acceptance of the training. In a study by Hastings, Sheckley, and Nichols (1995), the authors encountered trainees who believed that an initiative aimed at developing certain new skills would disrupt the operating procedures of their current workgroups. As a result, those who were uncomfortable with the anticipated changes were also resistant to training, and maintained the same discomfort when they returned to work. From their findings, the researchers concluded that for transfer to take place, trainees must be comfortable with targeted change and associated efforts to learn and to apply the training (Hastings et al., 1995). As described above, Yamnill and McLean (2005) replicated Holton, Bates, and Ruona's study (2000) to validate the Learning Transfer System Inventory (LTSI) in Thailand and understand whether the cultural context makes a difference in comprehending training transfer systems. The study used LTSI as a diagnostic tool to assess the factors that affect transfer of training in Thailand. A random computer sample selected participant organizations. From the 30 selected organizations, 1,256 employees who had completed a training program within the last two months were given a survey instrument to complete. Eighty-two percent (1,029 employees) participated in the survey. The results showed that, apart from several other factors influencing transfer, learner willingness, personal positive outcomes, opportunity to use the learning, and expectations about the effort required to transfer performance were significantly higher in state enterprise organizations (businesses owned by the government than those in government organizations, organizations under the control of the Office of Civil Service Commission) (Yamnill & McLean, 2005). This study shows that cultural context does not appear to be a significant factor in training transfer. Learner willingness to participate in training, expectation of positive personal outcomes, anticipation about the

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opportunity to use the learning, and the expectations about the effort required to transfer

performance appear to coincide with the studies previously discussed.

To summarize, results of these studies have shown that a primary motivation of the

trainee to transfer skills and knowledge learned in training is related to the trainee's belief that

the course content is relevant and the training would be useful on the job. The factors that affect

a worker's motivation to transfer training are universal and do not have significant cultural

implications affecting transfer. However, these studies have not proved conclusively that

trainees' perceptions are the most significant factor in training transfer. Therefore, it is

imperative to further analyze other factors that affect transfer, such as the role that the trainer

plays in motivating the trainees to learn and transfer (Broad & Newstrom, 1992).

Trainer Being Supportive and Inspiring

In a study of the effects of the psychosocial training climate on mental health outcomes

for long-term unemployed individuals, Creed, Hicks, and Machin, (1996) found that supportive

and encouraging interpersonal relationships between the trainer and trainee in the training

environment are associated with better levels of well-being in unemployed trainees and with

improvements in well-being across time. Foxon (1993) found that a low level of trainer

credibility is also a factor that inhibits transfer.

In summary, the investigator determined that there was a paucity of empirical studies on

how inspiration or support from the trainer affects training transfer. Nevertheless, this study

shows that an unstable trainee-trainer relationship does appear to have an effect on learning and

transfer. In addition, researchers have also suggested that the trainees' perception of how training

is designed and delivered affects the transfer (Clark et al., 1993; Lim, 2000; Seyler et al., 1998).

Again, these studies have not shown conclusively whether inspiration or support from the trainer

or the trainees' perceptions is a highly significant factor in training transfer. Therefore, it is necessary to examine the impact instructional design has on the transfer of training.

Trainees' Perception of Training Being Well Designed/Delivered

According to the instructional design (ISD) approach, training design requires a needs assessment of the learners, a task analysis of performance requirements, specific learning objectives, etc. Instructional design includes the sequence of the instruction, learning checks, delivery methods, and much more. For decades, the influence of training design on the transfer of training has been studied by many researchers because it is believed to be one of the most important influences on training transfer (Brinkerhoff & Gill, 1992). Baldwin and Ford (1988) describe three instructional design issues that influence training transfer: identical elements, stimulus variability, and teaching of general principles Researchers after Baldwin and Ford (1988) have studied these issues.

Garavalia's (1993) study revealed several instructional methods that result in effective training transfer, including using many different examples in various contexts such as analogies, computer simulations, and advance organizers. Foxon (1993) investigated different approaches to the transfer of training and found that training design factors accounted for 22% of the factors inhibiting training transfer; training delivery factors, such as inappropriate methods, media, and delivery style, represent 13% of the total.

Lim (2000) conducted a study of the training design factors that influence the transfer of training to the workplace. The findings of this study were supported by previous research studies that identified several training design variables that influence the transfer of training. These research studies appear to suggest that identical elements shared between the learning and job setting, stimulus variability in instruction, teaching general principles instead of job-related

principles (Baldwin & Ford, 1988), and over-learning (Hagman & Rose, 1983) affect the transfer

of training. The inhibiting training design factors identified were:

- Lack of sufficient time to preview the training content

- Lack of a thorough needs assessment for each trainee

- Insufficient practice and exercise sessions during training

- Mismatch between the practice session and the learning content

- Inappropriate grouping of trainees for workshop activities

- Lack of clarification of technical terminology

- Insufficient lab hours for computer use

The supporting training design factors identified were numerous (Lim, 2000):

- Instructor's mental and emotional involvement in the instruction;

- Instructor's ability to demonstrate the use of teaching principles through the
  instruction;

- Demonstration of specific examples

- Self-directed, daily wrap-up meetings

- Instructor's sensitivity to the cultural differences of the trainees

- Step-by-step instructions moving from basic to advanced learning content

- Skill practice sessions; using mixed specialty group teamwork activities

- Pre-distribution of reading materials; participatory learning methods

- Use of audio and visual material during instruction

To summarize, the research suggests that well-designed and well-delivered training helps

to improve learning and retention. If trainees are easily able to follow the lessons taught, the

training motivates the trainees and helps them to retain and transfer the skills and knowledge learned to the workplace. In addition to instructional design, peer support is another factor that has a significant impact on transfer; peer support strengthens the trainee's willingness to transfer knowledge and skills to the workplace.

<p align="center">*Peer Support*</p>

Interaction between the individual and his or her peers is a potent force in the socialization process within an organization. Peer support includes coworkers who help trainees to use the training by giving them some assistance and offering positive feedback for using the skills learned in training (Russ-Eft, 2002). The relationship between peers in the workplace may provide or prohibit the support and reinforcement to learn and to apply what is learned (Wexley & Baldwin, 1986). However, current research lacks sufficient information on the role of coworkers/peers in the transfer of training. Bates, Holton, Seyler, and Carvalho (2000) stated that researchers have overlooked the possibility that there might be work situations where coworker support is equal to, if not more important than, supervisor support. Peer support may be especially important in cases where trainees work in teams or groups in jobs that are hazardous or dangerous.

Facteau, Dobbins, Russell, Ladd, and Kudisch (1995) conducted a study that found a relationship between the transfer of training and peer relationships. The study was designed to determine the influence of trainees' pre-training beliefs and motivation on transfer of training. The workers who were surveyed consisted of 967 managers and supervisors. The researchers found that the trainees who perceived their peers and subordinates as supportive were more likely to produce greater transfer of their skills acquired during training than trainees who perceived their peers as unsupportive.

Cromwell and Kolb (2002) examined a combination of elements that affect transfer of training. They studied the impact of organizational support, management support, and peer support on the transfer of training in a supervisory skills training program at one-month, six-month, and one year points. Seventy-five front-line supervisors from one unit of a large northeastern university participated in this study. Two questionnaires examined the transfer of the key skills that were emphasized in the supervisory training program and the perceived degree of management, peer, and organizational support. The data analysis was completed with the help of ANOVA and correlations. The results of the study revealed significant differences in transfer of training based on organizational support, management support, peer support, and peer support networks. Trainees, who reported receiving a higher level of organizational, management, and peer support in the form of feedback, coaching, rewards, and follow-up, also reported applying, to a greater extent, the knowledge and skills learned in the supervisory training program. However, trainees who perceived low levels of organizational, management, and peer support in the form of feedback, coaching, rewards, and follow-up reported lower degrees of transfer. The results also showed that the time frame is an important matter to consider when measuring a trainee's application of knowledge and skills. If the trainees do not get opportunities to use the knowledge and skills when they first complete the training program, they might perceive that they were not supported by the organization, their supervisors, or their peers (Cromwell & Kolb, 2002).

In a longitudinal research study on training, transfer, and turnover, Curry, McCarragherb, and Dellmann-Jenkins (2005) investigated transfer support factors (supervisory support, peer support, application planning, and case load) as predictors of retention programs. Four-hundred-and-sixteen workers participated in all three phases of the study. The data were analyzed with

help of one-way ANOVA. The study results revealed that coworker support for training and transfer was a factor affecting less-experienced workers. It may be that workers with greater experience were more autonomous and less dependent upon both supervisors and coworkers.

Chiaburu and Marinova (2005) examined the predictors of skill transfer from an instructional environment to a work environment. A total of 186 employees from a work organization were surveyed on individual dimensions (goal orientation and training self-efficacy) and contextual factors (supervisor and peer support). The data were analyzed with the help of structural equation modeling. The results showed that pre-training motivation and peer support are related to skill transfer. In addition, pre-training motivation is predicted (in order of importance) by mastery-approach goal orientation, peer support, and self-efficacy. Self-efficacy is not directly related to skill transfer, while peer support influences mainly skill transfer rather than pre-training motivation.

The research literature on factors influencing the transfer of training has provided some, but not a great deal of, information about the role of coworker support. Researchers appear to have ignored the possibility that there may be work situations in which coworker support is equally, if not more, important than that given by supervisors. For instance, in fire-fighting environments, coworker support is highly valued by trainees in team-oriented work settings or settings in which characteristics of the job give rise to strong work-group bonds as individuals depend heavily on their coworkers for reasons of health or safety. In these situations, the power of the work group to influence work behavior is significant and could be expected to affect work behaviors, including learning transfer (Bates et al., 2000).

Even though the research literature on factors influencing the transfer of training has not provided a large amount of information about the role of coworker support, the studies reviewed

have helped to extend our understanding of the contributions coworker support variables bring to learning transfer.

Summary

Every organization is concerned with improving training quality and correctly evaluating training. The first step in developing a successful training initiative is to examine the issues that influence its effectiveness (Wagonhurst, 2002). Literature in this area recognizes that one of the best ways to reach training effectiveness is by increasing the rate of training transfer. However, the review of literature suggests that people often are not able to successfully apply what they learn in training to their work. This literature review underscores the value of different elements of the working environment that affect transfer of training in several ways, depending upon the particular type of training expected to be transferred, the characteristics of the trainees themselves, and particular environmental characteristics. Researchers have studied a variety of factors that are believed to help or hinder the application of skills and knowledge learned in training back to the workplace. Some have examined factors, including lack of reinforcement back on the job, time and work pressures, lack of authority, perceived irrelevance of the program (Newstrom, 1986), lack of peer support (Newstrom, 1986; Tannenbaum & Yukl, 1992), lack of support from the organization (Holton, Bates, Seyler, & Carvalho, 1997; Newstrom, 1986), rewards (Holton et al., 1997), and opportunity to use learning (Holton & Baldwin, 2003). However, these factors have not been examined together, and there has been an implicit assumption in research that these are all of the barriers and support elements that exist (Belling et al., 2004). To date, many unknowns remain regarding the extent to which particular factors posited influence the transfer of training.

This leads back to the research questions stated in Chapter One. In conclusion, researchers have indicated that there are several factors influencing transfer of training. Some researchers have focused on individual variables while others have created a system of variables based on environmental factors but nothing seems to be proven. Some researchers have gone out to empirically test these variables and there seems to be some validity in their findings. However, the only one who have proved successful in putting together a framework consisting of most of the variables are Broad and Newstrom (1992). There is potential in their findings, so if all of the variables stated by them are accounted for, it might lead to transfer of training. In the next chapter the researcher takes what was learned from this chapter to present the research questions.

CHAPTER THREE: METHODOLOGY

The study investigates the relationship between the nine Broad and Newstrom factors (1992) and transfer of training for fire-fighter trainees to handle hazardous material. To study the influence of the nine Broad and Newstrom factors, this chapter includes the following methodological components: research design; population and sample; variables; instruments; validity and reliability; data collection; and data analysis.

Research Design

This research is a quantitative design utilizing a survey method. This survey method involves the use of three self-administered questionnaires designed to gather specific data via a self-reporting system. The framework is based on the nine factors derived by Broad and Newstrom (1992). The literature review in Chapter Two provides the theoretical and empirical base for this study. The questionnaires allowed for confidentiality, in an effort to encourage more honest and candid responses.

Numerous authors have recommended researching post-training transfer interventions to ensure that knowledge and skills acquired in the training environment are transferred to the workplace and lead to improved job performance (Baldwin & Ford, 1988; Noe, 1986; Tannenbaum et al., 1993). Although a considerable amount of conceptual work has been performed in this area in recent years, rigorous empirical investigation of transfer of learning remains scarce (Burke, 1997; Burke & Baldwin, 1999). Training is employed to affect behavior change. Participants' perceptions may affect the impact of the training, and these must be considered and examined to better understand why or why not transfer occurs. In addition, it is important to know which factors are present in the participants' environment that can be linked

to transfer of training. Therefore, in this study, Broad and Newstrom's (1992) nine factors

framework was applied to draw upon both the perceptions of fire-fighter trainees and their

supervisors and their observations regarding factors influencing transfer of knowledge and skills

to the workplace.

Population and Sample

The primary target population for this study was fire fighters who in the two years or

more prior to the study underwent knowledge and skills training for handling hazardous

materials. In addition, current supervisors of fire fighters who have undergone the hazardous

materials were also included. This provided two distinct perspectives on the nine factors being

studied.

Sampling

The population of the study was comprised of fire-fighter trainees and their supervisors.

The sample consisted of 181 trainees and 100 supervisors, selected on the basis of convenience

sampling. The population for this study was deemed appropriate because fire fighters are first

responders in emergency situations, and it is highly important for them to transfer the skills and

knowledge learned in training to on-the-job situations. The survey instruments were administered

to fire-fighter trainees and their supervisors at the time of data collection.

Description of the Sample

The study was conducted with 13 fire departments which consisted of trainees who had

participated in what is known as HazMat training. The fire departments were: Ft. Worth, Denton,

and Houston in Texas; Goodyear in Arizona; Cincinnati in Ohio; Montgomery County in

Maryland; San Jose and Los Angeles in California; Milwaukee in Wisconsin; Bedford in

Massachusetts; and Miami, Gainesville and Key West in Florida. The characteristics of these 13 sites were similar. They were all fire departments, where fire-fighter trainees had been trained in first respondent operations. The ages of the fire fighters ranged from 18-65 and consisted of both males and females.

Fire fighters like other first responders, work under tremendous time pressure and a great deal of uncertainty. Fire fighters are allocated to companies (commonly referred to as either the "engine" or "truck") having 20-30 members. Four or five members of the company work as a team on each shift. At the scene of a fire or an emergency, each member has a position designated to him before-hand tied to particular tools or tasks. Furthermore, for particular positions, individual members have special aptitudes and physical abilities, and the team adjusts in order to utilize each member's strengths and minimize weaknesses. As the time passes, team members gain more experience and build up an unspoken understanding of who does what best and how to operate together. This tacit understanding is cultivated through insightful team-based learning, which gives emphasis to personal accountability, technical expertise, and commitment to the team. The teams are self-critical and highly performance-oriented and, thereby, fire fighters become so effective and efficient while working under conditions of extreme uncertainty.

The response rate to both trainees' and supervisors' questionnaires were 100%. It should be noted that the participants in this study responded to the questionnaires completely independently, completing all items without any assistance from any other individual. Participants were guaranteed complete anonymity and were encouraged to respond as accurately and truthfully as possible. Participants were also assured of confidentiality and privacy of their responses.

The variables examined in this study were divided into two categories: nine independent or predictor variables (nine Broad and Newstrom factors) and one dependent or criterion variable (transfer of training). This study identified a well-documented set of variables that have been found throughout the literature to affect transfer of training to the job; measured their degree of presence or absence in the fire fighters' environment; and verified the extent to which they affect on-the-job application of HazMat learning. Therefore, drawn from the Broad and Newstrom (1992) framework , the components of the independent variables include: reinforcement on the job (RJ), little interference from immediate (work) environment, (IWE), supportive organizational culture (SOC), trainees' perception of training programs being practical (PTP), trainees' perception of relevant training content (RTC), trainees' being comfortable with change and associated effort (CCE), inspiration or support of the trainer (SI), trainees' perception of training being well designed/delivered (DD), and peer support (PS).

Independent Variables: Broad and Newstrom Transfer of Training Factors

The conceptual framework of this study is based on what was developed by Broad and Newstrom (1992). These researchers used survey methodology in a systemic way to identify individual and environmental factors that affect transfer of training. The nine factors they uncovered have been transformed into the independent variables for this study. What follows is a listing of these and a brief definition of each.

Reinforcement on the job is praise or reward given to the trainees when they apply their newly learned skills and knowledge back on the job.

Little interference from immediate (work) environment refers to interference by the immediate work environment, which inhibits transfer of knowledge and skills to the workplace; for instance, even if trainees are willing to change, they still cannot use their new skills because of obstacles such as work and time pressures, insufficient authority, ineffective work processes, and inadequate equipment or facilities placed in their way. Broad and Newstrom suggest that the fewer the work environment interferences, the greater the probability of transfer.

Supportive organizational culture refers to philosophical support provided by the organization for the goals of the training and development programs. The job supervisor plays a vital role in offering this support.

Trainees' perception of training programs being practical refers to the trainees' perception that there is a link between what is taught in the training programs and career and work objectives. The more usable and applicable the training is to the trainees' work, the more it is viewed as practical.

Trainees' perception of relevant training content refers to trainees being satisfied with course material and feel that the content is pertinent to their needs. The content is viewed as meaningful, given the issues and tasks trainees must deal with in the real world.

Trainees' being comfortable with change and associated effort means proposed changes would not cause them discomfort or require extra effort.

Inspiration or support of the trainer relates to the trainer being helpful and encouraging. As result of the trainer's actions, the trainees value what has been taught and feel confident that they can apply new learning because of what the trainer has communicated.

Trainees' perception of training being well-designed/delivered refers to trainees' perceptions that the training program is organized and presented properly. It also indicates that

trainees view the sequence of course modules as appropriate the training as well-balanced with suitable time allotted for discussions, group activities, lectures, and other relevant methods.

Peer support is related to the cooperation, support, and encouragement of the trainees' peers to apply to the job what has been learned.

Dependent Variable-Transfer of Training

Training represents instructional experiences provided to develop new skills and knowledge that are expected to be applied at the workplace immediately upon return of the trainees (Broad & Newstrom, 1992). The focus of the training is to bring about a positive transfer of skills and knowledge to the workplace. Foxon (1993) defines transfer as what learners are doing on the job as a reflection of the skills and knowledge taught in training and that the related job performance has changed in a positive manner as a result of the training. Transfer of training has also been classified in terms of "near transfer" and "far transfer." Near transfer of skills and knowledge refers to the replication of the previously acquired knowledge and skills in all identical situations based on Thorndike's theory of "identical elements" (Stolovitch, 2000). Far transfer refers to learning new skills or performing new tasks in situations that differ significantly from the situations of original learning (Barnett & Ceci, 2002; Subedi, 2004). In this study, the focus is on near transfer.

Instruments

The data for this study was provided by two survey instruments for the trainees and one survey instrument for the supervisor. The first questionnaire; IAFF HazMat Training Questionnaire examined the perceptions of trainees regarding the presence/absence of Broad and Newstrom (1992) factors, and the second questionnaire; IAFF Transfer of Training

Questionnaire dealt with transfer of knowledge and skills. The IAFF HazMat Training

Questionnaire for the supervisors examined the perception of supervisors regarding the degree of

presence of the nine Broad and Newstrom (1992) factors. The questionnaires were developed

after a careful review of Broad and Newstrom's (1992) book, *Transfer of Training: Action*

Packed Strategies to Ensure High Payoff from Training Investment and numerous articles on

factors affecting transfer. After a thorough review of literature and instruments used in previous

studies for measuring transfer, a list of items for each factor was developed. Each item was

examined, and items that were not content relevant were eliminated. The items were then

restated based on the nature of the fire-fighter population to be measured by these instruments

and the hazardous material training the fire fighters received. The items were then submitted to a

panel of content knowledgeable fire fighter and training experts provided by the International

Association of Fire fighters. The experts, who were all highly proficient in the content area of

handling hazardous materials and experienced in the fire fighter requirements for dealing with

these dangerous articles as well as the conditions surrounding their presence, critically examined

each item. They provided detailed feedback to ensure the accuracy and safety dimensions of

each. They also verified the relevance of the items with respect to the official training given.

The questionnaires were again revised to derive the items and instruments, and reviewed

for content validity and correctness by a panel of transfer of training subject matter experts,

consisting Drs. Broad, Newstrom, and Stolovitch. The questionnaires were pilot tested with two

samples of fire fighters and supervisors selected from the population for which the study

intended to draw the survey participants. As a result of the careful preparation of the instruments

and the protocols for application, no changes in the instrument or their use were required

following the pilot study phase. The step-by-step process is detailed in the following sections.

Design of the Procedures

This study examined the relationship between the nine Broad and Newstrom (1992) factors and transfer of training. The process also sought to provide evidence for instrument validity.

Plan of Action

The purpose of this study was to assess the presence or absence of the nine Broad and Newstrom factors and their influence on transfer of training. The researcher developed three instruments related to the nine Broad and Newstrom transfer of training factors. The first instrument measured the perceptions of trainees related to degree of presence of factors influencing transfer of training; the second instrument measured perceptions regarding the transfer of skills and knowledge to the workplace; the third instrument measured the perceptions of their supervisors related to the degree of presence of the same factors influencing transfer of training (Appendix B). Table C1 (Appendix C) provides an overview of the plan of action for instrument design for this study. Additionally, areas of this plan are discussed in more detail in subsequent sections.

Developing the Inventory

The three instruments discussed above were the result of a comprehensive study and review of literature. The literature review suggested that training does not transfer consistently in measurable terms. Unless the reasons for lack of transfer can be identified and resolved, organizational support for future centrally managed Human Resource Development (HRD) efforts may be dramatically reduced. The investigator began by developing a tentative definition of the apparent problem to guide her thoughts and came up with the following questions: Why does training not transfer to the workplace? What are the barriers that keep trainees from fully

applying newly learned behaviors to their jobs? Broad and Newstrom (1992) identified nine

barriers preventing trainees from applying their knowledge and skills to the workplace. To date,

there is no validated instrument to assess the presence or absence of these nine Broad and

Newstrom (1992) factors and directly relate them to transfer.

To help determine the underlying principles to consider when developing a research

question, the investigator examined literature to discover what factors researchers have found

that influence transfer of training, how others have addressed this question, and the outcomes of

their investigations. A careful review of literature revealed that there was no study measuring all

the nine factors identified by Broad and Newstrom (1992). Therefore, there was a need for a

standardized, validated survey tool for measuring the nine Broad and Newstrom transfer of

training factors as a whole.

Development of the Instruments

The researcher reviewed empirical studies on transfer of training and selected five studies

(Burke & Baldwin, 1999; Clemenz, 2001; Cromwell, 2000; Hicks, 2006; Sekowski, 2002) that

had instruments containing the highest number of Broad and Newstrom (1992) factors. The

researcher then created Table C2 (Appendix C), containing statements found in these studies

related to the nine Broad and Newstrom (1992) factors and then selected the statements from the

five studies mentioned above that were most relevant to Broad and Newstrom's nine factors

(refer to Table C3 in Appendix C). To be sure, the researcher verified these statements with the

key words and phrases (refer to Table C3 in Appendix C) given in Broad and Newstrom's (1992)

book *Transfer of Training: Action Packed Strategies to Ensure High Payoff from Training

Investment*. The researcher was efficient and developed a Blueprint Table (refer to Table C4 in

Appendix C), which delineated the main topics of the questionnaire that are directly related to

the research question. The Blueprint Table was used as a guide to develop appropriate questions and to determine criterion-related validity. As questions or items were developed, they were assigned to a topic area in the Blueprint Table.

The author used University of Central Florida's Dr. Stephen Sivo's guidelines from his course on survey research and Dillman's (1999) three-step principles for framing a questionnaire.

Validity and Reliability

The protocol for the content validation process was based on that recommended by Kerlinger (1986) and Haynes and O'Brien (2000). Content validity is the representative or sampling adequacy of the content substance, the matter, and the topic of a measuring instrument (Kerlinger, 1986). The questionnaires were developed after a careful review of Broad and Newstrom's (1992) book, *Transfer of Training: Action Packed Strategies to Ensure High Payoff from Training Investment* and numerous articles on factors affecting transfer. Based on research literature as well as an array of instruments for measuring transfer used in previous studies(Burke & Baldwin, 1999; Clemenz, 2001; Cromwell, 2000; Hicks, 2006; Sekowski, 2002), a list of items for each factor was generated. Initially, most of the items were drawn from previous instruments used in transfer studies that have established validity (Burke & Baldwin, 1999; Clemenz, 2001; Cromwell, 2000; Hicks, 2006; Sekowski, 2002), and were compiled and categorized according to the nine Broad and Newstrom factors. Each item was then carefully examined and was weighed for its presumed representation of Broad and Newstrom factors (1992) (Appendix D). Items that did not appear to be content relevant were eliminated, and unclear items were reworded. The items for each factor not only measured the knowledge gained

but also measured understanding, interpretation, and analysis. The items were then restated based on the nature of the fire-fighter population which these instruments measured and the hazardous material training the fire fighter participants received. The items were then submitted to a panel of content knowledgeable fire fighter and training experts. The items were again edited to derive the items and instruments and expert review process was initiated.

Expert Review

An expert review of the item pool was conducted to assess the content validity of the survey by requesting detailed responses concerning clarity, relevance, and quality of items. The expert panel consisted of nationally renowned subject matter experts in the field of transfer of training: Drs. Broad, Newstrom, and Stolovitch. The investigator contacted these individuals through electronic mail and by telephone to request their assistance in serving as expert reviewers for this study.

The reviewers were provided with a letter explaining the intent of the study as well as the process of framing questionnaires and the measurement scale (Appendix F). They were given an expert rating sheet and were asked to rate each item on both clarity and relevance on a three-point scale (Appendix E). They were also asked to discuss the effectiveness of the items for each variable. Additional comments on items and measures as a whole were also solicited in a conference call where the investigator personally noted all the suggestions and comments.

The results of the expert review were compiled on a summary sheet. Each item was reviewed considering the individual item comments. Several items were revised due to these comments, and a few new items were added. Some items were rewritten due to feedback concerning the design of items rather than content. The researchers used

http://www.randomizer.org/ to randomize the items in the questionnaires for testing with pilot groups.

The first scale was the IAFF HazMat Training questionnaire (for the trainee and supervisor), with a total of nine items with each item having sub-items: Reinforcement on the Job had five sub-items; little interference from immediate (work) environment had seven sub-items; Supportive organizational culture had seven sub-items; Trainees' perception of training programs being practical had four sub-items; Trainees' perception of relevant training content had six sub-items; Trainees' being comfortable with change and associated effort had four sub-items; Inspiration or support of the trainer had six sub-items; Trainees' perception of training being well designed/delivered had six sub-items; and Peer support had six sub-items (Appendix B).

The second scale is an IAFF Transfer of Training scale with a total of three items with each item having sub-items: Understanding hazardous material had six sub-items; recognizing hazardous material had five sub-items; and responding to hazardous material had six items (Appendix B).

Survey Pilot Test

The questionnaires were pilot tested with two samples of individuals considered to be representative of the population from which the study was to draw the survey participants. This test ensured the internal validity of the instruments. Each scale of the instrument was developed keeping in mind the culture of fire fighters and a thorough review and understanding of the criteria. The pilot took place at two locations across the country-on the east coast in Gainesville, Florida where three trainees and three supervisors answered the questionnaires and on the west coast in Compton, California where two trainees and two supervisors were tested. The result of

the pilot test ensured internal validity, comprehensibility of the directions, and item content. It also verified the amount of time required for responses and other logistical issues. As a result of the pilot tests, there were no revisions were made to the questionnaires and procedures and therefore, the responses of pilot data were included in the final analysis.

Data Collection

Consideration of the time constraints and responsibilities of the potential respondents were taken into account. Very importantly, to maintain the confidentiality of the participants and to link transfer of knowledge and skills with presence of Broad and Newstrom's (1992) nine factors, the IAFF Transfer of Training and IAFF Hazardous Material Training trainee questionnaires were stapled together and made into individual packets for each participant (for Trainee). The supervisors were only administered IAFF Hazardous Material Training supervisor questionnaire. Before starting the data collection, the investigator filled institutional review board (IRB) forms for getting permission to conduct research on human subjects. The researcher personally visited the 12 of the 13 fire departments which had trainees who had undergone HazMat training to administer the questionnaires, collect the data, explain to the respondents what they were required to do for filling it out, and ensure that there was a private space for them to respond individually (In one instance, Dr. Stolovitch, who had worked very closely with the author if this study, administered the instruments following scripted guidelines). At the time of distribution of the packets, the investigator gave clear instructions for the questionnaires not to be separated. The participants were asked to fill out IRB approved consent forms and then respond to the questionnaires and return them directly into the packets. Finally, the packets were collected by the investigator on the same day.

Description of the Setting

The International Association of Fire Fighters (IAFF) is the nationwide employee representative for professional fire fighters and paramedics in the U.S., representing over 265,985 career fire fighters. Through its system of local unions, it maintains training partnership arrangements with hundreds of fire departments. The IAFF has supported improved major disaster response training even before the events of September 11, 2001. However; an intense national focus on disaster mitigation came into being as a result of that fateful day. The 9-11-01 tragedy showed that it is the fire fighters, who are the nation's first line of defense against any emergency, large or small, whether man-made or as the result of a natural disaster.

The IAFF has developed an extensive Hazardous Material (HazMat) training program for fire and emergency personnel. The IAFF HazMat Training for First Responders Program and Emergency Response to Terrorism Operations Programs have successfully trained tens of thousands of first responders in the U.S. to a recognized level of response. The IAFF executes a proven training plan that emphasizes occupational safety and health, and adhere to Occupational Safety & Health Administration (OSHA) standards which define first responder training as a foundation of professional and effective emergency response. The first responder operations-level course offers the tools to protect responder's health and safety, while covering basic defensive actions, personal protective equipment, hazard recognition and identification, pre-incident planning, and scene management. This course involves small group activities and real life case studies and meets or exceeds OSHA (29 CFR 1910.120) and National Fire Protection Association (NFPA) Standards (472).

The data for the study was collected from 13 fire departments located in metropolitan, suburban, and rural areas across the United States as detailed earlier. The 13 fire departments all had fire fighters, who had undergone first respondent training within last twelve months or more.

Data Analysis

This study is a correlational research study. The proposed research questions under investigation address the interrelationship between the Broad and Newstrom factors and transfer of training. The following are research questions investigated and tested in this study:

The Research Question

The two research questions were:

1. Do the nine individual Broad and Newstrom (1992) factors vary in their degree of influence on transfer of training?

2. Does the degree of influence of the nine individual Broad and Newstrom (1992) factors on transfer of training vary with the work context?

To analyze the data, a linear multiple regression and factor analysis was used to learn more about the relationship between several independent or predictor variables (nine Broad and Newstrom factors) and a dependent or criterion variable (transfer of training). Multiple regression can establish that a set of independent variables explains a proportion of the variance in a dependent variable at a significant level (through a significance test of R^2) and can establish the relative predictive importance of the independent variables (by comparing beta weights). Multiple regression was used to answer the question "Do the nine individual Broad and Newstrom (1992) factors vary in their degree of influence on transfer?" The order of entry of independent variables did not represent, retrospectively, their importance. For answering

research question number two, a correlation analysis was done on nine factors, transfer of

training, and 13 locations (work context).

Limitations

This study used a sample of convenience, and the number of participants was limited so

that the generalization of the results could be viewed as tentative. As with any self-report

approach, the subjects may overestimate or underestimate their perception of factors or degree of

transfer. Moreover, the items in the study's questionnaires, though developed from a thorough

review of the literature and approved by experts in the field of workplace performance and

training, may or may not have been defined appropriately or have measured what was intended.

CHAPTER FOUR: FINDINGS

The purpose of this chapter is to present the analysis of the data collected through the IAFF HazMat Training instruments for the trainees and supervisors and IAFF Transfer of Training Instrument for the trainees. Before presenting the analysis for question one, the author evaluates the quality of dependent variable (Transfer of Training) with help of factor analysis and provides quality to Transfer of Training Instrument. To substantiate further, validity results are discussed followed by analysis of question one and two. In the last section demographics related to the data are presented followed by a summary of the chapter.

Reliability and Validity

The instruments were adopted after a careful review of literature on transfer of training followed by examination by expert panel and pilot testing; nevertheless, the author tries to reaffirm the validity and reliability to a satisfactory degree with the help of internal consistency reliability analysis and exploratory factor analysis (on Transfer of Training instrument).

Validity of Transfer of Training Instrument

An exploratory factor analysis was conducted to validate the measures using the IAFF Transfer of Training instrument data. Using Cattell's (1979) rule to determine which factors were most eligible for interpretation, one prominent factor with an eigenvalue 8.640 was identified. This prominent factor, named Transfer of Training (TOT) was identified to be the intended construct for the measure, and it explained roughly 50% of all the variable variances (see Table 1).

Table 1. Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings(a)
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	8.640	50.824	50.824	8.141	47.886	47.886	7.192
2	1.547	9.103	59.926	1.136	6.684	54.570	6.929
3	1.043	6.136	66.062	.731	4.301	58.871	5.822
4	.748	4.397	70.460				
5	.682	4.010	74.469				
6	.605	3.556	78.026				
7	.512	3.015	81.040				
8	.465	2.737	83.777				
9	.450	2.650	86.427				
10	.412	2.422	88.849				
11	.389	2.289	91.137				
12	.342	2.009	93.147				
13	.317	1.867	95.014				
14	.290	1.705	96.718				
15	.244	1.434	98.152				
16	.160	.940	99.092				
17	.154	.908	100.000				

Extraction Method: Maximum Likelihood.
When factors are correlated, sums of squared loadings cannot be added to obtain a total variance

A plot of the eigenvalues (see Figure 1) provides evidence of the prominence of prime

factor underlying responses to the scale. In this study, the communalities did not exceed 1.0,

providing further evidence that the results are appropriate for interpretation (see Table 2). Given

the prominence of one factor, the results were re-run for a one factor solution.
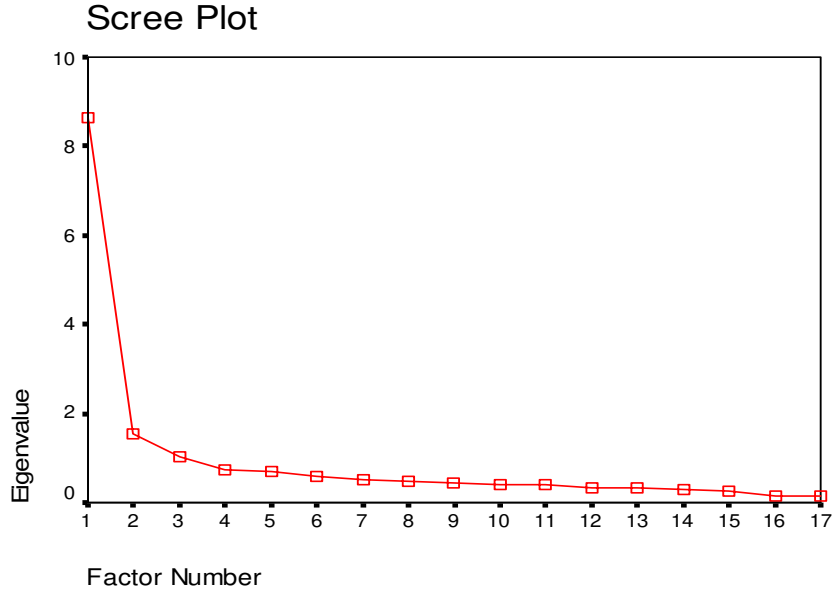
Scree Plot

Figure 1. Scree Plot of Eigenvalues

Table 2. Communalities

	Initial	Extraction
Review chem./phys	.486	.480
Discussion	.478	.505
Analyze incidents	.501	.546
Note HazMat materials	.497	.503
Review/address issues	.507	.488
Keep records HazMat	.565	.510
Avoided contact	.462	.539
Review dept procd	.598	.616
Reported signs exposure	.628	.705
Records alarms HazMat	.506	.433
Decontamination	.531	.502
Learned about chem.	.616	.589
Conducted pre-incident plans	.626	.589
Analyze potential HazMat	.665	.643
Planned HazMat response	.761	.766
Implemented the plan	.779	.867
Established proper decontamination	.716	.729

Extraction Method: Maximum Likelihood.

Review of the Factor matrix suggests that the way trainees responded to the transfer items was very consistent, and all of the variables together contribute strongly to the scale (see Factor Matrix in Table 3). The name of the factor extracted was Transfer of Training.

Table 3. Factor Matrix

	Factor
	1
Implemented the plan	.848
Planned Hazmat response	.838
Analyze potential hazmat	.807
Established proper decontamination	.789
Conducted pre-incident plans	.774
Learned abt chem.	.740
Keep records hazmat	.703
Note HazMat materials	.680
Review dept procedure	.673
Reported signs exposure	.650
Review/address issues	.638
Discussion	.637
Analyze incidents	.634
Records alarms HazMat	.619
Review chem./phys	.574
Decontamination	.539
Avoided contact	.453

Extraction Method: Maximum Likelihood.
1 factor extracted. 4 iterations required.

Reliability

There were two scales used to measure influence of Broad and Newstrom's (1992) nine factors and transfer of training. The first scale was the IAFF Hazardous Material Training Instrument for the trainees and their supervisors. The second scale IAFF Transfer of Training Instrument was only for trainees.

Overall respondent ratings of different factors obtained from the IAFF Hazardous Material Training questionnaire data were judged to be highly reliable for the fire-fighter trainees

and their supervisors to whom it was given, with an overall reliability coefficient of .941. The

reliability of the measures ranged between .696 and .836 (see Table 4).

Table 4. Reliability Statistics for IAFF HazMat Training Instrument

Variable	Cronbach's Alpha	No. of items
Reinforcement on the job	.770	5
Little interference from immediate (work) environment	.702	7
Supportive organizational culture	.760	7
Trainees' perception of training programs being practical	.836	4
Trainees' perception of relevant training content	.774	6
Trainees' being comfortable with change and associated effort	.834	4
Trainer being supportive and inspiring	.767	6
Perception of training being well designed/delivered	.696	6
Peer support	.775	6
Reliability Coefficients of the Instrument N of Cases: 281 N of Items: 9 Alpha: .941		

The cronbach's alpha coefficient of the IAFF Transfer of Training questionnaire data was

also very good with an overall reliability coefficient of .863. The values ranged between .660 and

.817. The value table (see Table 5) suggests that overall they have been assessed well.

Table 5. Reliability Statistics for IAFF Transfer of Training Instrument

Factor	Cronbach's Alpha	No. of items
Understanding Hazardous Material	.770	6
Recognizing Hazardous Material	.660	5
Responding to Hazardous Material	.817	6
Reliability Coefficients of the Instrument N of Cases: 177 N of Items: 3 Alpha:.863		

Research Question 1

Do the nine individual Broad and Newstrom (1992) factors vary in their degree of influence on transfer of training?

A standard multiple regression was used to answer this question by regressing the dependent variable transfer training against Broad and Newstrom's (1992) nine predictor/independent variables: reinforcement on the job, little interference from immediate (work) environment, supportive organizational culture, trainees' perception of training programs being practical, trainees' perception of relevant training content, trainees' being comfortable with change and associated effort, inspiration or support of the trainer, trainees' perception of training being well designed/delivered, and peer support.

Overall, the linear composite of the independent variables entered into the regression procedure predicted 45% of the variation (see Table 6) in the dependent criterion $F (9, 155) = 13.328$, $p < 0.05$ (see Table 7). Table 8 shows that there is a correlation between Broad and

Newstrom's (1992) nine factors and the dependent variable Transfer of Training providing

evidence of influence of Broad and Newstrom's (1992) factors on transfer of training.

Table 6. Multiple Regression Model Summary (a)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.672(a)	.451	.417	10.550

a. Predictors: (Constant), Peer Support, Perception of training being well designed/delivered , Relevant Training Content , Little Interference from immediate (work) environment, Supportive Organizational Culture, Trainer being supportive and inspiring , Reinforcement on the job, Trainees being comfortable with change and associated efforts, Practical Training Programs
b. Dependent Variable: Transfer of Training

Table 7. ANOVA (b)

Model Summary

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13349.902	9	1483.322	13.328	.000(a)
	Residual	16248.995	146	111.294		
	Total	29598.897	155			

a. Predictors: (Constant), Peer Support, Perception of training being well designed/delivered , Relevant Training Content , Little Interference from immediate (work) environment, Supportive Organizational Culture, Trainer being supportive and inspiring , Reinforcement on the job, Trainees being comfortable with change and associated efforts, Practical Training Programs
b. Dependent Variable: Transfer of Training

Table 8. Pearson Correlations

		Total transfer	Reinforcement on the job	Little interference from immediate (work) environment	Supportive organizational culture	Practical training programs	Relevant training content	Trainees being comfortable with change and associated efforts	Trainer being supportive and inspiring	Perception of training being well designed/ delivered	Peer support
Pearson Correlation	Total transfer	1.000	.470	.468	.618	.482	.460	.555	.414	.357	.568
	Reinforcement on the job	.470	1.000	.646	.800	.666	.523	.654	.609	.516	.739
	Little interference from immediate (work) environment	.468	.646	1.000	.622	.630	.562	.633	.623	.603	.561
	Supportive organizational culture	.618	.800	.622	1.000	.639	.507	.641	.566	.473	.755
	Practical training programs	.482	.666	.630	.639	1.000	.741	.772	.660	.699	.690
	Relevant training content	.460	.523	.562	.507	.741	1.000	.760	.633	.580	.549
	Trainees being comfortable with change and associated efforts	.555	.654	.633	.641	.772	.760	1.000	.617	.566	.741
	Trainer being supportive and inspiring	.414	.609	.623	.566	.660	.633	.617	1.000	.801	.509
	Perception of training being well designed/delivered	.357	.516	.603	.473	.699	.580	.566	.801	1.000	.422
	Peer support	.568	.739	.561	.755	.690	.549	.741	.509	.422	1.000

N=156

The result of the regression analysis revealed that relationship between Broad and Newstrom's (1992) nine factors and Transfer of Training was significant with reinforcement on the job (t=-2.134, p<.05) and supportive organizational culture (t=4.388, p<.05), contributing most significantly to transfer of training (dependent variable) (see Table 9).

Most of the confidence intervals around each of the b weights included zero as a probable value (see Table 9). Note two exceptions here: reinforcement on the job and supportive

organizational culture. This result suggests that most of the independent variables failed to

provide evidence for sufficient precision with the exception of reinforcement on the job and

supportive organizational culture.

Table 9. Coefficients(a)

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
	B	Std. Error	Beta	Lower Bound	Upper Bound	Tolerance	VIF
(Constant)	-2.805	7.434		-.377	.706	-17.497	11.886
Reinforcement on the job	-.969	.454	-.248	-2.134	.035	-1.866	-.072
Little Interference from immediate (work) environment	.235	.269	.081	.875	.383	-.296	.766
Supportive Organizational Culture	1.431	.326	.500	4.388	.000	.787	2.076
Practical Training Programs	-.434	.757	-.072	-.573	.568	-1.930	1.063
Relevant Training Content	.403	.454	.094	.887	.376	-.495	1.301
Trainees being comfortable with change and associated efforts	1.072	.707	.187	1.517	.132	-.325	2.469
Trainer being supportive and inspiring	.015	.469	.004	.033	.974	-.912	.943
Perception of training being well designed/delivered	.039	.494	.009	.080	.936	-.936	1.015
Peer Support	.631	.405	.181	1.559	.121	-.169	1.431

a. Dependent Variable: Transfer of Training

Closer inspection of the b weights revealed that with every unit increase in the supportive

organization culture, a 1.431 unit increase was observable in the transfer of training providing

further evidence for supportive organizational culture being strong predictor of transfer of

training. However, reinforcement on the job had an inverse relationship with transfer of training, with the every unit increase in reinforcement on the job, a -.969 unit decrease was observable in transfer of training, a result inconsistent with the theory, requiring further investigation (see Table 9).

The beta weight revealed that a standardized unit change in the independent variable-supportive organizational culture resulted in .500 unit change in the dependent variable transfer of training. This unit change in transfer of training was higher in comparison to a unit change brought about by other eight independent variables. The VIF for all the nine predictors did not exceed 10.00. The squared structure coefficients revealed that supportive organizational culture accounted for 50.0% of the explained variance in comparison to all other eight independent variables (see table 9). Therefore, supportive organizational culture explained a sizable portion of the R^2.

Examination of the plot of the data of the standardized residuals against the predicted values revealed no (1) nonlinear trends or (2) heteroscedasticity (inconstant variance). Moreover, the distribution of the standardized errors sufficiently approximated normality (see Figure 2, Figure 3, and Figure 4).

Histogram

Dependent Variable: Total Transfer

Mean =-2.63E-16
Std. Dev. =0.971
N =156
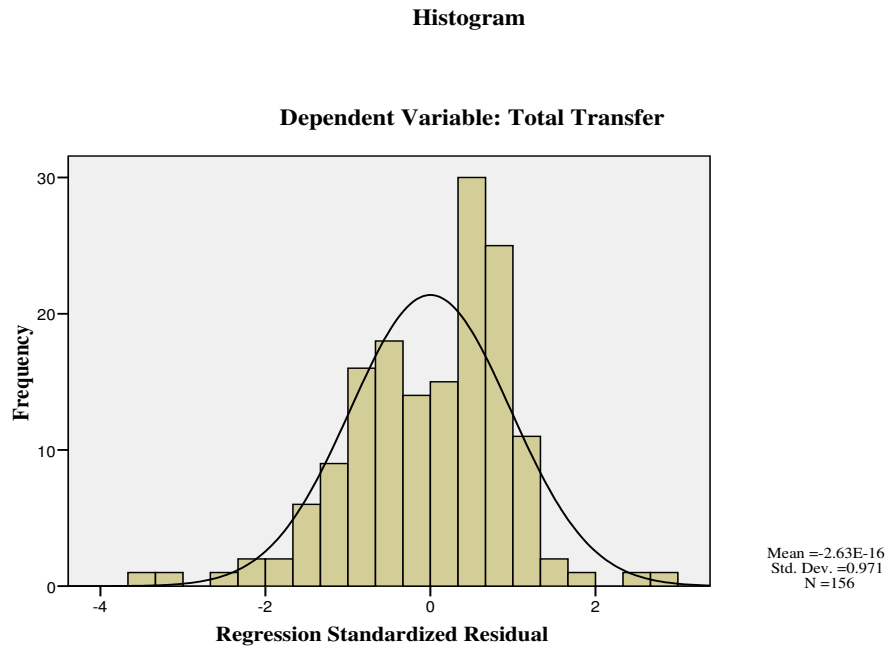
Figure 2. Histogram

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: Total Transfer
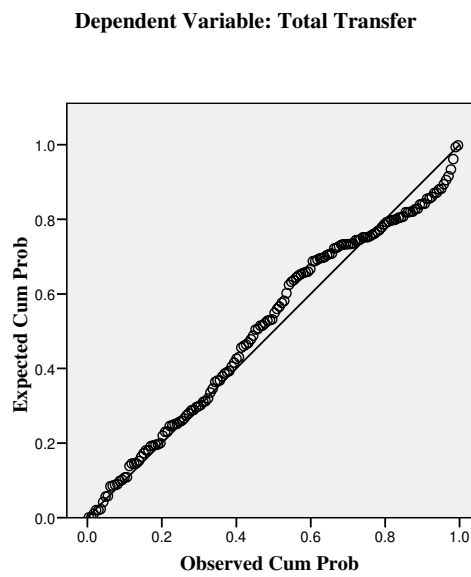
Figure 3. Normal P-P Plot of Regression Standardized Residual

Dependent Variable: Total Transfer
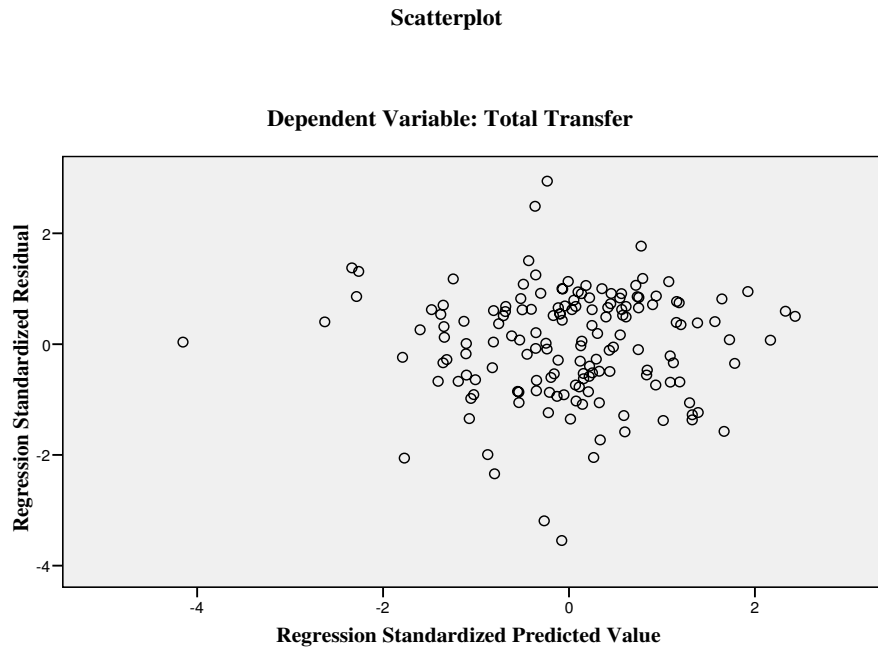
Figure 4. Scatter Plot

Given the discerning result that beta weight for reinforcement on the job was negative (-.248) though it was statistically significant with p=.035 (see Table 9), suggesting an inverse relationship with the dependent variable transfer of training contrary to the theory. Further investigation revealed that reinforcement on the job also had a correlation of .470 with the dependent variable transfer of training (see Table 8). The beta weights for peer support and trainees being comfortable with change and associated effort were not statistically significant (see Table 9), despite raw correlations of .568 and .555 respectively with transfer of training.The findings together suggest multicollinearity, therefore further investigation were conducted to understand the overall correlational dynamics. A factor analysis was done on all the items of IAFF HazMat Training Instrument and IAFF Transfer of Training Instrument to identify logical combination of variables and to understand the interrelationship among variables for providing

an empirical basis for judging the structure of the variables for interpreting the results (Hair,

Black, Babin, Anderson, & Tatham, 2006).

As a preliminary exploration of the factor space of the IAFF HazMat Training Instrument

and Transfer of Training instrument, a factor analysis was performed on the 68 items (51 items

of IAFF HazMat Training Instrument, 17 items of IAFF Transfer of Training instrument). The

first factor identified had the highest loading of 15.907 and a large eigenvalue of 23.120. It

accounted for 34.0% of the total variance. This factor was supportive organizational culture.

Table 10. Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings(a)
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	23.120	34.000	34.000	22.642	33.298	33.298	15.907
2	5.561	8.178	42.178	5.208	7.658	40.956	12.927
3	3.594	5.286	47.464	3.208	4.718	45.674	11.401
4	2.533	3.724	51.188	2.152	3.165	48.839	14.585
5	2.020	2.971	54.159	1.579	2.322	51.161	11.905
6	1.748	2.570	56.729	1.266	1.862	53.023	5.620
7	1.537	2.260	58.990	1.261	1.854	54.878	11.059
8	1.400	2.059	61.048	1.000	1.471	56.348	4.211
9	1.312	1.929	62.978	1.051	1.546	57.894	10.381
10	1.164	1.712	64.689	.764	1.123	59.017	5.440
11	1.106	1.627	66.316	.666	.980	59.997	7.343
12	1.023	1.504	67.820	.687	1.010	61.007	2.026
13	.977	1.437	69.257				
14	.949	1.395	70.652				
15	.918	1.350	72.003				

Extraction Method: Maximum Likelihood.
a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.
b. Factors with Eigenvalues of .900 or higher are presented in the table.

The designer of the 51-item IAFF HazMat Training instrument purported nine factors

based on the framework given by Broad and Newstrom (1992). The result of the factor analysis

shows that twelve factors were extracted; however; there were cross-loadings between items belonging to different factors (see Table 11). The structure matrix given in Table 11 shows that supportive organizational culture dominated all the other variables with a large eigenvalue of 23.120. It had a high correlation with the Reinforcement1, 4, and 5 (all parts of Factor 1) and Peer support 3, 4, 5, and 6 (all parts of factor 9). As shown in Table 11, all of the items belonging to transfer of training instrument were all highly correlated with each other and with other variables. The items belonging to transfer of training scale contributed to factor one because supportive organizational culture emerged from the data as the strongest predictor of transfer of training.

Table 11. Structure Matrix

	Factor											
	1	2	3	4	5	6	7	8	9	10	11	12
Practical Training 1	.317	.146	.506	.480	.445	.108	.299	.724	.335	.387	.167	-.203
Design 3	.416	.159	.593	.365	.380	.178	.337	.815	.295	.391	.157	-.124
Reinforcement 1	.710	.271	.275	.198	.284	7.146E-03	.374	.316	.291	.189	.219	2.529E-02
Design 5	.437	.193	.530	.485	.379	.170	.561	.423	.321	.323	.214	-.182
Supp Org Cul 2	.690	.400	.216	.286	.275	.221	.433	.159	.264	.220	.298	-.084
Peer support 6	.655	.394	.255	.425	.330	.198	.721	.104	.339	.210	.314	3.216E-02
Peer support 2	.481	.331	.114	.369	.323	.230	.545	5.381E-02	.230	.169	.267	-.169
Supp Org Cul 3	.633	.422	.286	.409	.578	.194	.532	.142	.397	.270	.437	-.297
Interference 5	.402	.334	.405	.331	.663	.270	.267	6.430E-02	.204	.219	.164	-.262
Interference 4	.339	.269	.516	.356	.613	.245	.434	.286	.289	.346	.198	-.329
Trainee comfortable 1	.332	.303	.369	.578	.437	.186	.643	.354	.385	.373	.290	-.217
Interference 7	.467	.315	.476	.465	.539	.176	.538	.180	.313	.157	.169	-.252
Peer support 3	.645	.445	.434	.551	.513	8.693E-02	.770	.148	.538	.173	.522	-.222
Practical Training 2	.590	.327	.324	.513	.366	.171	.552	.428	.460	.454	.368	-.151
Relevant Train Cont 2	.270	.197	.464	.647	.526	.360	.479	.347	.279	.526	.203	-.356
Interference 1	.396	.254	.384	.369	.705	8.723E-02	.433	.178	.397	.217	.429	-.034
Peer support 4	.684	.417	.300	.364	.309	.180	.668	6.477E-02	.332	.194	.324	.172
Trainee comfortable 2	.495	.395	.365	.679	.463	.170	.746	.295	.413	.291	.364	-.345
Trainer supportive 6	.492	.402	.454	.455	.352	.193	.395	.291	.332	.544	.308	-.104
Reinforcement 5	.701	.360	.359	.499	.549	2.955E-02	.374	.251	.491	.456	.497	-.241
Reinforcement 4	.737	.272	.313	.478	.366	5.286E-02	.373	.234	.316	.240	.356	-.141
Interference 3	.463	.261	.354	.513	.730	1.540E-02	.384	.175	.462	.319	.453	-.280
Practical Training 3	.465	.270	.348	.619	.522	9.150E-	.519	.216	.554	.484	.372	-.138

99

						02					
Reinforcement 3	.541	.260	.378	.348	.417	4.016E-03	.353	.126	.348	.156	.565	-.164
Trainer supportive 1	.269	.204	.749	.539	.436	.278	.343	.237	.287	.425	.144	-.224
Relevant Train Cont 1	.255	.222	.311	.609	.309	3.778E-02	.269	9.439E-02	.218	.174	.154	-.119
Trainee comfortable 4	.383	.386	.502	.772	.387	.276	.441	.260	.294	.248	.211	-.249
Trainer supportive 4	.429	.199	.620	.408	.292	.275	.274	.204	.233	.266	.266	-.067
Peer support 1	.499	.420	.328	.626	.397	6.869E-02	.465	3.254E-02	.410	-.042	.415	-.161
Trainer supportive 3	.261	.124	.775	.525	.475	6.983E-02	.310	.322	.310	.141	.190	-.173
Relevant Train Cont 3	.272	.312	.425	.762	.428	.301	.369	.153	.339	.254	.224	-.146
Interference 6	.403	.230	.402	.409	.748	2.684E-02	.241	.284	.312	.198	.109	-.154
Supp Org Cul 4	.653	.337	.424	.405	.379	.107	.285	.193	.281	.275	.191	3.232E-02
Relevant Train Cont 5	.538	.389	.406	.796	.427	.166	.467	.288	.382	.404	.274	-.193
Trainer supportive 5	.593	.304	.411	.331	.478	8.260E-02	.265	.177	.396	.371	.438	-.280
Design 4	.376	.213	.666	.486	.377	.243	.305	.407	.418	.470	.203	-.151
Peer support 5	.597	.369	.265	.338	.305	9.321E-02	.453	.132	.507	.222	.408	-.007
Trainer supportive 2	.374	.131	.839	.477	.436	.112	.335	.285	.277	.159	.288	-.163
Design 1	.324	.191	.799	.403	.402	.143	.225	.392	.319	.233	.229	-.177
Supp Org Cul 5	.767	.485	.382	.392	.453	.215	.378	.102	.383	.149	.377	-.055
Relevant Train Cont 4	.360	.281	.402	.680	.350	.212	.391	.285	.284	.172	.332	-.332
Supp Org Cul 1	.613	.428	.337	.364	.423	.270	.258	.117	.341	.212	.250	-.119
Interference 2	.561	.368	.327	.313	.486	.152	.234	.136	.452	.260	.389	.215
Relevant Train Cont 6	.446	.362	.505	.726	.374	.240	.430	.460	.396	.315	.290	-.050
Supp Org Cul 7	.715	.496	.214	.426	.404	.162	.270	.124	.472	.271	.535	4.592E-02
Practical Training 4	.450	.369	.490	.648	.336	.188	.460	.208	.332	.140	.313	-.037
Supp Org Cul 6	.738	.440	.288	.487	.394	.183	.314	5.210E-02	.588	.212	.472	3.091E-02
Reinforcement 2	.474	.406	.273	.442	.419	.109	.377	-.003	.276	.116	.217	-.089
Design 6	.312	.188	.537	.286	.500	9.394E-	.273	.181	.360	.136	.255	-.213

								02				
Trainee comfortable 3	.591	.460	.367	.411	.476	.108	.460	-.015	.370	.105	.382	-.013
Design 2	.330	.188	.736	.417	.386	.154	.195	.425	.368	.520	.103	-.030
TOT: Review chem/phys	.372	.488	.323	.360	.262	.342	.315	.194	.682	.244	.254	2.592E-02
TOT: Discussion	.474	.598	.225	.337	.390	.270	.325	2.024E-02	.633	.255	.448	2.684E-02
TOT: Analyze incidents	.391	.548	.265	.354	.410	.267	.305	6.501E-02	.647	.202	.381	-.219
TOT: Note Haz materials	.406	.674	.232	.340	.340	.279	.209	-.060	.431	.199	.359	-.023
TOT: Review/address issues	.404	.619	.147	.277	.241	.256	.278	9.263E-02	.591	.249	.430	.178
TOT: Keep records hazmat	.430	.704	.129	.338	.118	.245	.234	8.378E-02	.365	.198	.423	.189
TOT: Avoided contact	.169	.378	.160	.178	.103	.769	.180	2.282E-02	.168	.145	.125	-.021
TOT: Review dept procd	.307	.591	.299	.350	.203	.689	.298	.155	.401	.338	.268	-.097
TOT: Reported signs exposure	.351	.574	.207	.283	.241	.802	.268	6.603E-02	.337	.304	.207	-.012
TOT: Records alarms hazmat	.359	.532	9.214E-02	.248	.154	.526	.244	-.044	.330	.220	.618	9.406E-02
TOT: Decontamination	.207	.420	.279	.374	.309	.687	.264	.133	.368	.195	.326	-.163
TOT: Learned abt chem	.353	.656	.186	.398	.253	.481	.293	.131	.567	.398	.406	-.018
TOT: Conducted pre-incident plans	.454	.798	.191	.319	.311	.375	.217	3.989E-02	.447	.309	.347	-.030
TOT: Analyze potential hazmat	.468	.764	.319	.493	.419	.465	.486	1.738E-02	.471	.219	.333	-.256
TOT: Planned Hazmat response	.525	.890	.209	.367	.400	.392	.424	6.129E-02	.367	.148	.218	-.203
TOT: Implemented the plan	.441	.908	.188	.425	.347	.450	.383	6.927E-03	.287	.128	.263	-.075
TOT: Established proper decontam	.380	.836	.119	.420	.272	.382	.346	1.201E-02	.238	-.002	.175	-.142

Extraction Method: Maximum Likelihood.
Rotation Method: Promax with Kaiser Normalization.

The scree plot (see figure 5) indicates the prominence of prime factor underlying responses to IAFF Hazardous Material Training and Transfer of Training scales. "If a break exists, as will almost always be the case, between such larger factors and the debris of error factors and factors largely outside the test variables, then the number of psychologically significant factors can be found typically the plot line shows a distinct break between the "chute" of the larger factors and a much more gently sloping straight line running thereafter to the nth root. This latter runs at a constant angle, like the scree of the rock debris at the foot of the mountain-hence the present name" (Cattell, 1979 p. 62).
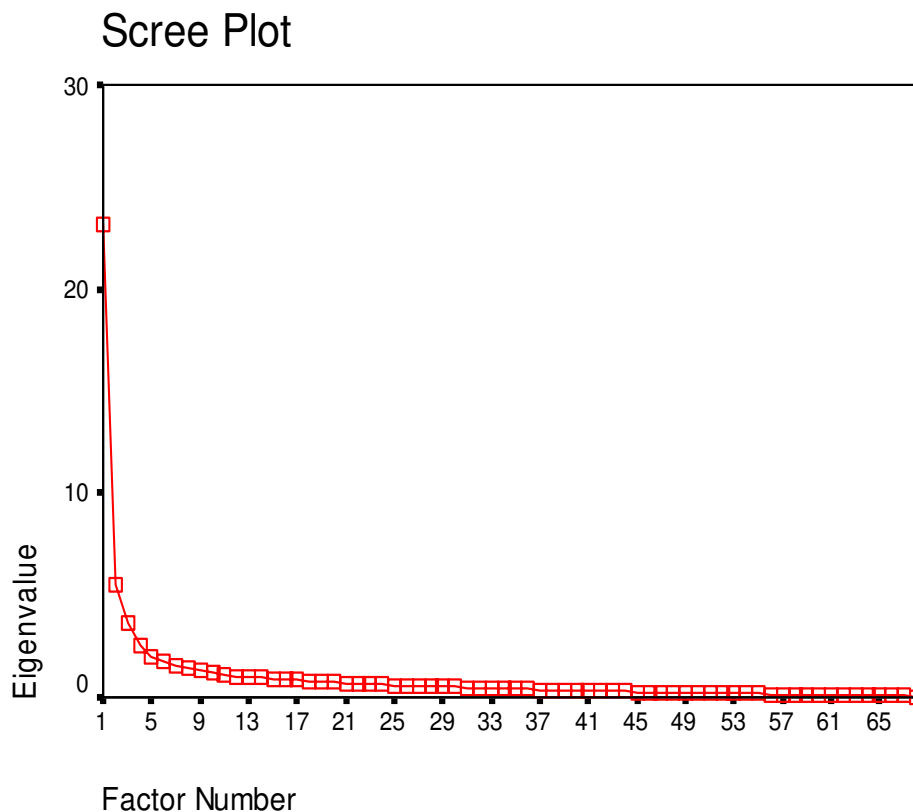
Scree Plot

Figure 5. Scree Plot of HazMat Training & Transfer of Training Items

In conclusion, the results of the factor analysis suggest that all the variables are highly correlated with each other. There is multicollinearity among variables. Supportive organizational

culture is the most prominent predictor of transfer of training (see Table 11) and it consists of three main underlying components of reinforcement on the job. Firstly, Reinforcement 1 which reads "When I use new skills and knowledge on the job that I learned in HazMat training, I receive some sort of recognition." Secondly, Reinforcement 4 states "Supervisors praise or reward those who demonstrate that they have effectively applied on-the-job what was taught in HazMat training." Thirdly Reinforcement 5 reads "Supervisors provide follow-up coaching directly related to HazMat training." Therefore, the results appear to suggest that reinforcement on the job is highly correlated with supportive organizational culture and does not stand as an independent predictor, consequently the reason for negative Beta coefficient. Moreover, Peer support did not turn out to be statistically significant as its items (3, 4, 5, and 6) load with the items belonging to supportive organizational culture and thereby, contribute to supportive organizational culture.

Research Question 2

Does the degree of influence of the nine individual Broad and Newstrom (1992) factors on Transfer of Training vary with the work context?

A bivariate correlation analysis was performed to test the relationship between the nine individual Broad and Newstrom (1992) factors, transfer of training and the work context (13 fire departments). The correlation analysis results suggest that there is a statistically significant relationship between the nine individual Broad and Newstrom (1992) factors and the transfer of training and the degree of influence of the nine individual Broad and Newstrom (1992) factors on transfer of training varied with the 13 fire departments across the country (see Table 12).

The correlation matrix in Table 12 indicates that the highest correlation with the transfer of training was practical training program with a coefficient of .940 in Compton and the lowest was little interference from immediate work environment in Gainesville, Florida, which had a coefficient of 0. A probable reason for this high and low correlation could be low sample size. Peer Support with a coefficient of .823 in Cincinnati, Ohio was the second highest predictor of transfer of training followed by perception of training being well designed and delivered with a coefficient of .782 in Bedford, Massachusetts.

To summarize, the degree of influence of the nine individual Broad and Newstrom (1992) factors on the transfer of training varied with the 13 fire departments. In Ft worth and Denton, Texas, supportive organization culture proved to be more influential among Broad and Newstrom's (1992) nine factors. Similarly, peer support proved to be highest predictor of transfer of training (TOT) at Houston, Texas, Cincinnati, Ohio, and Gainesville, Florida. Trainees' being comfortable with change and associated efforts was a strong predictor of TOT at Goodyear, Arizona, Milwaukee, Wisconsin, and Miami, Florida. Interference from the immediate (work) environment was a strong predictor of TOT at San Jose, California and Key West, Florida. In Montgomery County, Maryland, trainees' perception of relevant training content was a strong predictor of TOT in comparison to all the other eight factors while in Bedford, Massachusetts and Compton, California, trainees' perception of practical training programs was a strong predictor of TOT.

Table 12. Correlations

Total Transfer	N	Reinforcement on the Job	Little interference from immediate work environment	Supportive Organizational Culture	Practical Training Program	Relevant Training Content	Trainees being comfortable with change and associated effort	Trainer Being supportive and inspiring	Perception of training being well designed and delivered	Peer Support
Ft Worth, TX	23	.681	-.059	.763	.629	.538	.694	.463	.680	.583
Denton, TX	14	.099	-.468	.575	-.780	-.706	-.532	.110	-.635	.189
Houston, TX	32	.236	.422	.544	.690	.675	.656	.689	.599	.747
Goodyear, AZ	32	.568	.674	.690	.710	.542	.728	.551	.506	.615
Cincinnati, OH	30	.574	556	.691	.617	.731	.717	.374	374	.823
Montgomery, MD	5	-.118	.376	.096	.277	.733	.394	.558	.302	-.056
SanJose, CA	35	.300	.602	.417	.418	.450	.454	.367	.282	.295
Milwaukee, WI	28	.488	.160	.509	.137	.474	.637	.308	-.443	.330
Bedford, MA	16	.524	.610	.689	.180	-.043	.369	.521	.782	.550
Miami, FL	39	.507	.599	.584	.557	.591	.717	.528	585	.585
Key West, FL	17	-.007	.554	-.041	.077	.481	.204	.262	.482	.193
Gainesville, FL	6	.255	.000	.629	-.250	.563	.629	.511	-.176	.933
Compton, CA	4	.303	.061	.777	.940	.644	-.014	.175	-1.000	.287

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Data Characteristics

Perception of Trainees and Supervisors

Based on the *t*-test on the nine factors given in Table 13, it does seem as though the fire-fighter trainees and supervisors are somewhat distinct in their perception regarding the nine Broad and Newstrom (1992) factors. There were statistically significant differences in perception of fire fighter trainees and their supervisors on four of the factors at alpha level of .05. The factors are: supportive organizational culture with $p=.002$, trainees' perception of practical training programs with $p=.011$, trainer being supportive and inspiring with $p=.003$ and trainees' perception of training being well designed/delivered with $p=.000$.

A closer examination the descriptive statistics in Table 13 appears to suggest that for supportive organizational culture, the mean for the supervisors was higher than that for the fire-fighter trainees indicating that supervisors perceive supportive organizational culture to be more significant than trainees while for practical training program, trainer being supportive and inspiring and training being well designed/delivered, the mean for trainees was higher than that for the supervisors.

Table 13. Independent Sample *t*-test on Perception of Trainees and Supervisor

Factor	Variable	Group	N	Mean	sd	*P*
1	Reinforcement on the Job	Trainee	180	15.90	3.650	.054
		Supervisor	98	16.74	3.137	
2	Little Interference from Work Environment	Trainee	180	25.92	4.648	.519
		Supervisor	100	25.55	4.391	
3	Supportive Organizational Culture	Trainee	180	23.16	4.795	.002
		Supervisor	99	25.00	4.600	
4	Practical Training Program	Trainee	180	15.42	2.279	.011
		Supervisor	100	14.66	2.547	
5	Relevant Training Content	Trainee	180	24.35	3.149	.090
		Supervisor	100	23.66	3.421	
6	Comfort w/change	Trainee	179	15.49	2.378	.127
		Supervisor	100	15.02	2.550	
7	Supportive Trainer	Trainee	176	23.59	3.322	.003
		Supervisor	99	22.24	3.878	
8	Training well designed & delivered	Trainee	164	24.66	3.242	.000
		Supervisor	98	22.16	3.831	
9	Peer Support	Trainee	178	20.81	3.918	.106
		Supervisor	100	21.62	4.156	

Population and Sample

The survey was administered to 281 respondents, which consisted of 181 trainees (64.4%) and 100 supervisors (35.6%). Table 14 represents the number of respondents by location. The research effort was taken on a voluntary basis. Participants were purposively sampled, and the confidentiality of the participants was given top priority.

The data was collected from 13 fire departments which consisted of trainees who had undergone HazMat training and their current supervisors. The fire departments were: Ft. Worth, Denton, Houston in Texas; Goodyear in Arizona; Cincinnati in Ohio; Montgomery County in Maryland; San Jose and Compton in California; Milwaukee in Wisconsin; Bedford in Massachusetts; and Miami, Key West, and Gainesville in Florida. The respondents were asked to complete the surveys based on their perception of factors influencing transfer of knowledge and skills back at the workplace. The resulting response rate was 100% as; everyone who was administered a survey completed it.

Table 14. Study Respondents by Location

			Personnel		Total
			Trainee	Supervisor	Trainee
Location	Fort Worth, TX	Count	13	10	23
		% of Total	4.6%	3.6%	8.2%
	Denton, TX	Count	8	6	14
		% of Total	2.8%	2.1%	5.0%
	Houston, TX	Count	12	20	32
		% of Total	4.3%	7.1%	11.4%
	Goodyear, AZ	Count	25	7	32
		% of Total	8.9%	2.5%	11.4%
	Cincinnati, OH	Count	20	10	30
		% of Total	7.1%	3.6%	10.7%
	Montgomery County, MD	Count	5	0	5
		% of Total	1.8%	.0%	1.8%
	San Jose, CA	Count	23	12	35
		% of Total	8.2%	4.3%	12.5%
	Milwaukee, WI	Count	18	10	28
		% of Total	6.4%	3.6%	10.0%
	Bedford, MA	Count	11	5	16
		% of Total	3.9%	1.8%	5.7%
	Miami, FL	Count	28	11	39
		% of Total	10.0%	3.9%	13.9%
	Key West, FL	Count	12	5	17
		% of Total	4.3%	1.8%	6.0%
	Gainesville, FL	Count	3	3	6
		% of Total	1.1%	1.1%	2.1%
	Compton, CA	Count	3	1	4
		% of Total	1.1%	.4%	1.4%
Total		Count	181	100	281
		% of Total	64.4%	35.6%	100.0%

Table 15 summarizes the demographic characteristics by education level. Out of 281 respondents, 113 (40.2%) of the survey respondents had some college, 81 (28.8%) had an associate Degree; 53 (18.9%) had bachelor's degree; 18 (6.4%) were high school educated; 8 (2.8%) had master's degree; 7 (2.5%) had post-bachelor's degree; and 1 (.4%) had a post-master's degree.

Table 15. Distribution of Respondents by Education Level

			Schooling							Total
			High School	Some College	Associate Degree	Bachelor's Degree	Post Bachelor's Degree	Master's Degree	Post Master's Degree	High School
Personnel	Trainee	Count	11	79	44	35	5	6	1	181
		% of Total	3.9%	28.1%	15.7%	12.5%	1.8%	2.1%	.4%	64.4%
	Supervisor	Count	7	34	37	18	2	2	0	100
		% of Total	2.5%	12.1%	13.2%	6.4%	.7%	.7%	.0%	35.6%
Total		Count	18	113	81	53	7	8	1	281
		% of Total	6.4%	40.2%	28.8%	18.9%	2.5%	2.8%	.4%	100.0%

Table 16 represents the distribution of respondents by present employer. Most of the

respondents were employed by Fire Service (98.2%) in comparison to Public Safety (.7%),

Public EMS (.7%), and Law Enforcement (.4%).

Table 16. Distribution of Respondents by Employer

			Employer				Total
			Fire Service	Law Enforcement	Public Safety	Public EMS	Fire Service
Personnel	Trainee	Count	176	1	2	2	181
		% of Total	62.6%	.4%	.7%	.7%	64.4%
	Supervisor	Count	100	0	0	0	100
		% of Total	35.6%	.0%	.0%	.0%	35.6%
Total		Count	276	1	2	2	281
		% of Total	98.2%	.4%	.7%	.7%	100.0%

Table 17 summarizes the distribution of respondents by years of job experience with the

fire department. Most of the trainees had from one to five years of experience (24.9%), followed

by those with six to ten years (16.4%); while most of the supervisors had more than 20 years of

experience (18.1%).

Table 17. Distribution of Respondents by Years of Experience

Personnel			Experience-Years						Total
			Less than one year	1-5 years	6-10 years	11-15 years	16-20 years	Over 20 years	Less than one year
Personnel	Trainee	Count	12	70	46	26	14	13	181
		% of Total	4.3%	24.9%	16.4%	9.3%	5.0%	4.6%	64.4%
	Supervisor	Count	0	0	9	22	18	51	100
		% of Total	.0%	.0%	3.2%	7.8%	6.4%	18.1%	35.6%
Total		Count	12	70	55	48	32	64	281
		% of Total	4.3%	24.9%	19.6%	17.1%	11.4%	22.8%	100.0%

Table 18 represents the distribution of respondents by their current position. Most of the fire-fighter trainee held the post of EMS Provider (Paramedic, EMT, or First Responder) (25.7%) followed by Probationary Fire Fighter (Recruit, Trainee) (20.4%). Most of fire-fighter supervisors, among the respondents held the position of Captain or equivalent (16.8%) followed by Lieutenant or equivalent (11.8%).

Table 18. Distribution of Respondents by Current Position

			Personnel		Total
			Trainee	Supervisor	Trainee
Current Position	Probationary Fire Fighter (Recruit, Trainee)	Count	57	1	58
		% of Total	20.4%	.4%	20.7%
	EMS Provider (Paramedic, EMT, or First Responder)	Count	72	0	72
		% of Total	25.7%	.0%	25.7%
	HazMat Team Member	Count	46	0	46
		% of Total	16.4%	.0%	16.4%
	Fire Service Trainer	Count	4	0	4
		% of Total	1.4%	.0%	1.4%
	Fire Fighter	Count	0	6	6
		% of Total	.0%	2.1%	2.1%
	lieutenant/or equivalent	Count	0	33	33
		% of Total	.0%	11.8%	11.8%
	Captain/or equivalent	Count	0	47	47
		% of Total	.0%	16.8%	16.8%
	Battalion Chief/or equivalent	Count	0	10	10
		% of Total	.0%	3.6%	3.6%
	Deputy Chief/or equivalent	Count	0	2	2
		% of Total	.0%	.7%	.7%
	Chief/or equivalent	Count	0	1	1
		% of Total	.0%	.4%	.4%
	Other	Count	1	0	1
		% of Total	.4%	.0%	.4%
Total		Count	180	100	280
		% of Total	64.3%	35.7%	100.0%

Table 19 summarizes ethnicity characteristics. Of the 281 respondents, 205 (73.5%) were

Caucasian; 44 (15.8%) were Hispanic; 15 (5.4%) were African American; 11 (3.9%) were

Others; 2 (.7%) were Asian/Pacific Islander; and 2 (.7%) Native American.

Table 19. Distribution of Respondents by Ethnicity

			Ethnicity						Total
			African American	Asian/Pacific Islander	Caucasian	Hispanic	Native American	Other	African American
Personnel	Trainee	Count	11	2	123	34	0	9	179
		% of Total	3.9%	.7%	44.1%	12.2%	.0%	3.2%	64.2%
	Supervisor	Count	4	0	82	10	2	2	100
		% of Total	1.4%	.0%	29.4%	3.6%	.7%	.7%	35.8%
Total		Count	15	2	205	44	2	11	279
		% of Total	5.4%	.7%	73.5%	15.8%	.7%	3.9%	100.0%

Data Analysis

Completion of data analysis gave support for the collected data to confirm it was of an adequate size and valid. The measurement and research model was tested by applying a multiple regression approach and correlation analysis by using SPSS. The sample size of 281 in this study was considered adequate. This study used maximum likelihood estimation to obtain estimates of model parameters, and R Square level of .10 or higher and statistical significance of <.05 was used for statistical tests.

Summary

The study examined the perception of trainees and supervisors regarding the influence of Broad and Newstrom's (1992) nine factors on transfer of training. Although, the instruments were adapted from literature and verified by subject matter experts and pilot tested with a focus group, the author attempted to reaffirm that the instruments carried the validity and reliability to a satisfactory degree. A total of 181 trainees and 100 supervisors participated in the survey from

13 fire departments across the country. The data was processed through SPSS 15.0 for Windows to provide the findings. Regression and correlation analysis were used as procedures to report the findings. The data analysis was used to answer two research questions given in Chapter 1. A summary and discussion of the findings, along with conclusions, implications, and recommendations for future research are presented in Chapter 5.

CHAPTER FIVE: DISCUSSION AND CONCLUSIONS

Introduction

The purpose of this chapter is to discuss the findings of the study. The chapter begins with an overview and discussion of the results of the study. It also addresses the limitations of the study and concludes with recommendations for further research and final comments.

The rationale behind this study was to extend the understanding of the transfer of training process by investigating the perceptions of fire-fighter trainees and their supervisors regarding the relationship between Broad and Newstrom's (1992) nine factors and the extent of the transfer. The study was also undertaken to provide evidence to training and organization development practitioners of the need to develop interventions that address the gaps between training and application of knowledge and skills.

Study Overview

The researcher's intent was to contribute a formative study to expand the data gained from prior scholarly research and the associated literature related to transfer of training. The study examined the perception of fire-fighter trainees and their supervisors regarding the transfer of skills and knowledge to the workplace. The rationale for the research was to identify what was known about the transfer of training, what causes the learning gap, the importance of continuing to study the transfer of training, the validity of the research questions, the limitations of the research, and the methodology used. The formative study findings serve as a basis for future studies.

A problem identified prior to the study was that trainees often do not apply to the workplace what they have learned during their training. Therefore, enormous amounts of money invested in structured training for employees by business and industry is wasted (Baldwin & Ford, 1988; Broad & Newstrom, 1992; Lim & Morris, 2006; Rodríguez & Gregory, 2005; Yamnill & McLean, 2005). There are many causes for this gap between training events and on-the-job application of the training. Most gaps fall into three categories: trainee characteristics, characteristics of the training itself and work environment variables (Bates & Khasawneh, 2005; Lim & Morris, 2006; Nijman & Matthias, 2004; Parry & Proctor-Thompson, 2003; Subedi, 2004, 2006).

To investigate the causes of the failure to transfer knowledge and skills, the researcher adopted Broad and Newstrom's (1992) framework to look at the factors that influence the transfer of training. The population chosen for this study was fire-fighter trainees and their supervisors since fire fighters are the first respondents in any emergency situations and must be trained to cope with a countless variety of life-threatening events. First responders work on front line where their work world is filled with danger, uncertainty, and pressure; they have to make decisions instantaneously. In such situations, every second counts and fire fighters have to make split-second decisions about the strategies they must use for to handle each emergency situation. The decision-making process and the hands-on skills that fire fighters need to do their jobs are based on the knowledge and skills they gained through training.

Purpose of the Study

This study addressed the issue of the lack of the transfer of knowledge and skills from training to on-the-job application based on the perception of fire-fighter trainees and their

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supervisors. The current trend shows that even though organizations continue to increase their training expenditures, there is not a corresponding increase in the transfer of knowledge and skills from the training to the workplace. The literature review indicated that only 10% of skills and knowledge acquired during training is transferred to the workplace (Broad & Newstrom, 1992; Georgenson, 1982). While there have been many studies on measuring the impact of either the environmental (Bates & Khasawneh, 2005; Cheng & Ho, 1998; Clarke, 2002; Lim, 2000; Lim & Morris, 2006; Mathieu et al., 1992; Mathieu & Martineau, 1997; Nijman & Matthias, 2004; Quinones et al., 1995) or the individual factors on transfer of training (Chiaburu & Tekleab, 2005; Hicks, 2006; Kontoghiorghes, 2002; Mathieu et al., 1992; Mathieu & Martineau, 1997; Mathieu, Martineau, & Tannenbaum, 1993; Tracey et al., 2001), the fact is that little research has been done that addressed both environmental and individual factors. It was also evident that there are relatively very few studies in the literature focusing on fire fighter's environment even though the impact of their training on their job performance is critical and life-threatening. This led to the conception of this study, which examined the perception of fire fighters regarding impact of a specific group of factors on the transfer of training. As a result, this research has expanded the knowledge base regarding the important facilitators to transfer of knowledge and skills.

Sample and Data Collection

The population of the study comprised of fire-fighter trainees and their supervisors. The sample consisted of 181 trainees and 100 supervisors, selected on the basis of convenience sampling. The study was conducted with 13 fire departments which consisted of trainees who had participated in what is known as HazMat training. The fire departments were: Ft. Worth,

Denton, and Houston in Texas; Goodyear in Arizona; Cincinnati in Ohio; Montgomery County in Maryland; San Jose and Compton in California; Milwaukee in Wisconsin; Bedford in Massachusetts; and Miami, Gainesville and Key West in Florida. The characteristics of these 13 sites were similar. The ages of the fire fighters ranged from 18-65 and consisted of both males and females.

To maintain the confidentiality of the participants and to link the transfer of knowledge and skills with Broad and Newstrom's (1992) nine factors, the Transfer of training, and IAFF HazMat trainee questionnaires were stapled together and made into individual packets for each participant. The researcher personally visited the 12 of the 13 fire departments, which had trainees who had undergone HazMat training (in one instance Dr. Stolovitch visited to collect the data). The participants were asked to fill out IRB approved consent forms and then respond to the questionnaires and return them directly to the packets. Finally, the researcher collected the packets on the same day. The response rate to both the trainees' and the supervisors' questionnaire was 100%.

Instrumentation

The IAFF HazMat Training survey instruments (Trainees and Supervisors) items were initially drawn from previous instruments used in transfer studies that established validity (Burke & Baldwin, 1999; Clemenz, 2001; Cromwell, 2000; Hicks, 2006; Sekowski, 2002) and were compiled and categorized according to the nine Broad and Newstrom factors. Each item was then carefully examined and weighed for its presumed representation of the Broad and Newstrom factors (1992). The items were then restated based on the nature of the fire-fighter population, which these instruments measured and the hazardous training that the fire-fighter

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participants received. The items were then submitted to a panel of content-knowledgeable fire fighters and training experts for evaluation of their applicability to the fire-fighters' job. The items were then edited to derive the pertinent items and instruments; next then the expert review process was initiated. Each item was reviewed considering the individual item comments made by the experts. Several items were revised due to these comments, and a few new items were added. Some items were rewritten due to feedback concerning the design of the items rather than the content. The researchers used http://www.randomizer.org/ to randomize the items in the questionnaires to test with pilot groups. There was no change made to the instruments after the pilot test; therefore, the pilot study data was included in the final analysis. The IAFF Transfer of Training (TOT) Instruments items were drawn from pre-validated instruments used by IAFF to collect data. This instrument also passed through the rigorous process previously described.

Research Questions

There were two research questions posed including the following:

1. Do the nine individual Broad and Newstrom (1992) factors vary in their degree of influence on transfer?
2. Does the degree of influence of the nine individual Broad and Newstrom (1992) factors vary with the work context?

This section presents the conclusion of the study and its significance through the above.

Research Question 1

Do the nine individual Broad and Newstrom (1992) factors vary in their degree of influence on transfer of training?

Based on the findings of the previous studies on transfer of training, it was hypothesized that all the nine Broad and Newstrom's (1992) factors would be significant predictors of the transfer of training in this study. As expected, all the nine Broad and Newstrom (1992) factors were highly correlated to transfer of training. The results of regression analysis indicate that the only statistically significant variables were reinforcement on the job (t=-2.134, p<.05) and supportive organizational culture (t=4.388 p<.05). However, reinforcement on job had a negative b weight even though it was statistically significant suggesting an inverse relationship with transfer of training which is contrary to the theory. The b weights for peer support and trainees being comfortable with change and associated effort were not statistically significant despite a raw correlation of .568 and .555 respectively with transfer of training. These findings together suggest multicollinearity; therefore, factor analysis was conducted to understand the correlational dynamics of the variables.

The result of the factor analysis showed that 12 factors were extracted; however; there were cross-loadings between items belonging to different factors. Supportive organizational culture dominated all other factors with a large eigenvalue of 23.120. It had a high correlation with Reinforcement1, 4, and 5 (all parts of variable1) and Peer Support 3, 4, 5, and 6 (all parts of variable 9). This finding shows that reinforcement on the job may be a part of supportive organizational culture and does not stand as an independent factor. Three reinforcement on the job items (Reinforcement 1, 4, and 5) and four Peer Support item (Peer Support 3, 4, 5, and 6) loaded with supportive organizational culture items and made supportive organizational culture a

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very strong factor with a large eigenvalue of 23.120 and accounted for 34.0% of the total variance.

In conclusion, the factor analysis results suggest that all variables highly correlate with each other. There is multicollinearity among variables. Supportive organizational culture turned out to be the most prominent predictor of transfer of training. This finding corresponds with previous studies on the transfer of training (Baldwin & Magjuka, 1991, 1997; Bates & Khasawneh, 2005; Broad, 1997; Broad & Newstrom, 1992; Lim & Morris, 2006).

Reinforcement on the job with items that provide recognition or reward for applying new skills, such as incentives, reference for promotion, and advice and coaching related to the application of new skills (Appendix B) are part of trainees feeling supported by the organization. The research study findings appear to support Moorhead and Griffin's (1992), Taylor's (2000), Condly, Clark, and Stolovitch's (2003) research, which suggested that supervisors' feedback and rewards, special acknowledgments, and promotional preference to trainees resulted in successful transfer of training and appeared to be part of the supportive organizational culture.

As stated earlier, the supportive organizational culture includes the external environment, organization's structure, culture, job supervisor, and upper management of the firm (Broad and Newstrom, 1992). Items that reflect supportive organizational culture included objectives of training, potential barriers to implementation of new skills, action plans for the application of training, and providing opportunities for the use of new skills (Appendix B).

Based on the perception of fire-fighter trainees, the study results appear to suggest that if the trainees have organizational support in the form of peer support, support of the job supervisor or upper management then they perceive that transfer of knowledge and skills to the workplace will be much higher (Baldwin & Ford, 1988; Broad, 1997; Ford et al., 1992; Foxon, 1993;

Huczynski & Lewis, 1980; Salas & Cannon-Bowers, 2001). The job supervisor can offer support by discussing:

- the objectives of training
- identifying potential barriers to implementation of new skills,
- constructing action plans for the application of training
- providing opportunities for the use of new skills
- praise, reward, recommendation for promotion

To conclude, this study results suggest that fire-fighter trainees will exhibit on-the-job application of newly learned skills if they receive recognition or rewards in the form of incentives, praise, advice, coaching, and reference for promotion from their supervisor. Overall, fire-fighter trainees desire feedback and increased interaction with their supervisors. For instance, the supervisor can meet with the trainees at frequent intervals after the trainee returns from the training program to discuss his use of learned skills and any potential barriers. Offering regular feedback to the trainees will help reinforce the use of newly learned knowledge and skills; feedback also conveys the importance of training and its on-the-job use and demonstrates that the ultimate transfer is the result of a partnership between trainees and supervisors. The findings of the study have also been supported by previous research done on supervisor support (Chiaburu & Marinova, 2005; Egan et al., 2004; Foxon, 1993; Lim & Morris, 2006).

The results have several implications. First the rather strong effect of the supportive organizational culture, which appears to include reinforcement on the job and peer support. The other seven Broad and Newstrom (1992) factors did have a correlation with transfer of training, though not a strong one. This finding has a particular significance given that the transfer literature reports that individual characteristics like self-efficacy and motivation to learn are on

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equal footing with supervisory influence. The fire fighter environment may alone explain this discrepancy, which strongly suggests that further research is needed. Much of the prior transfer training research was conducted in either an academic setting or using soft-skill development training in a business environment. The hazardous material training in this study, by contrast, was very job-specific within a simulated high-risk environment, where the trainees were expected to display both mental and physical toughness. Moreover, this study was a field-based study where there were many confounding variables; still, the researcher was successfully able to find variables that have a statistically significant effect on the transfer of knowledge and skills.

Research Question 2

Does the degree of influence of the nine individual Broad and Newstrom (1992) factors on transfer of training vary with the work context?

On the basis of the findings of the previous studies on transfer of training, it was hypothesized that the degree of influence of the nine individual Broad and Newstrom (1992) factors will vary with the work context (13 locations).

The findings of the correlation analysis indicate that influence of all nine individual factors on the transfer of training varied with the 13 locations. However, there were patterns observed as some factors had a more significant influence on the transfer of training (TOT) in some locations than in others. For example, the supportive organizational culture in Ft. Worth, and Denton, Texas, proved to be more significant in comparison to all other eight factors. Peer support proved to be the highest predictor of TOT at Houston, Texas, Cincinnati, Ohio and Gainesville, Florida while trainees' being comfortable with change and associated efforts was a strong predictor of TOT at Goodyear, Arizona, Milwaukee, Wisconsin and Miami, Florida in comparison to all other eight factors. Interference from the immediate (work) environment was a

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strong predictor of transfer of training at San Jose, California and Key West, Florida. In Montgomery County, Maryland trainees' perception of relevant training content was a strong predictor of transfer in comparison to all other eight factors, while in Bedford, Massachusetts, trainees' perception of training being well designed/delivered and in Compton, California trainees' perception of practical training programs was a strong predictor of TOT. Even though, some factors proved to be more influential on the transfer of training than others at the 13 locations, all of the factors were related to the transfer of training; the highest correlation with transfer of training was practical training program with a coefficient of .940 in Compton, California, and the lowest was little interference from immediate work environment in Gainesville, Florida, which had a coefficient of 0. A probable reason for this result could be the low sample size for these two locations.

There does not appear to be a readily available explanation for the variations in work context and its influence on all nine individual factors on the transfer of training; therefore, additional research is suggested.

<div align="center">Perception of Trainees and Supervisors</div>

A *t*-test analysis was performed to find if there were any significant differences in the perception of trainees and supervisors regarding Broad and Newstrom's (1992) nine factors. The results of this analysis appear to suggest a statistically significant difference between fire-fighter trainee' perceptions and their supervisors' perceptions of supportive organizational culture, trainees' perception of practical training programs, trainer being supportive and inspiring, and trainees' perception of training being well designed/delivered. Further examination suggests that supervisors perceive supportive organizational culture to be more significant than trainees who

perceive practical training program, trainer being supportive and training being well designed & delivered more important for transfer of knowledge and skills than supportive organizational culture. Earlier research provided evidence of the impact of environmental factors on the transfer of training. The results of this study provide further insight and suggest that the supervisors and trainees may not share similar views regarding these factors. This gap in perceptions may create barriers for trainees that hamper the successful transfer of knowledge and skills. Organizations may seek to diminish this gap by involving supervisors and trainers in discussing their organizational perceptions. Broad and Newstrom (1992) stated the probability of transfer in any organization can be dramatically increased if the forces for change are increased and if the forces against change are diminished or removed. Further research is suggested to clarify this issue.

With regard to demographic variables, out of 281 respondents, 98.2% of the respondents were employed by Fire Service. A notable result was that there was no difference at all in years of schooling between fire-fighter trainees and their supervisors (refer to Table I3 in Appendix I), but a very large difference in years of experience favoring supervisors who had had over 20 years of experience. A plausible explanation could be that formal schooling might be irrelevant for moving up the fire fighters' corporate ladder.

Significant Findings of the Study

The Broad and Newstrom's (1992) nine factors have a relationship with transfer of training.

- Reinforcement on the job and supportive organizational culture have a statistically significant impact on transfer of knowledge and skills. Other researchers (Rouiller and Goldstein, 1993; Martineau, 1995) previously demonstrated the importance of a

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supportive work environment on training transfer. The data appear to suggest that reinforcement on the job might be a sub factor of supportive organizational culture.

- The findings of the correlation analysis indicate that the influence of all nine individual factors on the transfer of training varied with 13 locations.

- There are statistically significant differences between perceptions of fire-fighter trainees and their supervisors regarding supportive organizational culture, practical training programs, trainer being supportive and inspiring, and well-designed and delivered training.

- No statistical significant difference in years of schooling between fire-fighter trainees and their supervisors, but a very large difference in years of experience favoring supervisors who had had over 20 years of experience, thereby, suggesting that formal schooling might not be very significant for getting promotion among fire fighters.

As previously mentioned the primary objective of this study was to examine the perception of fire-fighter trainees and their supervisors regarding the degree of influence of the Broad and Newstrom (1992) factors on the transfer of training. Understanding the perception of fire-fighter trainees and their supervisors is vital because fire fighters are the first respondents in any emergency situations, often situations that involve mass destruction and may be life-threatening or may involve physically demanding activities. Fire Fighters are at risk everyday and are called upon to save others. Little is known about the nature and extent of fire fighters responses to factors influencing the transfer of training. Understanding the impact of various factors on fire fighters training transfer is critical to their ability to do their jobs.

Based on the findings the key factor facilitating the transfer of training from the training environment to the workplace for fire fighters is supportive organizational culture, which includes the environment, organization's structure, culture, and a job supervisor who plays a vital role in transfer of training by arranging work schedules for trainees to attend training and offering positive reinforcement for using the skills learned.

Job supervisor support is part of supportive organizational culture. The data appears to indicate that the fire-fighter trainees perceive that supervisors need to plan ways to mentor the trainees before and after training. Supervisors should make plans to ensure a smooth transition of trainees back to the workplace. In addition, supervisors should meet with the trainees immediately upon their return from training and debrief them to discover what took place. They should also identify mutually unforeseen barriers to the transfer and explore possibilities for the use newly learned knowledge and skills. The study findings regarding supportive organizational culture having an impact on transfer of training have been substantiated by previous research (Baldwin & Ford, 1988; Brinkerhoff & Montesino, 1995; Chiaburu & Tekleab, 2005; Ford, Quinones, Sego, & Sorra, 1992; Richman-Hirsch, 2001; Salas & Cannon-Bowers, 2001; Seyler, Holton, Bates, Burnett, & Carvalho, 1998; Smith-Jentsch, Salas, & Brannick, 2001; Van der Klink, Gielen, and Nauta, 2001).

Conclusions

Based on empirical research, this study surfaced some unanticipated findings and demonstrated the importance of organizational support in the transfer of training process. Clearly, fire-fighter trainees and their supervisors work in a high-risk environment, where they are regularly exposed to numerous on-the-job hazards. Given this high risk environment, it is

imperative that fire fighters, who operate as highly effective work units, get organizational support, including encouragement and support from peers, trainers, and supervisors in fighting fires and other emergencies. As the data suggests, all nine Broad and Newstrom (1992) factors have a correlation with transfer of training, supporting Broad and Newstrom (1992) theory about the nine facilitators of transfer. In this fire fighter-based study, out of nine Broad and Newstrom factors (1992), only two were found to have statistically significant impact on transfer of training. The two are reinforcement on the job and a supportive organizational culture. Further research needs to be done to clarify the findings.

Limitations of the Study

There were numerous factors that impacted the findings. Some limitations are included in the list below but are by no means limited to this list:

- The access to a variety of fire departments was not easy. Fire departments were invited to participate based on the numbers of recent participants to the Hazardous Materials training program delivered by the IAFF. Both local unions and management had to accept participation in the study. For security purposes, available resources to support the study had to be present to make appropriate fire fighter and supervisor subjects available.
- Low sample- A limitation of this study was at some locations the researcher was only able to get a small number of respondents. At some locations the respondents were less then ten.

- Administrative limits due to the emergency environment.

  Emergency conflicts-The fire fighters and their supervisors work in a high-risk

  environment and are always on alert to handle emergency situations. A limitation of

  the study has been that, while answering the questionnaires, the study respondents

  had to handle emergency situations. They returned later to complete the

  questionnaires, but there was a lapse in time on task. Consideration should include the

  fact that when the study respondents were answering the questionnaire, some of them

  had just returned from handling fires or HazMat situations, which are physically and

  emotionally draining on the respondents.

- Some fire departments had specialized HazMat units that dealt specifically with

  hazardous materials; therefore, some of the participants of this study had been on a

  HazMat call but did not participate in handling the situation since the specialized

  HazMat unit took over from them.

- Using perception rather than actual behavior can be problematic in social science

  research, but fire fighters' high risk environment makes it almost impossible to measure

  actual behavior.

- Validity of the study relied on participants' honest responses to the questionnaires.

- The HazMat context and fire-fighter environment is narrow by design and, therefore,

  may reduce the generalization of the findings to other contexts and settings.

Recommendations for Future Research

- Broad and Newstrom (1992) proposed nine factors of transfer of training. The

  instruments were carefully examined by expert panel for content validity. However, the

results of this study point to just one single factor. Further research needs to be done to clarify this issue.

- The current findings of this study should be investigated further with a different population to ascertain if the trend found in this study continues in other work environment.

- Further research on work environmental factors not included in the Broad and Newstrom (1992) factors is essential to understand all the variables affecting a trainee's willingness and ability to show transfer behaviors.

- A longitudinal study of training effectiveness should be conducted to determine whether the trainees maintained the learned behavior over time.

- Future studies may want to consider collecting data on such variables as age and gender.

- A more in-depth qualitative study combined with the quantitative study is recommended to determine factors influencing transfer of knowledge and skills.

- This study could be redesigned to include a control group and an experimental group.

- A validation study is recommended for testing the quality of IAFF Hazardous Material Training and IAFF Transfer of Training instruments.

Recommendations for Practitioners

Based on the results of this research project, the recommendations provided below might be considered by any training or management professional who wants to improve the success of training programs.

- From a perception perspective mandatory training appears to reduce motivation to transfer. Eventually, the willingness to learn affects their perception of training and how comfortable the trainees are with changes that the training brings to their workplace.

- It is recommended that for trainees to maintain the use of newly learned skills and transfer them to the workplace, a mentoring system needs to be developed where an experienced supervisor coaches, supports, and encourages the newer trainees to implement their knowledge and skills.

- The training program should be based on a needs assessment. Upon analysis of the need assessment data, appropriate instructional strategies need to be selected prior to delivering the training program. It also should be pilot tested and modified as appropriate and continually evaluated periodically and updated accordingly.

- Training needs to be designed with more hands-on activities related to fire-fighter environment. It is recommended that training content should be divided into chunks and delivered with adequate breaks to avoid monotony and hold the attention of the participants. The instructors should also utilize instructional strategies to make the lessons interesting and relevant for the participants.

- It is proposed that there should be a follow-up of training periodically.

The research findings of this study add to the existing body of literature on transfer of training. However, because we are dealing with unique training programs and humans as our subjects, transfer of training studies may continue to produce mixed results. Nevertheless, systematic identification of factors influencing transfer of training, as well as testing how these factors inter-relate, need to continue. More research is needed to provide evidence to training and

development professionals as to why transfer does not take place regardless of the amount of money that is spent on training. Researchers also must develop techniques that may be applied before, during, and after training to enhance and improve the transfer of training. These types of changes will facilitate the successful transfer of training and, ultimately, help to improve organizational effectiveness.

APPENDIX A: IRB LETTER

University of
**Central
Florida**

Office of Research & Commercialization

April 5, 2007

Divya Bhati
12089 Napiers Circle
Orlando, FL 32826

Dear Ms. Bhati:

With reference to your protocol #07-4352 entitled, "Factors that Influence the Transfer of Training: The Perceptions of Selected Supervisors and Trainees," I am enclosing for your records the approved, expedited document of the UCFIRB Form you had submitted to our office. **This study was approved on 4/2/2007. The expiration date for this study will be 4/1/2008.** Should there be a need to extend this study, a Continuing Review form must be submitted to the IRB Office for review by the Chairman or full IRB at least one month prior to the expiration date. This is the responsibility of the investigator.

Please be advised that this approval is given for one year. Should there be any addendums or administrative changes to the already approved protocol, they must also be submitted to the Board through use of the Addendum/Modification Request form. Changes should not be initiated until written IRB approval is received. Adverse events should be reported to the IRB as they occur.

Should you have any questions, please do not hesitate to call me at 407-823-2901.

Please accept our best wishes for the success of your endeavors.

Cordially,

Joanne Muratori
IRB Coordinator
(FWA00000351 Exp. 5/13/07, IRB00001138)

Copies: IRB File
         Gary Orwig, Ph.D.
         Stephen Sivo, Ph.D.

JM:jm

All Institutional Review Board (IRB) information can be obtained via the Internet or from the IRB Coordinator at the Office of Research. Please submit to the following address:

Address: **Contact:**
Office of Research & Commercialization   Phone: 407-823-3778
12201 Research Parkway - Suite 501   Fax: 407-823-3299
        Orlando, FL 32826-3246   E-mail:
IRB@mail.ucf.edu

The UCFIRB website address is: www.research.ucf.edu/compliance/irb.htm

_____
_____

UCFIRB Submission Checklist:

__**X**__ UCFIRB Form [page 24]
__**X**__ Consent Form [unless study does not use human participants]
        Assent Form [if participants are between 7-17 years of age]
__**X**__ School/Class Approval [if using students as participants]
__**X**__ Copies of Surveys, Tests, Questionnaires, etc. [if applicable]
__**X**__ Detailed Research Methodology [at least one page minimum]
__**N/A**__ Physical or Medical Contingency Plan [if applicable]
        All Department Chairs'/Directors' Signatures [approvals from all involved departments are required]

__**X**__ Dates of Proposed Research have not Already Expired [see page 6, A-4 for more details]
__**X**__ Current Mailing Address Provided [attach this as a separate page if you are a student]

Principal Investigator: Divya Bhati   Date Thursday, November 01, 2007

Supervising Instructors:
Gary Orwig, Ed.D.
                Professor, Instructional Systems Educational Research, Technology and Leadership
                The College of Education, The University of Central Florida (UCF)
                Department of Educational Research, Technology, and Leadership (ERTL)
                Education Complex Office: 322-S
                4000 Central Florida Blvd. PO Box 161250
                Orlando, FL 32816-1250
                Office Phone: 407/823-5179
                E-mail: orwig@mail.ucf.edu
                Homepage: pegasus.cc.ucf.edu/~orwig

Stephen A. Sivo, Ph.D.

> Associate Professor, Instructional Systems Educational Research, Technology and Leadership
> The College of Education, The University of Central Florida (UCF)
> Department of Educational Research, Technology, and Leadership (ERTL)
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> 4000 Central Florida Blvd. PO Box 161250
> Orlando, FL 32816-1250
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> Fax: 407/823-5144
> E-mail: ssivo@mail.ucf.edu
> Homepage: pegasus.ucf.cc.edu/~ssivo

Request for Expedited Review

This research study involves no more than minimal risk and falls within one or more of the following categories can receive expedited review under most circumstances:

   _X_ Research conducted in commonly accepted educational settings involving normal   educational practices, use of educational tests, survey procedures, interview procedures or observation of public behavior provided that the information obtained is recorded in such a manner that the participants cannot be identified and that any disclosure of the participants' responses outside the research could not reasonably place the participants at risk of criminal or civil liability nor be damaging to the participants' financial standing, employability, or reputation

   _X Research on individual or group behavior or characteristics of individuals, such as studies of perception, cognition, game theory, or test development where the Principal Investigator does not manipulate participants' behavior and the research will not involve stress to participants

   ❒ Research and demonstration projects that are designed to study, evaluate, or examine: public benefit or service programs; procedures for obtaining benefits or services under those programs; possible changes in or alternatives to those programs or procedures; or, possible changes in methods or levels of payment for benefits or services under those programs.

UCFIRB Form

The complete IRB packet must be submitted by the 1st business day of the month for consideration at that monthly IRB meeting. Please see page 6 of this manual for detailed instructions on completing this form.

1.	Title of Project: Factors that Influence the Transfer of Training: the Perceptions of Selected Supervisors and Trainees

2.	Principal Investigator(s):

Signature:

Name:	Divya Bhati
	Mr./**Ms.**/Mrs./Dr. (Circle one)
Degree:	M.A.
Title:	Ph.D. Candidate
Department:	Educational Research, Technology, and Leadership
College:	The College of Education
Email:	dbhati@mail.ucf.edu
Telephone:	407/913-8707
Facsimile:	-
Home Phone:	407/913/8707

**3.	Faculty Supervisors:**

Signature:		Degree:	Ed.D.
Name:	Gary Orwig	Title:	Professor
	Mr./Ms./Mrs./**Dr.** (Circle one)	Office Phone: 407/823-5179	
Department:	ERTL	Email:	orwig@mail.ucf.edu
College:	The College of Education	Homepage: pegasus.cc.ucf.edu/~orwig	

Signature:		Degree:	Ph.D.
Name:	Stephen A. Sivo	Title:	Associate Professor
	Mr./Ms./Mrs./**Dr.** (circle one)	Office Phone: 407/823-4147	
Department:	ERTL	Facsimile:	407/823-5144
College:	The College of Education	E-mail: ssivo@mail.ucf.edu	

4.	**Dates of Proposed Project (cannot be retroactive):** From: IRB Approval **To**: May 30, 2008

5.	**Source of Funding for the Project: (project title, agency, and account number):** The project is unfunded.

6.	**Scientific Purpose of the Investigation:** The primary purpose of this study is to investigate influence of critical factors identified by Broad and Newstrom (1992) on degree of transfer of training and whether the relative impact of these factors varies with the training situation. The literature in this area recognizes that one of the best ways to attain a desired training effectiveness result is by increasing the rate of training transfer. However, the review of literature also suggests that people often are not able to successfully apply what they learned in their training to their work. Different elements of the working environment may affect transfer of training in diverse ways depending upon the particular type of training expected to be transferred, the characteristics of the trainees themselves, and particular environmental characteristics. To date, there remains much we do not know regarding the extent to which particular factors influence transfer of training. Moreover, there is no validated instrument to measure the presence of Broad and Newstrom's (1992) nine transfer of training factors. Therefore, this study will focus on

investigating the influence of a defined group of factors on transfer of training and for achieving this goal the investigator will first develop an instrument to measure the perception of trainees and supervisors to nine Broad and Newstrom (1992) factors and then use the instruments to examine the perceptions of supervisors and trainees regarding factors influencing transfer of training.

7.   **Describe the Research Methodology in Non-Technical Language: (the UCFIRB needs to know what will be done with or to the research participants).** This research is a quantitative design utilizing a survey method using three self-administered questionnaires designed to gather specific data via a self-reporting system. The proposed study will look at the hazardous material training being conducted by the International Association of Fire fighters (IAFF). The target populations for this study are fire fighters who have undergone knowledge and skills training for handling hazardous material 15 months prior and their supervisors. The sample is 181 trainees and 100 supervisors. The data for the proposed study will be collected from ten training sites located in metropolitan, suburban, and rural areas across the United States. For the data collection, consideration of the time constraints and responsibilities of fire fighters will be taken into account. To maintain the confidentiality of the participants, the questionnaires will be coded and will be stapled together and made into a packet for each participant. The principal investigator will personally visit the ten sites to administer it and collect the data, explaining to the questionnaire respondents what they are required to do for filling it out and insuring that there is a private space for them to respond individually. At the time of distribution of the packets the investigator will gave clear instructions for the questionnaires not to be separated. The participants will be asked to fill out the questionnaires and keep them back in packets and the packets will be collected by the principal investigator herself. Quantitative method like a stepwise multiple regression will be used for analyzing the data.

The questionnaire were developed after review of literature as well as instruments used in previous studies for measuring transfer and a list of items for each factor was made. Items were then reworded, transforming them from their generic format into one that is focused on the study subjects, content and context. Based on the nature of fire-fighter population with which these instruments are to be used and the hazardous material training the fire-fighters participants received, the questionnaires were submitted to a panel of content knowledgeable fire fighter hazardous training experts. After the review, the items were edited to derive the revised items, and were again reviewed for content validity and correctness by a panel of subject matter experts consisting Drs. Broad, Newstrom, Stolovitch. The items were then reworded based on the review comments to derive the questionnaires that are attached. The next step in the process of instrument review is that the questionnaires will be submitted to a small sample (6 fire-fighter trainees and 4 supervisors) of individual fire-fighter subjects who will be observed responding to the instrument and who will then be debriefed. The purpose of this exercise is to verify and revise the instrument for comprehensibility and clarity and to eliminate all ambiguities and confusions and to drive the final version of questionnaires which will be used on actual population. This is not a pilot test of the questionnaire. It is for checking to see how long it takes to complete the questionnaire and to make sure there are no difficult words or expressions. The final version of the questionnaires will be sent as an addendum once it is done.

7.   **Potential Benefits and Anticipated Risks:** There are no anticipated risks, compensation or other direct benefits for participation in this research project. Participants are free to withdraw and may discontinue participation at any time without consequences. Participant responses will be analyzed and reported anonymously to protect their privacy. The information collected will be kept on a secured site and password protected. Physical documentation collected will be filed in a locked cabinet, accessible to only the principal investigator.

9. **Describe how participants will be recruited, the number and age of the participants, and proposed compensation (if any):**

Participants will be OVER the age of 18 (no minors will be included). They will be surveyed. Their identity and disclosures will be kept confidential. The IAFF would send an informal email to fire fighters and their supervisors, informing them about the study and requesting their voluntary participation in it.

10. **Describe the informed consent process: (include a copy of the informed consent document):**

Participants will be given a copy to read and if they are willing to participate, they will sign the copy and it will be kept on file. A second copy will be provided to the participant for his/her records. A copy of the letter along with the questionnaire protocol (as needed) and sample instrument is included with this IRB application. The student researcher is a doctoral candidate using information collected toward partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Department of Educational Research, Technology and Leadership in the College of Education at the University of Central Florida Orlando, Florida.

Letter of Informed Consent for the Supervisor
Factors that Influence the Transfer of Training: the Perceptions of selected Supervisors and Trainees.

Monday, April 02, 2007

Dear Participant:

I am a Ph.D. candidate at the University of Central Florida under the supervision of Dr. Gary Orwig, Professor, and Dr. Stephen A. Sivo, Professor, Educational Research, Technology, and Leadership, conducting a study for, the purpose of researching factors influencing transfer of training. The results of the study may help identify gaps between training and application of skills and knowledge.

You are being invited because you have been identified as a supervisor of trainees who have undergone a hazardous materials training. You are at least 18 years of age or older to participate. Please be aware that you are not required to participate in this research and you may discontinue your participation at any time without penalty. You may also omit any questions you prefer not to answer. The questionnaire may be completed at a location at your fire station and your responses should be completed and submitted to the principal investigator the same day.

Your responses will be kept in a file in a locked cabinet and only the principal investigator will have the key. Physical documentation collected will be filed in a locked secure file, accessible to only the principal investigator.

There are no anticipated risks, compensation or other direct benefits to you as a participant in this study. You are free to withdraw your consent to participate and may discontinue your participation in the study at any time without consequences. If you have any questions about this research project, please contact me at 407/913-8707 or my faculty supervisors, Dr. Orwig at 407/823-5179, or Dr. Sivo at 407/823-4147. Information regarding your rights as a research volunteer may be obtained from:

IRB Coordinator, Institutional Review Board (IRB) University of Central Florida (UCF), 12201 Research Parkway, Suite 501; Orlando, Florida 32826-3246
Telephone: (407) 823-2901
The hours of operation are 8:00 am until 5:00 pm, Monday through Friday except on University of Central Florida official holidays. The phone number is (407) 823-2901.

The questionnaires are unidentified. You will not be asked for your name and the survey will not be linked to your name in anyway. Your responses will be analyzed and reported in aggregate to protect your privacy.

APPROVED BY
University of Central Florida
Institutional Review Board

IRB Designated Reviewer

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If you decide to participate in this research study, please indicate your acceptance by placing a check mark beside each item below. Also, please sign and return this copy of the consent form.

A second copy is provided for your records.

Sincerely, _____ ,
Divya Bhati, Principal Investigator, Ph.D. Candidate, College of Education at the University of Central Florida

Project title: Factors that Influence the Transfer of Training: the Perceptions of selected Supervisors and Trainees.

___I have read the procedure described above. I have read the "Informed Consent to Participate" and agree to allow the researcher to use the information I provide as part of the aggregated data collected and without being in any way individually identified for related presentations and publications.

___I voluntarily agree to participate in the study.

Participant   Date

Letter of Informed Consent for the Trainee

Factors that Influence the Transfer of Training: the Perceptions of selected Supervisors and Trainees.

Monday, April 02, 2007

Dear Participant:

I am a Ph.D. candidate at the University of Central Florida under the supervision of Dr. Gary Orwig, Professor, and Dr. Stephen A. Sivo, Professor, Educational Research, Technology, and Leadership, conducting a study for, the purpose of researching factors influencing transfer of training. The results of the study may help identify gaps between training and application of skills and knowledge.

You are being invited because you have been identified as a trainee who has undergone hazardous materials training. You are at least 18 years of age or older to participate. Please be aware that you are not required to participate in this research and you may discontinue your participation at any time without penalty. You may also omit any questions you prefer not to answer. The questionnaire may be completed at a location at your fire station and your responses should be completed and submitted to the principal investigator the same day.

Your responses will be kept in a file in a locked cabinet and only the principal investigator will have the key. Physical documentation collected will be filed in a locked secure file, accessible to only the principal investigator.

There are no anticipated risks, compensation or other direct benefits to you as a participant in this study. You are free to withdraw your consent to participate and may discontinue your participation in the study at any time without consequences. If you have any questions about this research project, please contact me at 407/913-8707 or my faculty supervisors, Dr. Orwig at 407/823-5179, or Dr. Sivo at 407/823-4147. Information regarding your rights as a research volunteer may be obtained from:

IRB Coordinator, Institutional Review Board (IRB) University of Central Florida (UCF), 12201 Research Parkway, Suite 501; Orlando, Florida 32826-3246 Telephone: (407) 823-2901

The hours of operation are 8:00 am until 5:00 pm, Monday through Friday except on University of Central Florida official holidays. The phone number is (407) 823-2901.

The questionnaires are unidentified. You will not be asked for your name and the survey will not be linked to your name in anyway. Your responses will be analyzed and reported in aggregate to protect your privacy.

If you decide to participate in this research study, please indicate your acceptance by placing a check mark beside each item below. Also, please sign and return this copy of the consent form.

A second copy is provided for your records.

Sincerely, _____,
Divya Bhati, Principal Investigator, Ph.D. Candidate, College of Education at the University of Central Florida

Project title: Factors that Influence the Transfer of Training: the Perceptions of selected Supervisors and Trainees.

___I have read the procedure described above. I have read the "Informed Consent to Participate" and agree to allow the researcher to use the information I provide as part of the aggregated data collected and without being in any way individually identified for related presentations and publications.

___I voluntarily agree to participate in the study.

Participant   Date

The International Association of Fire Fighters Hazardous Materials and Weapons of Mass Destruction Training Department will be funding a study entitled, "Factors that Influence the Transfer of Training: the Perceptions of Selected Supervisors and Trainees," by Ms. Divya Bhati of the Department of Educational Research, Technology, and Leadership (ERTL), University of Central Florida.

The results of this study present a potential for adding to the knowledge base for helping fire fighters to effectively and safely deal with hazardous materials. The IAFF has selected your specific local and asks for your support in providing access to fire fighters who have been trained by the IAFF within the last 15 months on Hazardous Materials. The Department can provide you a list of those members who have completed our training within this time period. All information collected will be handled with complete confidentiality and anonymity.

A recent study has shown that the single most influential person on whether or not training is applied back on the job is the supervisor. There are many other factors affecting the degree to which training gets translated into action. The IAFF trains thousands of our brothers and sisters each year in a variety of topics. Health and safety is a priority within all of our training and we want our members to act with safety as a priority throughout their firefighting careers, not just when they are in training. Like you, we want to ensure that our members receive the support they need when applying the training they received on the job. Therefore, we also request your assistance in providing access to these fire fighters' supervisors to gather their insights so they may participate in survey process. Again, all information collected will be handled with complete confidentiality and anonymity.

Should you choose to participate;
- The IAFF will arrange a site visit to your location. This visit will be arranged on a mutually acceptable date and time.
- We ask that you reach out to your members who have completed our training within the last 15 months and ask them to be present on the scheduled date and time. The IAFF can assist you in identifying those members by providing a list to you.
- Members and their respective supervisors will be asked to complete a brief interview and survey.

The information collected in this survey is completely confidential.

APPENDIX B: ASSESSMENTS

IAFF Transfer of Training Questionnaire

Instructions: This questionnaire contains 22 items. Each item represents an action to take following HazMat training. Please respond to **all items** and mark **only one** response for each. There are no right or wrong answers; we only want your honest assessment of what you did. Of course, your responses are kept in a confidential database and are used for statistical treatment only.

The rating scale is as follows: 1 = Very Low, no effort; 2 = Low, little effort; 3 = Moderate, some effort; 4 = High, good effort; 5 = Very High, strong effort. Circle one of the five numbers to the right of each statement.

	Very Low	Low	Moderate	High	Very High
	1	2	3	4	5

Understanding Hazardous Materials

Following my HazMat training and based on the **Understanding Hazardous Materials** unit, I…

1. Reviewed chemical and physical properties of hazardous materials and how they affect the response at a given scene.	1	2	3	4	5
2. Routinely discussed with my shift the most common hazardous materials found at fixed sites and transportation routes.	1	2	3	4	5
3. Analyzed a HazMat incident.	1	2	3	4	5
4. Drove or walked through my first due area to note occupancies, transportation corridors and other sites where hazardous materials could be found.	1	2	3	4	5
5. Reviewed HAZWOPER and addressed the six main issues that have an impact on fire fighters and other emergency response personnel.	1	2	3	4	5
6. Kept records of responses where hazardous materials were present and learned about their possible harmful effects.	1	2	3	4	5

Recognizing Hazardous Materials

Following my HazMat training and based on the **Recognizing Hazardous Materials** unit, I…

7. Avoided contact with any persons or equipment that might have been contaminated in a hazardous materials incident until they	1	2	3	4	5

	Very Low	Low	Moderate	High	Very High
	1	**2**	**3**	**4**	**5**

were decontaminated.

8. Reviewed my department's procedures for reporting exposures to ensure they maintain confidentiality. — 1 2 3 4 5

9. Reported any signs or symptoms of exposure following responses where toxic materials were present. — 1 2 3 4 5

10. Kept records of my responses to alarms where hazardous materials were detected and learned about these hazardous materials and their possible harmful effects. — 1 2 3 4 5

11. Decontaminated my clothing and equipment whenever I might have been exposed to toxic materials. — 1 2 3 4 5

Responding to Hazardous Materials

Following my HazMat training and based on the **Responding to Hazardous Materials** unit, I…

12. Referred to hazardous materials information sources and made sure I learned about chemicals in my first due area. — 1 2 3 4 5

13. Conducted pre-incident plans of hazardous materials sites in my first due area. — 1 2 3 4 5

14. Analyzed a potential HazMat incident while considering occupancy/location, container shapes/sizes, placards, and weather conditions. — 1 2 3 4 5

15. Planned a HazMat response by determining response objectives, defensive options, and appropriate PPE based on the scope of the incident. — 1 2 3 4 5

16. Implemented the plan by enforcing scene control and performing defensive control functions and decontamination. — 1 2 3 4 5

17. Established proper decontamination procedures for each potential HazMat incident. — 1 2 3 4 5

Please provide your demographic information by circling one for each of the following items:

18. Select highest level completed.
   A. Grade School
   B. High School
   C. Some College
   D. Associate Degree
   E. Bachelor's Degree

F. Post Bachelor's Degree
G. Master's Degree
H. Post Master's Degree

19. Which of the following describes your present employer?
    A. Fire Service
    B. Law Enforcement
    C. Industrial Fire Brigade
    D. Private Industry/Consultant
    E. Private EMS
    F. Public Safety
    G. Emergency Management
    H. Public EMS
    I. Other

20. How many years have you have been involved in the Fire/Rescue service?
    A. Not Applicable
    B. Less than one year
    C. 1 - 5 years
    D. 6 - 10 years
    E. 11 - 15 years
    F. 16 - 20 years
    G. Over 20 years

21. Please mark the choice that best describes your current position.
    A. Probationary Fire Fighter (Recruit, Trainee)
    B. EMS Provider (Paramedic, EMT or First Responder)
    C. HazMat Team Member
    D. Fire Service Trainer
    E. Supervisor

22. Location:

23. What is your ethnic background?
    A. African American
    B. Asian/Pacific Islander
    C. Caucasian
    D. Hispanic
    E. Native American
    F. Other

Thank you for taking the time to complete this questionnaire

IAFF Hazardous Materials (HazMat)
Training Questionnaire – Supervisor

Instructions: Please respond to all items and mark only one response for each. There are no right or wrong answers; we are only interested in your opinions. Of course, your responses are kept in a strictly confidential database and are used for statistical treatment only.

As a supervisor of those who attend HazMat training, please indicate the extent to which you agree with each statement below by circling one of the five numbers to the right of the statement (1 = Strongly Disagree to 5 = Strongly Agree).

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
	1	2	3	4	5
1. The HazMat training is up-to-date and aligned with current conditions of the job.	1	2	3	4	5
2. Communication and directions during HazMat training are clear and adequate.	1	2	3	4	5
3. Management provides some sort of recognition for those who use new on-the-job skills and knowledge from their HazMat training.	1	2	3	4	5
4. The quality of materials and assignments used in HazMat training is satisfactory.	1	2	3	4	5
5. After training, as a general practice in my supervisory capacity, I discuss with returning participants potential barriers to applying new HazMat skills and knowledge.	1	2	3	4	5
6. I have observed HazMat training participants recognize each other's effectiveness when they use newly learned HazMat skills on the job.	1	2	3	4	5
7. I have observed on their return to the job that HazMat training participants discuss problems related to using the skills and knowledge taught in HazMat training.	1	2	3	4	5

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
	1	2	3	4	5

8. As a general practice in my supervisory capacity, I meet with those who participated in HazMat training for a sufficient amount of time to discuss action plans and on-the-job application of what was taught.

	1	2	3	4	5

9. As a general practice in my supervisory capacity, I ensure that work is covered while participants attend HazMat training.

	1	2	3	4	5

10. As a general practice in my supervisory capacity, I notify participants well in advance of their enrollment in HazMat training.

	1	2	3	4	5

11. Those who participate in HazMat training feel capable of using the skills and knowledge they developed in their everyday work.

	1	2	3	4	5

12. The equipment, facilities, and materials in our department are adequate to help in applying newly learned HazMat skills and knowledge to the job.

	1	2	3	4	5

13. I have observed on their return to the job, HazMat training participants encourage one another to use the skills and knowledge learned in HazMat training.

	1	2	3	4	5

14. The HazMat training provides participants with sufficient opportunities to practice the key behaviors related to the skills they should improve.

	1	2	3	4	5

15. The content of the HazMat training has practical applicability to the job.

	1	2	3	4	5

16. As a general practice in my supervisory capacity, I help ease the pressure of work while participants are off the job attending HazMat training.

	1	2	3	4	5

17. I have observed on their return to the job, HazMat training participants praise and recognize one another when they observe

	1	2	3	4	5

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
	1	2	3	4	5
use of newly learned HazMat skills.					
18. Those who participate in HazMat training use their newly learned knowledge in their work.	1	2	3	4	5
19. HazMat trainers provide refresher/problem-solving sessions following training to give a brief summary of essential concepts and discuss problems participants of the training have encountered.	1	2	3	4	5
20. As a general practice in my supervisory capacity, I provide follow-up coaching directly related to HazMat training.	1	2	3	4	5
21. As a general practice in my supervisory capacity, I praise or reward those who demonstrate that they have effectively applied on-the-job what was taught in HazMat training.	1	2	3	4	5
22. As a general practice in my supervisory capacity, I authorize release time or alter work schedules to encourage participation in HazMat training.	1	2	3	4	5
23. Participants of Haz Mat training have time to apply newly learned skills and knowledge in the workplace.	1	2	3	4	5
24. As a general practice in my supervisory capacity, I provide recommendations for promotion to those who demonstrate on-the-job HazMat training application.	1	2	3	4	5
25. HazMat trainers create an environment that is conducive to learning.	1	2	3	4	5
26. The HazMat training is clearly linked to participant career and/or performance objectives.	1	2	3	4	5
27. Those who participated in HazMat training are convinced that they will do a better job due to the training.	1	2	3	4	5
28. HazMat trainers express a personal interest in participants.	1	2	3	4	5

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
	1	2	3	4	5
29. I have observed on their return from HazMat training, that participants help support their peers in the application of HazMat practices.	1	2	3	4	5
30. HazMat trainers are easy to understand.	1	2	3	4	5
31. I know of work situations to which participants of HazMat training can apply what they learn.	1	2	3	4	5
32. As a general practice in my supervisory capacity, I arrange to minimize work disruptions that might intrude on a participant's HazMat training.	1	2	3	4	5
33. As a general practice in my supervisory capacity, I listen actively to concerns about applying HazMat learning.	1	2	3	4	5
34. The HazMat training significantly contributes to job effectiveness.	1	2	3	4	5
35. HazMat trainers provide follow-up support after the training.	1	2	3	4	5
36. There is a good balance between trainer input (lecture) and participant input (involvement via discussion and group activity/practice sessions).	1	2	3	4	5
37. I have observed on their return to the job, that HazMat training participants provide feedback to one another about the value and usefulness of the HazMat training.	1	2	3	4	5
38. HazMat trainers are confident and enthusiastic.	1	2	3	4	5
39. The HazMat training is well planned and organized.	1	2	3	4	5
40. As a general practice in my supervisory capacity, I give positive and constructive feedback about HazMat job performance.	1	2	3	4	5
41. The HazMat training realistically reflects the conditions of the job.	1	2	3	4	5

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
	1	2	3	4	5
42. Before training, as a general practice in my supervisory capacity, I discuss with returning participants the objectives of the HazMat training program.	1	2	3	4	5
43. As a general practice in my supervisory capacity, I reduce the job pressure when participants return from HazMat training so they can take time to become accustomed to using the new pattern of skills and knowledge.	1	2	3	4	5
44. The relevance of the HazMat training to the job is well demonstrated.	1	2	3	4	5
45. As a general practice in my supervisory capacity, I hold follow-up meetings at periodic intervals for information sharing, problem solving, and support in applying HazMat skills and knowledge to the job.	1	2	3	4	5
46. As a general practice in my supervisory capacity, I have pointed out work situations where application of newly learned HazMat skills and knowledge is useful.	1	2	3	4	5
47. As a general practice in my supervisory capacity, I assist participants in meeting the HazMat training goals by providing opportunities to apply new skills and knowledge.	1	2	3	4	5
48. Management offers incentives for application to the job of what is taught in HazMat training.	1	2	3	4	5
49. Physical facilities for the HazMat training activities are adequate.	1	2	3	4	5
50. Those who have participated in HazMat training freely and positively share with their co-workers what they learned.	1	2	3	4	5
51. HazMat trainers are well prepared and help participants understand the sequence and time allotted to each topic during training.	1	2	3	4	5

Please provide information about yourself by circling one for each of the following items:

52 Select highest level completed.
    A. Grade School
    B. High School
    C. Some College
    D. Associate Degree
    E. Bachelor's Degree
    F. Post Bachelor's Degree
    G. Master's Degree
    H. Post Master's Degree

53 Which of the following describes your present employer?
    A. Fire Service
    B. Law Enforcement
    C. Industrial Fire Brigade
    D. Private Industry/Consultant
    E. Private EMS
    F. Public Safety
    G. Emergency Management
    H. Public EMS
    I. Other

54 How many years have you have been involved in the Fire/Rescue service?
    A. Not Applicable
    B. Less than one year
    C. 1 - 5 years
    D. 6 - 10 years
    E. 11 - 15 years
    F. 16 - 20 years
    G. Over 20 years

55 Please mark the choice that best describes your current position.
    A. Firefighter
    B. Lieutenant/ or Equivalent
    C. Captain/ or Equivalent
    D. Battalion Chief/ or Equivalent
    E. Deputy Chief/ or Equivalent
    F. Chief/ or Equivalent

56 What is your ethnic background?
    A. African American
    B. Asian/Pacific Islander
    C. Caucasian
    D. Hispanic
    E. Native American
    F. Other

57 Location:

_____

_____

_____

_____

Thank you for taking the time to complete this questionnaire

IAFF Hazardous Materials (HazMat)
Training Questionnaire – Trainee

Instructions: Please respond to all items and mark only one response for each. There are no right or wrong answers; we are only interested in your opinions. Of course, your responses are kept in a confidential database for statistical treatment only.

Indicate the extent to which you agree with each statement following the HazMat training you completed by circling one of the five numbers to the right of the statement (1 = Strongly Disagree to 5 = Strongly Agree).

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
	1	2	3	4	5
1. HazMat training was up-to-date and aligned with current conditions in my job.	1	2	3	4	5
2. Communication and directions concerning the HazMat training activities were clear and adequate.	1	2	3	4	5
3. When I use new skills and knowledge on the job that I learned in HazMat training, I receive some sort of recognition.	1	2	3	4	5
4. The quality of materials and assignments used in HazMat training was satisfactory.	1	2	3	4	5
5. After training, my supervisor and I identified potential barriers to applying new skills and knowledge.	1	2	3	4	5
6. My co-workers recognize my effectiveness when I use the newly learned HazMat skills on the job.	1	2	3	4	5
7. My co-workers discuss problems related to use of the skills and knowledge taught in the HazMat training.	1	2	3	4	5
8. My supervisor met with me for a sufficient amount of time to discuss action plans and on-the-job application of HazMat training.	1	2	3	4	5

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
	1	2	3	4	5
9. Supervisors ensured that work was covered while I attended training HazMat training.	1	2	3	4	5
10. Supervisors notified me well in advance of my enrolment in HazMat training.	1	2	3	4	5
11. I feel capable of using the skills and knowledge developed in the HazMat training in my everyday work.	1	2	3	4	5
12. The equipment, facilities and materials in my department were adequate to help me in applying newly learned HazMat skills and knowledge to the job.	1	2	3	4	5
13. My co-workers encourage me to use the skills and knowledge I learned in HazMat training.	1	2	3	4	5
14. The HazMat training provided me with sufficient opportunities to practice the key behaviors related to the skills I should improve.	1	2	3	4	5
15. The content of the HazMat training had practical applicability to my job.	1	2	3	4	5
16. When I attended the HazMat training program, my supervisors helped to ease the pressures of work while I was off the job.	1	2	3	4	5
17. My co-workers praise and recognize when I use the newly learned HazMat skills on the job.	1	2	3	4	5
18. I use my newly learned HazMat skills and knowledge in my work.	1	2	3	4	5
19. The HazMat trainer/s provided refresher or problem-solving sessions to give a brief summary of essential concepts and discuss problems I or others encountered.	1	2	3	4	5
20. Supervisors provide follow-up coaching directly related to HazMat training.	1	2	3	4	5

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
	1	2	3	4	5
21. Supervisors praise or reward those who demonstrate that they have effectively applied on-the-job what was taught in HazMat training.	1	2	3	4	5
22. Supervisors authorized release time or altered work schedules to encourage my participation in HazMat training.	1	2	3	4	5
23. I had sufficient time to apply my newly learned HazMat skills and knowledge in the workplace.	1	2	3	4	5
24. Supervisors provide recommendations for promotion to those who demonstrate on-the-job HazMat training application.	1	2	3	4	5
25. The HazMat trainer/s created an environment that was conducive to learning.	1	2	3	4	5
26. I saw a clear link between the HazMat training and my career and/or performance objectives.	1	2	3	4	5
27. I feel the skills and knowledge I learned in HazMat training will help me do my job better.	1	2	3	4	5
28. The HazMat trainer/s expressed a personal interest in me and the other trainees.	1	2	3	4	5
29. I have helped support my co-workers in the application of HazMat practices.	1	2	3	4	5
30. The HazMat trainer/s was/were easy to understand.	1	2	3	4	5
31. I know of work situations to which I can apply what I learned from my HazMat training.	1	2	3	4	5
32. Supervisors arranged to minimize disruptions from work that might have intruded on my HazMat training.	1	2	3	4	5

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
	1	2	3	4	5
33. My supervisor listened actively to my concerns about applying HazMat learning.	1	2	3	4	5
34. The HazMat training significantly contributed to my job effectiveness.	1	2	3	4	5
35. The HazMat trainer/s provided follow-up support after the training.	1	2	3	4	5
36. There was a good balance between trainer input (lecture) and participant input (involvement via discussion and group activity/practice sessions).	1	2	3	4	5
37. I and my co-workers provide feedback to one another about the value and usefulness of the HazMat training.	1	2	3	4	5
38. The HazMat trainer/s was/were confident and enthusiastic.	1	2	3	4	5
39. The HazMat training was well planned and organized.	1	2	3	4	5
40. My supervisor gave positive and constructive feedback about my HazMat job performance.	1	2	3	4	5
41. The HazMat training realistically reflected the conditions of my job.	1	2	3	4	5
42. Before training, my supervisor and I discussed the objectives of the HazMat training program.	1	2	3	4	5
43. My supervisors reduced the job pressure on my return from HazMat training so that I could take time to become accustomed to using new skills and knowledge.	1	2	3	4	5
44. The relevance of the HazMat training to my job was well demonstrated.	1	2	3	4	5
45. My supervisor held follow-up meetings at periodic intervals for information sharing, problem solving, and support in applying	1	2	3	4	5

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
	1	2	3	4	5
HazMat skills and knowledge to the job.					
46. I identified work situations where the application of newly learned HazMat skills and knowledge was useful.	1	2	3	4	5
47. My supervisor assisted in meeting the HazMat training goals by providing me with opportunities to apply new HazMat skills and knowledge.	1	2	3	4	5
48. Management offers some form of incentive for me to apply to the job what I learned in HazMat training.	1	2	3	4	5
49. Physical facilities for the HazMat training activities that I attended were adequate.	1	2	3	4	5
50. My supervisor asked me or others to freely and positively share with our co-workers what we learned in HazMat training.	1	2	3	4	5
51. The HazMat trainer/s was/were well prepared and helped me understand the sequence and time allotted to each topic.	1	2	3	4	5

Please provide information about yourself by circling one for each of the following items:

52 Select highest level completed.
   A. Grade School
   B. High School
   C. Some College
   D. Associate Degree
   E. Bachelor's Degree
   F. Post Bachelor's Degree
   G. Master's Degree
   H. Post Master's Degree

53 Which of the following describes your present employer?
   A. Fire Service

B. Law Enforcement
C. Industrial Fire Brigade
D. Private Industry/Consultant
E. Private EMS
F. Public Safety
G. Emergency Management
H. Public EMS
I. Other

54 How many years have you have been involved in the Fire/Rescue service?
A. Not Applicable
B. Less than one year
C. 1 - 5 years
D. 6 - 10 years
E. 11 - 15 years
F. 16 - 20 years
G. Over 20 years

55 Please mark the choice that best describes your current position.
A. Probationary Fire Fighter (Recruit, Trainee)
B. EMS Provider (Paramedic, EMT or First Responder)
C. HazMat Team Member
D. Fire Service Trainer

56 What is your ethnic background?
G. African American
H. Asian/Pacific Islander
I. Caucasian
J. Hispanic
K. Native American
L. Other

57 Location:

Thank you for taking the time to complete this questionnaire

APPENDIX C: INSTRUMENT DEVELOPMENT

Table C 1. Survey-Research Plan of Action

1. Develop a research question
2. Investigate existing literature on the topic and subtopics on transfer of training
3. Clarify and refocus the research question(s) if appropriate.
4. Establish the validity of the instrument; if the instrument is appropriate measuring the presence/absence of nine Broad and Newstrom factors and perception of trainees and supervisors on transfer of training, rework instrument and validate using method described below.
a. Develop a Table consisting of questions from previously done studies related to Broad and Newstrom factors.
b. Develop a Table of Questions and relate them to key words given by Broad and Newstrom (1992)
c. Develop a Table of Specifications
d. Develop an instrument based upon the table of specifications and table of questions
e. Validate the instrument.
f. Determine the sample.
g. Acquire and analyze the data.

Table C 2. Selected Statements

Factor 1: Reinforcement on the Job
1. If I use new skills learned in training, I can expect to receive some sort of recognition or reward. (Burke and Baldwin, 1999).
2. The supervisor/manager provide for salary increase/incentives for participants in training who apply what they learned on the job (Cronwell, 2000).
3. The supervisor/manager provides references for promotions to those demonstrating on-the-job application (Cronwell, 2000).
4. Gives praise or rewards to participants who demonstrate that they have effectively applied on the job what was learned in training (Cronwell, 2000).
Factor 2: Little Interference from immediate (work) environment
1. When I attend training programs, my supervisor helps to ease the pressures of work while I'm away (Burke and Baldwin, 1999).
2. My supervisor reduces the job pressure on returning trainees so that we could take time to solidify the new pattern of behavior.
3. My supervisor/manager authorizes released time or altered work schedules to encourage participation in training (Cronwell, 2000).
4. My supervisor/manager notifies participants of their attendance at training and ensures that work is covered while they attend training (Cronwell, 2000).
5. My supervisor/manager arranges to minimize disruptions from work to intrude on training (Cronwell, 2000).
Factor 3: Supportive Organizational Culture
1. My supervisor/manager and I discuss the objectives of training programs that I had attended and identified mutually unforeseen barriers to transfer (Broad and Newstrom, 1992; Burke and Baldwin, 1999).
2. My supervisor/manager exhibits behaviors that are consistent with the training I receive (e.g., uses the same terminology taught in training; practices the same skills) away (Burke and Baldwin, 1999).
3. My supervisor/manager has a positive attitude toward training (Burke and Baldwin, 1999).
4. I am encouraged to try using new techniques or innovations in my job (Burke and Baldwin, 1999).
5. If I implement new techniques from training programs, it usually goes unnoticed by my supervisor (Burke and Baldwin, 1999).
6. The supervisor/manager Provides advice and coaching to participants when required immediately following training (Cronwell, 2000).
7. The supervisor/manager meets regularly with participant to discuss action plans and on-the-job application of training (Cronwell, 2000).

8. The supervisor/manager helps participants establish realistic on-the-job action plans based on what was learned in training (Cronwell, 2000).
9. The supervisor/manager plans follow-up assessment procedures to measure how much and how well participants applied on the job what they learned in training (Cronwell, 2000).
10. The supervisor/manager requests reports from participants on how much and how well they applied on the job what they learned in training (Cronwell, 2000).
11. My supervisor/manager made performance expectations and priorities clear to his/her subordinates (Burke and Baldwin, 1999).
12. My supervisor/manager listened actively to his/her subordinates' concerns (Burke and Baldwin, 1999).
13. My supervisor/manager told his/her subordinates when they performed well (Burke and Baldwin, 1999).
14. My supervisor/manager tried to build rapport with his/her subordinates (Burke and Baldwin, 1999).
15. My supervisor/manager given his/her subordinates the freedom to develop and work independently (Burke and Baldwin, 1999).
16. My supervisor/manager provided both positive and constructive feedback to his/her subordinates about their job performance (Burke and Baldwin, 1999).
17. My supervisor/manager assisted his/her subordinates in meeting their goals (Burke and Baldwin, 1999).
Factor 4: Practical Training Programs
1. I learned skills in this course that I intend to use in my everyday work (Hicks 2006).
2. Training directly related to my job (Clemenz, 2001).
3. The training was up-to-date with current conditions on my job (Sekowski, 2002).
4. This course provided me with sufficient opportunities to learn and practice the key behaviors related to the skills I want to improve (Hicks, 2006).
5. I know of work situations in which I plan to use what I have learned in this course (Hicks, 2006).
Factor 5: Relevant Training Content
1. I see a link between the training programs I participate in and my career and/or performance objectives (Burke and Baldwin, 1999).
2. The content of most training programs I attend has practical applicability to my job (Burke and Baldwin, 1999).
3. The training realistically mirrored my job (Clemenz, 2001).
4. The training will significantly enhance my job effectiveness (Sekowski, 2002).
Factor 6: Trainees being comfortable with change and associated efforts
1. I feel capable of using the skills developed in this course in my everyday work (Hicks,

	2006).
2.	I would recommend this training to others in my field (Sekowski , 2002).
3.	Overall, I am satisfied with this training experience (Sekowski, 2002) .
Factor 7: Trainer being supportive and inspiring	
1.	The trainers helped to create an environment that was conducive to learning (Hicks, 2006).
2.	Trainer was knowledgeable regarding content (Clemenz, 2001).
3.	Trainer was confident, enthusiastic and was easy to understand (Clemenz, 2001; Hicks, 2006).
4.	Trainer expressed a personal interest in me and the other trainees (Clemenz, 2001).
5.	Trainer expressed appreciation for my previous work experience (Clemenz, 2001).
6.	While in training, I felt I was treated in a non-discriminatory manner (Sekowski, 2002).
Factor 8: Trainees' perception of training being well designed/delivered	
1.	Physical facilities for training activities that I attend are adequate (Burke and Baldwin, 1999).
2.	Communications concerning the activities in this course were clear and adequate (Hicks, 2006).
3.	This course was well planned and organized (Hicks, 2006)
4.	The level of material presented in this course was neither too easy nor too difficult (Hicks, 2006).
5.	There was a good balance between trainer input (lecture) and participant inputs (involvement via discussion and group activity) (Hicks, 2006)
6.	The quality of materials and assignments used in this course were satisfactory (Hicks, 2006).
7.	I knew how much time would be allotted to each topic during training (Sekowski, 2002).
8.	I knew the sequence of training (Sekowski, 2002)
Factor 9: Peer Support	
1.	My peers ridicule (i.e., mock) those who use new techniques learned in training programs (Burke & Baldwin, 1999).
2.	Peers encourage me to utilize the knowledge and skills learned in training (Cronwell, 2000).
3.	Peers discuss problems related to utilizing the knowledge and skills learned in training (Cronwell, 2000).
4.	Peers meet to discuss application of the training on the job (Cronwell, 2000).
5.	Peers provide answers to questions relative to use of knowledge an skills on the job (Cronwell, 2000).

6. Peers praise and recognize when you have used the newly learned skills on the job (Cronwell, 2000).
7. Peers provide feedback about the value and usefulness of the training (Cronwell, 2000)
8. You share your training experience with your peers and encourage peer support (Cronwell, 2000).
9. Peers recognize your effectiveness when you use the newly learned skills on the job (Cronwell, 2000).

Selected statements for Supervisors

Factor 1: Reinforcement on the Job

1. Provide for salary increase/incentives for participants in training who completed the program and apply what they learned on the job (Cronwell, 2000).
2. Provide preference for promotion to those demonstrating on-the-job application (Cronwell, 2000).
3. Give praise or rewards to participants who demonstrate that they have effectively applied on-the-job what was learned in training (Cronwell, 2000).
4. Provides advice and coaching inform of direct on the job guidance and immediate correction if necessary.
5. Explain the rewards for using acquired skills/knowledge when trainees come back to their job.

Factor 2: Little Interference from immediate (work) environment

1. Authorize released time or altered work schedules to encourage participation in IAFF training (Cronwell, 2000).
2. Notify participants of their attendance at training and ensure that work is covered while they attend training (Cronwell, 2000).
3. Arrange to minimize disruptions from work to intrude on training (Cronwell, 2000).
4. Reduces the job pressure on returning trainees so that they could take time to solidify the new pattern of behavior.
5. The equipment and facilities are adequate to help in applying newly learned skills and knowledge to the workplace.

Factor 3: Supportive Organizational Culture

1. Inform participants of new behaviors expected on the job following the training (Cronwell, 2000).
2. Provide advice and coaching to participants when required immediately following training (Cronwell, 2000).
3. Encourage individual attendance at all training sessions (Cronwell, 2000).
4. Know personal communication strengths and needs, use different types of questions to

obtain information, listen effectively; convey information and opinions effectively (Cronwell, 2000).
5. Discuss with participant of the changes in performance that should result from the training (Cronwell, 2000).
6. Understanding the conditions that facilitate on-job-training (Cronwell, 2000).
7. Establish a clear, measurable description of employee work performance before training as a basis for comparison after training (Cronwell, 2000).
8. I have been able to effectively work with the employee to support what was learned in training (Sekowski, 2002).
9. Met personally with the participants during training to discuss how training might have been applied back on the job (Cronwell, 2000).
10. Discuss the objectives of training programs that trainees had attended and identified mutually unforeseen barriers to transfer.
11. Meets regularly with trainee to discuss action plans and on-the-job application of training.
12. Requests reports from participants on how much and how well they applied on the job what they learned in training.
13. Listens actively to trainees concerns and gives positive and constructive feedback to his/her subordinates about their job performance.
Factor 4: Practical Training Programs
1. The training was offered when it when the employee needed it (Sekowski, 2002).
2. The employee was successful in applying what was learned (Sekowski, 2002).
3. The training had a significant impact on the employees' work results (Sekowski, 2002).
4. The training was directly related to trainee' job.
5. The training was up-to-date with current conditions on trainees' job.
6. This course provided trainees with sufficient opportunities to learn and practice the key behaviors related to the skills they wanted to improve.
Factor 5: Relevant Training Content
1. The training my employee received applies to his/her current job responsibilities (Sekowski, 2002).
2. The course appears to have been worth the costs and time off the job.
3. The relevance of the material to the trainees' job was well demonstrated.
4. I identified work situations where the application of newly learned knowledge and skills would be useful.
5. The training will significantly enhance trainees' job effectiveness.
6. The trainee felt capable of using the skills developed in this course in everyday work.
Factor 6: Trainees being comfortable with change and associated efforts

[Modified from trainees' survey]
1. Trainee felt capable of using the skills developed in this course in everyday work (Hicks, 2006).
2. Overall, I am satisfied with this training experience (Sekowski, 2002).
3. Asked trainees to present a briefing to co-workers on the training objectives, content, methods, and outcomes.
4. The trainees felt relaxed and supported each other in implementing new skills and knowledge.
Factor 7: Trainer being supportive and inspiring
[Modified from trainees' survey]
1. The trainers helped to create an environment that was conducive to learning (Hicks, 2006).
2. Trainer was knowledgeable regarding content (Clemenz, 2001).
3. Trainer was confident (Clemenz, 2001).
4. Trainer was enthusiastic (Clemenz, 2001).
5. Trainer candidly related his/her work experiences (Clemenz, 2001).
6. Trainer expressed a personal interest in the trainees (Clemenz, 2001).
7. Trainer expressed appreciation for trainees' previous work experience (Clemenz, 2001).
8. The trainer was easy to understand (Hicks, 2006).
9. The trainer provided a follow up support after the training by contacting the individual trainees or in groups and giving advice and support.
10. The trainer after few months of the training provided refresher/problem-solving sessions to give a brief summary of essential concepts and discuss trainees' problems.
Factor 8: Trainees' perception of training being well designed/delivered
[Modified from trainees' survey]
1. Physical facilities for training activities that I attend are adequate (Burke and Baldwin, 1999).
2. Communications concerning the activities in this course were clear and adequate (Hicks, 2006).
3. This course was well planned and organized (Hicks, 2006).
4. The level of material presented in this course was neither too easy nor too difficult (Hicks, 2006).
5. There was a good balance between trainer input (lecture) and participant inputs (involvement via discussion and group activity) (Hicks, 2006)
6. The quality of materials and assignments used in this course were satisfactory (Hicks, 2006).
7. The trainees knew how much time would be allotted to each topic during training (Sekowski, 2002).

8. The trainees knew the sequence of training (Sekowski, 2002)
9. The course covered the areas for which the employee most needed training (Sekowski, 2002).
10. This course was well planned and organized.
11. The trainer reviewed the training design and materials in advance so the trainees knew the sequence time would be allotted to each topic.
12. The communications concerning the activities in this course were clear and adequate.
13. There was a good balance between trainer input (lecture) and participant inputs (involvement via discussion and group activity/practice sessions).
Factor 9: Peer Support
[Modified from trainees' survey]
1. Peers encouraged trainees to utilize the knowledge and skills learned in training (Cronwell, 2000).
2. Peers provided feedback about the value and usefulness of the training (Cronwell, 2000)
3. The trainees shared their training experience with their peers and encouraged peer support (Cronwell, 2000).
4. The trainees discussed with their peers problems related to utilizing the knowledge and skills learned in training.
5. The trainees' co-workers praised when trainees' used the newly learned skills on the job.

∗ Selected statements highlighted in blue

Table C 3. Linking the Statements to Broad and Newstrom Transfer Strategies

Factor 1: Reinforcement on the Job
5. If I use new skills learned in training, I can expect to receive some sort of recognition or reward. (Burke and Baldwin, 1999).
6. The supervisor/manager provide for salary increase/incentives for participants in training who apply what they learned on the job (Cronwell, 2000).
7. The supervisor/manager provides references for promotions to those demonstrating on-the-job application (Cronwell, 2000).
8. Gives praise or rewards to participants who demonstrate that they have effectively applied on the job what was learned in training (Cronwell, 2000).
9. My supervisor provides advice and coaching inform of direct on the job guidance and immediate correction if necessary.
10. The rewards for using acquired skills/knowledge when back on the job were explained (Clemenz (2001).
Factor 1: Reinforcement on the Job (Broad and Newstrom, 1992)
➢ The supervisors should provide a role model or coach gives direct, on-the-job guidance and immediate correction if necessary.
➢ Trainees' don't expend their energy to do something new because no one around them seems to care.
Factor 2: Little Interference from immediate (work) environment
6. When I attend training programs, my supervisor helps to ease the pressures of work while I'm away (Burke and Baldwin, 1999).
7. My supervisor reduces the job pressure on returning trainees so that we could take time to solidify the new pattern of behavior.
8. My supervisor/manager authorizes released time or altered work schedules to encourage participation in training (Cronwell, 2000).
9. My supervisor/manager notifies participants of their attendance at training and ensures that work is covered while they attend training (Cronwell, 2000).
10. My supervisor/manager arranges to minimize disruptions from work to intrude on training (Cronwell, 2000).
11. The equipment and facilities are adequate to help in applying newly learned skills and knowledge to the workplace.
Factor 2: Little Interference from immediate (work) environment (Broad and Newstrom, 1992)
➢ Mangers need to make it easier (initially) for trainees to attempt transfer, and they can do

this by temporarily reducing the restraining forces.
➤ Managers can do this by temporarily reducing the job pressures that newly trained employees bear.
➤ The raps have no time (as the phone rings off the hook) to try new learned skills.
➤ Inadequate equipment and facilities.
Factor 3: Supportive Organizational Culture
18. My supervisor/manager and I discuss the objectives of training programs that I had attended and identified mutually unforeseen barriers to transfer (Broad and Newstrom, 1992; Burke and Baldwin, 1999).
19. The supervisor/manager meets regularly with participant to discuss action plans and on-the-job application of training (Cronwell, 2000).
20. The supervisor/manager requests reports from participants on how much and how well they applied on the job what they learned in training (Cronwell, 2000).
21. My supervisor/manager listened actively to his/her subordinates' concerns and positive and constructive feedback to his/her subordinates about their job performance (Burke and Baldwin, 1999).
22. My supervisor/manager assists in meeting training programs goals by providing opportunities to apply new knowledge and skills.
23. My supervisor should sets up additional follow-up meetings at periodic intervals for further information sharing, problem solving, and support of the transfer effort.
Factor 3: Supportive Organizational Culture (Broad and Newstrom, 1992)
➤ We advocate that supervisor make plans to smooth trainees' transition back to the jobs and facilitate use of their skills.
➤ The supervisor should sit down with trainees themselves, debriefs them what took place during the time when they were being trained and make plans to implement the new skills and knowledge.
➤ The supervisors should conduct a series of one-on-one meetings with the trained individuals to communicate support for transfer through message such as " I'm aware you are trying to apply your training."
➤ The supervisor should set up additional follow-up meetings at periodic intervals for further information sharing, problem solving, and support of the transfer effort.
➤ Trainees must have opportunities to apply new knowledge and skills.
Factor 4: Practical Training Programs
6. I learned skills in this course that I intend to use in my everyday work (Hicks 2006).
7. Training directly related to my job (Clemenz, 2001).
8. The training was up-to-date with current conditions on my job (Sekowski, 2002).
9. This course provided me with sufficient opportunities to learn and practice the key behaviors

related to the skills I want to improve (Hicks, 2006).

10. I know of work situations in which I plan to use what I have learned in this course (Hicks, 2006).

11. I enjoyed the training but I don't have time to apply the newly learned skills and knowledge in the workplace.

Factor 4: Practical Training Programs (Broad and Newstrom, 1992)

➤ Trainees belief that training programs are impractical or irrelevant to their needs and that proposed changes would cause them undue discomfort or extra effort.

➤ Although the Ace trainers enjoyed the training, they are convinced that they don't have time to apply it properly on their jobs.

Factor 5: Relevant Training Content

5. I see a link between the training programs I participate in and my career and/or performance objectives (Burke and Baldwin, 1999).

6. The content of most training programs I attend has practical applicability to my job (Burke and Baldwin, 1999).

7. The training realistically mirrored my job (Clemenz, 2001).

8. The training will significantly enhance my job effectiveness (Sekowski, 2002).

9. The relevance of the material to the trainees job was well demonstrated (Sekowski 2002).

10. I identified work situations where the application of newly learned knowledge and skills would be useful.

Factor 5: Relevant Training Content (Broad and Newstrom, 1992)

The raps do not believe they need training in customer service skills. They are sure that on-line data base will help improve sales by making their jobs easier.

Factor 6: Trainees being comfortable with change and associated efforts

4. I feel capable of using the skills developed in this course in my everyday work (Hicks, 2006).

5. I would recommend this training to others in my field (Sekowski , 2002).

6. Overall, I am satisfied with this training experience (Sekowski, 2002).

7. I am excited about using my newly learned knowledge and skills at the work place.

8. The supervisors asks me to present a briefing to co-workers on the training objectives, content, methods, and outcomes.

9. I felt relaxed during the training as the mood during the training was supportive (Clemenz, 2001).

Factor 6: Trainees being comfortable with change and associated efforts (Broad and Newstrom, 1992)

> The trainees are apprehensive about their ability to use new communication styles in the high-pressure work situation.

> The supervisors asks me to present a briefing to co-workers on the training objectives, content, methods, and outcomes.

Factor 7: Trainer being supportive and inspiring

7. The trainers helped to create an environment that was conducive to learning (Hicks, 2006).
8. Trainer was knowledgeable regarding content (Clemenz, 2001).
9. Trainer was confident, enthusiastic and was easy to understand (Clemenz, 2001; Hicks, 2006).
10. Trainer expressed a personal interest in me and the other trainees (Clemenz, 2001).
11. The trainer provided a follow up support after the training by contacting the individual trainees or in groups and giving advice and support.
12. The trainer after few months of the training provides refresher/problem-solving sessions to provide a brief but coherent summary of essential concepts and discuss trainees' problems.

Factor 7: Trainer being supportive and inspiring (Broad and Newstrom, 1992)

> The trainees were able to learn and demonstrate new communication styles in the protected training environment, with support from the charismatic XYZ trainers. However, on the job, they can't apply the new skills in the high pressure work setting without additional support from those trainees.

> Trainers can help to induce synergy among their trainees back on the job in a number of ways. They can take initiative to contact individual trainees or small groups after they have returned to their jobs. By redefining their roles from strictly trainers/presenters to facilitators of behavioral change on the job.

> The trainer after few months of the training provides refresher/problem-solving sessions to provide a brief but coherent summary of essential concepts and discuss trainees' problems.

Factor 8: Trainees' perception of training being well designed/delivered

9. This course was well planned and organized (Hicks, 2006).
10. The trainer reviewed the training design and materials in advance so I knew the sequence time would be allotted to each topic.
11. Communications concerning the activities in this course were clear and adequate (Hicks, 2006).
12. There was a good balance between trainer input (lecture) and participant inputs (involvement via discussion and group activity/practice sessions) (Hicks, 2006).
13. The quality of materials and assignments used in this course were satisfactory (Hicks, 2006).
14. Physical facilities for training activities that I attend are adequate (Burke and Baldwin, 1999).

Factor 8: Trainees' perception of training being well designed/delivered (Broad and Newstrom, 1992)
a. Practice sessions during training were limited, so trainees are not sure how to apply new skills on the job. The trainer did not review the training design and materials in advance to ensure that the training followed sounds principles of adult learning and instructional design.
Factor 9: Peer Support
10. You share your training experience with your peers and encourage peer support (Cronwell, 2000).
11. Peers discuss problems related to utilizing the knowledge and skills learned in training (Cronwell, 2000).
12. Peers encourage me to utilize the knowledge and skills learned in training (Cronwell, 2000).
13. Peers praise and recognize when you have used the newly learned skills on the job (Cronwell, 2000).
14. Peers provide feedback about the value and usefulness of the training (Cronwell, 2000).
15. Peers recognize your effectiveness when you use the newly learned skills on the job (Cronwell, 2000).
Factor 9: Peer Support (Broad and Newstrom, 1992)
b. Maintain contact with training buddies.
c. Experiences trainees don't like the new techniques and pressure their newer co-workers to the previous less time consuming procedures.

∗ Selected statements highlighted in blue

Table C 4. Blue Print Table

Factors	Trainees' Questions	Supervisors' Questions
Factor 1: Reinforcement on the Job	1-6	1-5
Factor 2: Little Interference from immediate (work) environment	7-12	6-10
Factor 3: Supportive Organizational Culture	13-18	11-15
Factor 4: Practical Training Programs	19-24	16-20
Factor 5: Relevant Training Content	25-30	21-25
Factor 6: Trainees being comfortable with change and associated efforts	31-36	26-28
Factor 7: Trainer being supportive and inspiring	37-42	29-33
Factor 8: Trainees' perception of training being well designed/delivered	43-48	34-38
Factor 9: Peer Support	49-54	39-43
Demographics ▪ Gender ▪ Ethnic background ▪ Education ▪ Present Employer ▪ Experience ▪ Current Position ▪ Location	 55 56 57 58 59 60 61	 44 45 46 47 48 49 50

Table C 5. Developing the Questionnaire and Related Materials

GENERAL
➢ Ensure that materials are attractive and professional, including layout, quality of paper, and overall appearance.
➢ Most surveys include 2 parts: consent letter that includes acknowledgment of consent; questionnaire; and self-addressed, stamped envelope to ensure return.
➢ Ensure that the length and difficulty of the questionnaire is realistic for the audience solicited.
➢ Ensure that all questions are of the same format
➢ Attempt to put all responses in the same place on the form for ease of coding.
➢ Provide directions in a clear and concise manner at the top of the first page and repeat on subsequent pages if needed.
Question Wording
➢ State all questions precisely but not so specifically that they require research to respond.
➢ Ensure that each item asks only one question. A question should not be embedded within a question.
➢ Keep questions language neutral so as to not present the respondent with a perceived bias.
➢ Avoid universal words such as all, always, none, or never, and jargon, slang, or words with double meanings.
➢ Avoid questions with double negatives or hypothetical situations.
➢ Ask short questions in a consistent way using simple words.
Question Sequence
➢ Ensure that later responses are not biased by earlier questions.
➢ Ensure that questions are listed in a logical, efficient sequencing. Group similar content questions together unless this will bias the response.

Table C 6. Types of Validity

VALIDITY	OVERVIEW
Content Experts [Dr S. Sivo, Dr. G. Orwig, Dr Harold Stolovitch, Dr. John Newstrom, Dr. Mary Broad, Dr. S. Martin, Dr. S. Condly]	Ensure that the content of the questionnaire accurately assesses all essential aspects of the topic.
Construct Experts [Dr S. Sivo, Dr. G. Orwig, Dr Harold Stolovitch, Dr. John Newstrom, Dr. Mary Broad, Dr. S. Martin, Dr. S. Condly]	Agree with the hypothetical constructs (causes) that the investigator suggests underlie the research question.
Criterion-related Evaluation [Dr S. Sivo, Dr. G. Orwig, Dr Harold Stolovitch, Dr. John Newstrom, Dr. Mary Broad, Dr. S. Martin, Dr. S. Condly]	To determine that all items used in the survey are related to specific criteria to be analyzed.

APPENDIX D: INSTRUMENT VALIDATION

Table D 1. Broad and Newstrom Factors for Supervisor's Questions

Broad and Newstrom factors and questions related to each Factor
Supervisor's Questionnaire
Factor 1: Reinforcement on the Job
1. Management provides some sort of recognition or reward for those who use new on-the-job skills and knowledge from their HazMat training.
2. Management offers incentives for application to the job of what is taught in HazMat training.
3. As a general practice, supervisors provide references for promotion to those who demonstrate on-the-job HazMat training application.
4. As a general practice, supervisors praise or reward those who demonstrate that they have effectively applied on-the-job what was taught in HazMat training.
Factor 2: Little Interference from immediate (work) environment
1. As a general practice, supervisors help ease the pressure of work while participants are off the job attending HazMat training.
2. As a general practice, supervisors reduce the job pressure when participants return from HazMat training so they can take time to solidify the new pattern of skills and knowledge.
3. As a general practice, supervisors authorize release time or alter work schedules to encourage participation in HazMat training.
4. As a general practice, supervisors notify participants of their enrollment in HazMat training and ensure that work is covered while they attend training.
5. As a general practice, supervisors arrange to minimize work disruptions that might intrude on a participant's HazMat training.
6. The equipment, facilities, and materials in our department are adequate to help in applying newly learned HazMat skills and knowledge to the job.
Factor 3: Supportive Organizational Culture
1. As a general practice, supervisors provide advice and coaching directly related to HazMat training in the form of job guidance and immediate correction, if necessary.
2. As a general practice, supervisors discuss with returning participants the objectives of the HazMat training program and mutually identify unforeseen barriers to applying new skills and knowledge.
3. As a general practice, supervisors meet with those who participated in HazMat training and offer a sufficient amount of time to discuss action plans and on-the-job application of what was taught.
4. As a general practice, supervisors listen actively to concerns about applying HazMat learning and give positive and constructive feedback about job performance.
5. As a general practice, supervisors assist participants in meeting the HazMat training

goals by providing opportunities to apply new skills and knowledge.
6. As a general practice, supervisors set up additional follow-up meetings at periodic intervals for further information sharing, problem solving, and support for applying HazMat skills and knowledge to the job.
Factor 4: Practical Training Programs
1. The HazMat training is up-to-date and aligned with current conditions of the job.
2. The HazMat training provides participants with sufficient opportunities to learn and practice the key behaviors related to the skills they should improve.
3. Participants have time to apply newly learned skills and knowledge in the workplace.
4. As a supervisor, I have pointed out work situations where application of newly learned HazMat skills and knowledge is useful.
Factor 5: Relevant Training Content
1. The HazMat training is clearly linked to participant career and/or performance objectives.
2. The content of the HazMat training has practical applicability to the job.
3. I know of work situations to which participants of HazMat training can apply what they learn.
4. The HazMat training realistically reflects the conditions of the job.
5. The HazMat training significantly enhances job effectiveness.
6. The relevance of the HazMat training to the job is well demonstrated.
Factor 6: Trainees being comfortable with change and associated efforts
1. Those who participate in HazMat training feel capable of using the skills they developed in their everyday work.
2. Those who participate in HazMat training use their newly learned knowledge in their work.
3. Supervisors ask those who participated in HazMat training to present a briefing to co-workers on the training objectives, content, methods, and outcomes.
Factor 7: Trainer being supportive and inspiring
1. HazMat trainers create an environment that is conducive to learning.
2. HazMat trainers are confident, enthusiastic, and easy to understand.
3. HazMat trainers express a personal interest in participants.
4. HazMat trainers provide follow-up after the training by contacting trainees and giving advice and support.
5. HazMat trainers provide refresher/problem-solving sessions following training to give a brief summary of essential concepts and discuss problems participants of the training encountered.
Factor 8: Trainees' perception of training being well designed/delivered
1. The HazMat training is well planned and organized.

2. HazMat trainers are well prepared and help participants understand the sequence and time allotted to each topic during training.
3. Communication and directions during HazMat training are clear and adequate.
4. There is a good balance between trainer input (lecture) and participant input (involvement via discussion and group activity/practice sessions).
5. The quality of materials and assignments used in HazMat training is satisfactory.
6. Physical facilities for the HazMat training activities are adequate.
Factor 9: Peer Support
1. On their return from HazMat training, participants share experiences with peers and help support each other.
2. On their return to the job, peers discuss problems related to using the skills and knowledge taught in HazMat training.
3. On their return to the job, peers encourage one another to use the skills and knowledge learned in HazMat training.
4. On their return to the job, peers praise and recognize one another when they observe use of newly learned HazMat skills.
5. On their return to the job, peers provide feedback to one another about the value and usefulness of the HazMat training.
6. Peers recognize each other's effectiveness when they use newly learned HazMat skills on the job.

Table D 2. Broad and Newstrom factors and Trainee's Questionnaire

Broad and Newstrom factors and questions related
Trainee's Questionnaire
Factor 1: Reinforcement on the Job
1. When I use new skills and knowledge on the job that I learned in HazMat training, I receive some sort of recognition or reward.
2. Management offers some form of incentive for me to apply to the job what I learned in HazMat training.
3. Supervisors provide references for promotion to those who have demonstrated on-the-job HazMat training application.
4. Supervisors praise or reward those who demonstrate that they have effectively applied on-the-job what was taught in HazMat training.
5. Supervisors provide advice and coaching directly related to HazMat training in the form of on-the-job guidance and immediate correction if necessary.
Factor 2: Little Interference from immediate (work) environment
1. When I attended the HazMat training program, my supervisors helped to ease the pressures of work while I was off the job.
2. My supervisors reduced the job pressure on my return from HazMat training so that I could take time to solidify the new skills and knowledge.
3. Supervisors authorized release time or altered work schedules to encourage my participation in HazMat training.
4. Supervisors notified me of my enrolment in HazMat training and ensured that work was covered while I attended training.
5. Supervisors arranged to minimize disruptions from work that might have intruded on my HazMat training.
6. The equipment, facilities and materials in my department were adequate to help me in applying newly learned HazMat skills and knowledge to the job.
Factor 3: Supportive Organizational Culture
1. My supervisor and I discussed the objectives of the HazMat training program that I attended and together we identified unforeseen barriers to applying new skills and knowledge.
2. My supervisor met with me a sufficient amount of time to discuss action plans and on-the-job application of HazMat training.
3. My supervisor listened actively to my concerns about applying HazMat learning and gave positive and constructive feedback about my HazMat job performance.
4. My supervisor assisted in meeting the HazMat training goals by providing me with opportunities to apply new HazMat skills and knowledge.
5. My supervisor set up additional follow-up meetings at periodic intervals for further

information sharing, problem solving, and support in applying HazMat skills and knowledge to the job.
Factor 4: Practical Training Programs
1. HazMat training was up-to-date and aligned with current conditions in my job.
2. The HazMat training provided me with sufficient opportunities to learn and practice the key behaviors related to the skills I should improve.
3. I had sufficient time to apply my newly learned HazMat skills and knowledge in the workplace.
4. I identified work situations where the application of newly learned HazMat skills and knowledge was useful.
Factor 5: Relevant Training Content
1. I saw a clear link between the HazMat training and my career and/or work objectives.
2. The content of the HazMat training had practical applicability to my job.
3. I know of work situations to which I can apply what I learned from my HazMat training.
4. The HazMat training realistically reflected the conditions of my job.
5. The HazMat training significantly enhanced my job effectiveness.
6. The relevance of the HazMat training to my job was well demonstrated.
Factor 6: Trainees being comfortable with change and associated efforts
1. I feel capable of using the skills developed in the HazMat training in my everyday work.
2. I use my newly learned HazMat skills and knowledge in my work.
3. My supervisor asked me or others to present a briefing to co-workers on the HazMat training objectives, content, methods, and outcomes.
Factor 7: Trainer being supportive and inspiring
1. The HazMat trainer/s created an environment that was conducive to learning.
2. The HazMat trainer/s was/were confident, enthusiastic, and easy to understand.
3. The HazMat trainer/s expressed a personal interest in me and the other trainees.
4. The HazMat trainer/s provided follow-up after the training by contacting trainees and giving advice and support.
5. The HazMat trainer/s provided refresher or problem-solving sessions to give a brief summary of essential concepts and discuss problems I or others encountered.
Factor 8: Trainees' perception of training being well designed/delivered
1. The HazMat training was well planned and organized.
2. The HazMat trainer/s was/were well prepared and helped me understand the sequence and time allotted to each topic.
3. Communication and directions concerning the HazMat training activities were clear

and adequate.
4. There was a good balance between trainer input (lecture) and participant input (involvement via discussion and group activity/practice sessions).
5. The quality of materials and assignments used in HazMat training was satisfactory.
6. Physical facilities for the HazMat training activities that I attended were adequate.
Factor 9: Peer Support
1. I have shared my HazMat training experience with my peers and have helped support them.
2. My peers discuss problems related to use of the skills and knowledge taught in the HazMat training.
3. My peers encourage me to use the skills and knowledge I learned in HazMat training.
4. My peers praise and recognize when I use the newly learned HazMat skills on the job.
5. I and my peers provide feedback to one another about the value and usefulness of the HazMat training.
6. My peers recognize my effectiveness when I use the newly learned HazMat skills on the job.

APPENDIX E: EXPERT PANEL RATING SHEET

Table E 1. Validation Table: Transfer of Training Questionnaire

Following my HazMat training and based on the Understanding Hazardous Materials unit, I…				
Question	Acceptable as is	Requires revision as follows	Unaccept-able/ Eliminate	Additional Comments
5. Reviewed chemical and physical properties of hazardous materials and how they affect the response at a given scene.				
6. Routinely discussed with my shift the most common hazardous materials found at fixed sites and transportation routes.				
7. Analyzed a HazMat incident.				
8. Drove or walked through my first due area to note occupancies, transportation corridors and other sites where hazardous materials could be found.[replace by word toured]				
9. Reviewed HAZWOPER and addressed the six main issues that have an impact on fire fighters and other emergency response personnel.				
10. Kept records of responses where hazardous materials were present and learned about their possible harmful effects.[separate in to two items]				

Following my HazMat training and based on the Recognizing Hazardous Materials unit, I…				
Question	**Acceptable as is**	**Requires revision as follows**	**Unaccept-able/ Eliminate**	**Additional Comments**
1. Avoided contact with any persons or equipment that might have been contaminated in a hazardous materials incident until they were decontaminated.				
2. Reviewed my department's procedures for reporting exposures to ensure they maintain confidentiality.				
3. Reported any signs or symptoms of exposure following responses where toxic materials were present.				
4. Kept records of my responses to alarms where hazardous materials were detected and learned about these hazardous materials and their possible harmful effects.				
5. Decontaminated my clothing and equipment whenever I might have been exposed to toxic materials.[what if they have not been exposed to toxic material]				
Following my HazMat training and based on the Responding to Hazardous Materials unit, I…				
Question	**Acceptable as is**	**Requires revision as follows**	**Unaccept-able/ Eliminate**	**Additional Comments**
1. Referred to hazardous				

materials information sources and made sure I learned about chemicals in my first due area.				
2. Conducted pre-incident plans of hazardous materials sites in my first due area.				
3. Analyzed a potential HazMat incident while considering occupancy/location, container shapes/sizes, placards, and weather conditions.				
4. Planned a HazMat response by determining response objectives, defensive options, and appropriate PPE based on the scope of the incident.				
5. Implemented the plan by enforcing scene control and performing defensive control functions and decontamination.				
6. Established proper decontamination procedures for each potential HazMat incident.				

Overall rating for this instrument (please circle):

Acceptable as is   **Acceptable with revisions**   **Unacceptable**

Name of the Validator: ————————————————————

Signature: ————————————————————

Date: ————————————————————

Table E 2. Validation Table: IAFF HazMat Training Questionnaire for the Trainees

Factor 1: Reinforcement on the Job				
Question	**Acceptable as is**	**Requires revision as follows**	**Unaccept-able/ Eliminate**	**Additional Comments**
11. When I use new skills and knowledge on the job that I learned in HazMat training, I receive some sort of recognition or reward.				
12. Management offers some form of incentive for me to apply to the job what I learned in HazMat training.				
13. Supervisors provide references for promotion to those who have demonstrated on-the-job HazMat training application.				
14. Supervisors praise or reward those who demonstrate that they have effectively applied on-the-job what was taught in HazMat training.				
15. Supervisors provide advice and coaching directly related to HazMat training in the form of on-the-job guidance and immediate correction if necessary.				
Rating for factor 1 items as a group	**Acceptable as is**	**Requires additions as follows**	**Comments**	

Question	Acceptable as is	Requires revision as follows	Unaccept-able/ Eliminate	Additional Comments
Factor 2: Little Interference from immediate (work) environment				

Question	Acceptable as is	Requires revision as follows	Unaccept-able/ Eliminate	Additional Comments
7. When I attended the HazMat training program, my supervisors helped to ease the pressures of work while I was off the job.				
8. My supervisors reduced the job pressure on my return from HazMat training so that I could take time to solidify the new skills and knowledge.				
9. Supervisors authorized release time or altered work schedules to encourage my participation in HazMat training.				
10. Supervisors notified me of my enrolment in HazMat training and ensured that work was covered while I attended training.				
11. Supervisors arranged to minimize disruptions from work that might have intruded on my HazMat training.				
12. The equipment, facilities and materials in my department were adequate to help me in applying newly learned HazMat skills and knowledge to the job.				

Rating for factor 2 items as a group	Acceptable as is	Requires additions as follows	Comments	

Factor 3: Supportive Organizational Culture

Question	Acceptable as is	Requires revision as follows	Unaccept-able/ Eliminate	Additional Comments
1. My supervisor and I discussed the objectives of the HazMat training program that I attended and together we identified unforeseen barriers to applying new skills and knowledge.				
2. My supervisor met with me a sufficient amount of time to discuss action plans and on-the-job application of HazMat training.				
3. My supervisor listened actively to my concerns about applying HazMat learning and gave positive and constructive feedback about my HazMat job performance.				
4. My supervisor assisted in meeting the HazMat training goals by providing me with opportunities to apply new HazMat skills and knowledge.				
5. My supervisor set up additional follow-up meetings at periodic				

intervals for further information sharing, problem solving, and support in applying HazMat skills and knowledge to the job.			

Rating for factor 3 items as a group	**Acceptable as is**	**Requires additions as follows**	**Comments**

Factor 4: Practical Training Programs

Question	**Acceptable as is**	**Requires revision as follows**	**Unaccept-able/ Eliminate**	**Additional Comments**
1. HazMat training was up-to-date and aligned with current conditions in my job.				
2. The HazMat training provided me with sufficient opportunities to learn and practice the key behaviors related to the skills I should improve.				
3. I had sufficient time to apply my newly learned HazMat skills and knowledge in the workplace.				
4. I identified work situations where the application of newly learned HazMat skills and knowledge was useful.				

Rating for factor 4 items as a group	**Acceptable as is**	**Requires additions as**	**Comments**

		follows		

Factor 5: Relevant Training Content				
Question	**Acceptable as is**	**Requires revision as follows**	**Unaccept-able/ Eliminate**	**Additional Comments**
1. I saw a clear link between the HazMat training and my career and/or work objectives.				
2. The content of the HazMat training had practical applicability to my job.				
3. I know of work situations to which I can apply what I learned from my HazMat training.				
4. The HazMat training realistically reflected the conditions of my job.				
5. The HazMat training significantly enhanced my job effectiveness.				
6. The relevance of the HazMat training to my job was well demonstrated.				
Rating for factor 5 items as a group	**Acceptable as is**	**Requires additions as follows**	**Comments**	

Factor 6: Trainees being comfortable with change and associated efforts				
Question	**Acceptable**	**Requires**	**Unaccept-**	**Additional**

	as is	revision as follows	able/ Eliminate	Comments
1. I feel capable of using the skills developed in the HazMat training in my everyday work.				
2. I use my newly learned HazMat skills and knowledge in my work.				
3. My supervisor asked me or others to present a briefing to co-workers on the HazMat training objectives, content, methods, and outcomes.				

Rating for factor 6 items as a group	Acceptable as is	Requires additions as follows	Comments	

Factor 7: Trainer being supportive and inspiring

Question	Acceptable as is	Requires revision as follows	Unaccept-able/ Eliminate	Additional Comments
6. The HazMat trainer/s created an environment that was conducive to learning.				
7. The HazMat trainer/s was/were confident, enthusiastic, and easy to understand.				
8. The HazMat trainer/s expressed a personal interest in me and the other trainees.				
9. The HazMat trainer/s provided follow-up after the training by				

contacting trainees and giving advice and support.				
10. The HazMat trainer/s provided refresher or problem-solving sessions to give a brief summary of essential concepts and discuss problems I or others encountered.				

Rating for factor 7 items as a group	Acceptable as is	Requires additions as follows	Comments	

Factor 8: Trainees' perception of training being well designed/delivered

Question	Acceptable as is	Requires revision as follows	Unaccept-able/ Eliminate	Additional Comments
1. The HazMat training was well planned and organized.				
2. The HazMat trainer/s was/were well prepared and helped me understand the sequence and time allotted to each topic.				
3. Communication and directions concerning the HazMat training activities were clear and adequate.				
4. There was a good balance between trainer input (lecture) and participant input (involvement via discussion and group activity/practice sessions).				

Question	Acceptable as is	Requires revision as follows	Unaccept-able/ Eliminate	Additional Comments
5. The quality of materials and assignments used in HazMat training was satisfactory.				
6. Physical facilities for the HazMat training activities that I attended were adequate.				

Rating for factor 8 items as a group	Acceptable as is	Requires additions as follows	Comments	

Factor 9: Peer Support

Question	Acceptable as is	Requires revision as follows	Unaccept-able/ Eliminate	Additional Comments
1. I have shared my HazMat training experience with my peers and have helped support them.				
2. My peers discuss problems related to use of the skills and knowledge taught in the HazMat training.				
3. My peers encourage me to use the skills and knowledge I learned in HazMat training.				
4. My peers praise and recognize when I use the newly learned HazMat skills on the job.				
5. I and my peers provide feedback to one another about the value and usefulness of the HazMat training.				

	Acceptable as is	Requires additions as follows	Comments
6. My peers recognize my effectiveness when I use the newly learned HazMat skills on the job.			
Rating for factor 9 items as a group	**Acceptable as is**	**Requires additions as follows**	**Comments**

Overall rating for this instrument (please circle):
Acceptable as is   **Acceptable with revisions**   **Unacceptable**

Name of the Validator: ——————————————————————
Signature: ———————————————————————
Date: ———————————————————————

Table E 3. Validation Table: IAFF HazMat Training Questionnaire for the Supervisor

Factor 1: Reinforcement on the Job				
Question	Acceptable as is	Requires revision as follows	Unaccept-able/ Eliminate	Additional Comments
16. Management provides some sort of recognition or reward for those who use new on-the-job skills and knowledge from their HazMat training.				
17. Management offers incentives for application to the job of what is taught in HazMat training.				
18. As a general practice, as a supervisor, I provide references for promotion to those who demonstrate on-the-job HazMat training application.				
19. As a general practice, as a supervisor, I praise or reward those who demonstrate that they have effectively applied on-the-job what was taught in HazMat training.				
20. As a general practice, as a supervisor, I provide advice and coaching directly related to HazMat training in the form of job guidance and immediate correction, if necessary.				
Rating for factor 1 items as a group	Acceptable as is	Requires additions as follows	Comments	
Factor 2: Little Interference from immediate (work) environment				

Question	Acceptable as is	Requires revision as follows	Unaccept-able/ Eliminate	Additional Comments
13. As a general practice, as a supervisor, I help ease the pressure of work while participants are off the job attending HazMat training.				
14. As a general practice, as a supervisor, I reduce the job pressure when participants return from HazMat training so they can take time to solidify the new pattern of skills and knowledge.				
15. As a general practice, as a supervisor, I authorize release time or alter work schedules to encourage participation in HazMat training.				
16. As a general practice, as a supervisor, I notify participants of their enrollment in HazMat training and ensure that work is covered while they attend training.				
17. As a general practice, as a supervisor, I arrange to minimize work disruptions that might intrude on a participant's HazMat training. 18. The equipment, facilities, and materials in our department are adequate to help in applying newly learned HazMat skills and knowledge to the job.				
Rating for factor 2 items as a	Acceptable	Requires additions as	Comments	

group	as is	follows		

Factor 3: Supportive Organizational Culture				
Question	Acceptable as is	Requires revision as follows	Unaccept-able/ Eliminate	Additional Comments
6. As a general practice, as a supervisor, I discuss with returning participants the objectives of the HazMat training program and mutually identify unforeseen barriers to applying new skills and knowledge.				
7. As a general practice, as a supervisor, I meet with those who participated in HazMat training and offer a sufficient amount of time to discuss action plans and on-the-job application of what was taught.				
8. As a general practice, as a supervisor, I listen actively to concerns about applying HazMat learning and give positive and constructive feedback about job performance.				
9. As a general practice, as a supervisor, I assist participants in meeting the HazMat training goals by providing opportunities to apply new skills and knowledge.				
10. As a general practice, as				

a supervisor, I set up additional follow-up meetings at periodic intervals for further information sharing, problem solving, and support for applying HazMat skills and knowledge to the job.				
Rating for factor 3 items as a group	Acceptable as is	Requires additions as follows	Comments	

Factor 4: Practical Training Programs				
Question	Acceptable as is	Requires revision as follows	Unaccept-able/ Eliminate	Additional Comments
5. The HazMat training is up-to-date and aligned with current conditions of the job.				
6. The HazMat training provides participants with sufficient opportunities to learn and practice the key behaviors related to the skills they should improve.				
7. Participants have time to apply newly learned skills and knowledge in the workplace.				
8. As a supervisor, I have pointed out work situations where application of newly learned HazMat skills and knowledge is useful.				
Rating for factor 4 items as a group	Acceptable as is	Requires additions as follows	Comments	

Factor 5: Relevant Training Content				
Question	Acceptable as is	Requires revision as follows	Unaccept-able/ Eliminate	Additional Comments
7. The HazMat training is clearly linked to participant career and/or performance objectives.				
8. The content of the HazMat training has practical applicability to the job.				
9. I know of work situations to which participants of HazMat training can apply what they learn.				
10. The HazMat training realistically reflects the conditions of the job.				
11. The HazMat training significantly enhances job effectiveness.				
12. The relevance of the HazMat training to the job is well demonstrated.				
Rating for factor 5 items as a group	Acceptable as is	Requires additions as follows	Comments	
Factor 6: Trainees being comfortable with change and associated efforts				
Question	Acceptable as is	Requires revision as follows	Unaccept-able/ Eliminate	Additional Comments
1. Those who participate in HazMat training feel capable of using the skills they developed in their everyday work.				
2. Those who participate in HazMat training use their newly learned knowledge in their work.				
3. Supervisors ask those				

who participated in HazMat training to present a briefing to co-workers on the training objectives, content, methods, and outcomes.				
Rating for factor 6 items as a group	Acceptable as is	Requires additions as follows	Comments	
Factor 7: Trainer being supportive and inspiring				
Question	Acceptable as is	Requires revision as follows	Unaccept-able/ Eliminate	Additional Comments
11. HazMat trainers create an environment that is conducive to learning.				
12. HazMat trainers are confident, enthusiastic, and easy to understand.				
13. HazMat trainers express a personal interest in participants.				
14. HazMat trainers provide follow-up after the training by contacting trainees and giving advice and support.				
15. HazMat trainers provide refresher/problem-solving sessions following training to give a brief summary of essential concepts and discuss problems participants of the training encountered.				
Rating for factor 7 items as a group	Acceptable as is	Requires additions as follows	Comments	
Factor 8: Trainees' perception of training being well designed/delivered				

Question	Acceptable as is	Requires revision as follows	Unaccept-able/ Eliminate	Additional Comments
1. The HazMat training is well planned and organized.				
2. HazMat trainers are well prepared and help participants understand the sequence and time allotted to each topic during training.				
3. Communication and directions during HazMat training are clear and adequate.				
4. There is a good balance between trainer input (lecture) and participant input (involvement via discussion and group activity/practice sessions).				
5. The quality of materials and assignments used in HazMat training is satisfactory.				
6. Physical facilities for the HazMat training activities are adequate.				
Rating for factor 8 items as a group	Acceptable as is	Requires additions as follows	Comments	
Factor 9: Peer Support				
Question	Acceptable as is	Requires revision as follows	Unaccept-able/ Eliminate	Additional Comments
7. On their return from HazMat training, participants share experiences with peers and help support each				

other.			
8. On their return to the job, peers discuss problems related to using the skills and knowledge taught in HazMat training.			
9. On their return to the job, peers encourage one another to use the skills and knowledge learned in HazMat training.			
10. On their return to the job, peers praise and recognize one another when they observe use of newly learned HazMat skills.			
11. On their return to the job, peers provide feedback to one another about the value and usefulness of the HazMat training.			
12. Peers recognize each other's effectiveness when they use newly learned HazMat skills on the job.			
Rating for factor 9 items as a group	Acceptable as is	Requires additions as follows	Comments

Overall rating for this instrument (please circle):

Acceptable as is   **Acceptable with revisions**   **Unacceptable**

Name of the Validator: ———————————————————

Signature: —————————————————

Date: ————————————————

APPENDIX F: LETTER TO THE EXPERT PANEL

Dear Drs. Broad, Newstrom, Stolovitch,

I have carefully reviewed the content published in your book, *Transfer of Training*, and articles on factors affecting transfer. My doctoral committee requested that I reword the nine barriers/factors so that they are all stated in positive direction. I have generated a number of items for each factor based upon a review of the research literature and other instruments for measuring transfer and factors affecting transfer and have derived a number of items to indicate the presence/absence of the nine factors. With the help of my committee members, I then reviewed the initial set of items, eliminating those that did not appear to be content relevant. Given that I will be conducting my study in a specific context – that of fire fighters who have been trained to deal with hazardous materials. I reworded the items, transforming them from their generic format into one that is focused on the study subjects, content and context..

Based on the nature of fire-fighter population with which these instruments are to be used and the hazardous material training the fire fighters participants received, I submitted the items to a panel of content knowledgeable fire fighter hazardous training experts. I edited the items based on the review comments to derive the questions and instruments that I have attached. I am now requesting you to do the following:

Carefully read the instrument directions and the content of the items.

Verify that all nine Broad and Newstrom factors are addressed.

To verify the content validity of the items associated with each factor, rate each one as follows:

Acceptable as it is (A)

Requires revision as follows: (R)

Unacceptable/ eliminate (U)

Determine whether the items for each factor are, as a group, sufficient. Rate the set of items for each factor as either acceptable as is, or make specific recommendations for additional items.

Verify the rating scale and indicate whether it is acceptable as is or requires revision. Please make specific revision recommendations, if necessary

Finally, rate each of the instruments in its entirety as appropriate or requires revision. Please make specific revision recommendations, if necessary

Once the instruments have been revised based on your expert inputs, I will send them to you for final review. When you ultimately accept the content and format of my instruments, I will request from you an email indicating that you conducted a careful review of the instruments and all items and approve of them for the study.

With respect to instrument administration, I will be visiting each fire department site, explaining to the questionnaire respondents what they are required to do and I will ensure that there is a private space for them to respond individually. All questionnaires will be handled with confidentiality and according to University of Central Florida IRB guidelines (see attached).

Prior to administration at all of the test sites, questionnaires will be submitted to a small sample of individual fire-fighter subjects who will be observed responding to the instrument and who will then be debriefed. The purpose of this exercise is to verify and revise the instrument for comprehensibility and clarity and to eliminate all ambiguities and confusions. While I estimate the time requirement to respond to the questionnaires as follows:

- Supervisor Questionnaire: 15-20 minutes

- Trainee Questionnaires: 20-30 minutes

I will verify actual time during individual observations. I will also conduct reliability measures with pilot groups, prior to full scale administration of the questionnaires.

Dr. Stolovitch, who is also acting as a validator and will contact you shortly to set up a conference call whose purpose, is it collect all of your review comments.

I cannot sufficiently express to you how appreciative I am of the work you have done with respect to transfer of training and of your willingness to participate in the content validation of these instruments. When the study is completed, I will send you copies of the final report. Thank you for your support.

Sincerely,

Divya Bhati

APPENDIX G: EXPERT PANEL CONFIRMATION LETTER

To Whom It May Concern

I have participated in the content validation of Divya Bhati's three instruments for her study 'Factors that Influence the Transfer of Training: the Perceptions of Selected Supervisors and Trainees' and approve them from a content perspective.

Name: Dr. John W. Newstrom   Signature: _____

Title: Distinguished Teaching Professor Emeritus of Management, University of Minnesota Duluth

Date: _March 29, 2007_

Contact information: 916 Blackrock Road, Aitkin, MN 56431
                             218-428-2439
                             jnewstro@d.umn.edu

Mary L. Broad, EdD, CPT
Performance Excellence
3709 Williams Lane
Chevy Chase, MD 20815-4951
marybroad@earthlink.net
301.657.9638

March 30, 2007

Divya Bhati
#12089 Napiers Circle
Orlando, Florida 32826

To Whom It May Concern

I have participated in the content validation of Divya Bhati's three instruments for her study

"Factors that Influence the Transfer of Training: the Perceptions of Selected Supervisors and

Trainees" and approve them from a content perspective.

Mary L. Broad

Mary L. Broad, EdD, CPT
Principal Consultant, *Performance Excellence*

HSA LEARNING & PERFORMANCE SOLUTIONS LLC

Divya Bhati
#12089 Napiers Circle
Orlando, Florida 32826

April 2, 2007

To Whom It May Concern:

I have participated in the content validation of Divya Bhati's three instruments for her study "Factors That Influence the Transfer of Training: The Perceptions of Selected Supervisors and Trainees" and approve them from a content perspective.

Harold D. Stolovitch, PhD, CPT
Emeritus Professor, Université de Montréal
Principal, HSA Learning & Performance Solutions LLC

1520 S. Beverly Glen Blvd.
Suite 305
Los Angeles, CA
USA 90024-6195
Tel: (310) 286-2722
Fax: (310) 286-2724

APPENDIX H: IAFF LETTER OF SUPPORT

INTERNATIONAL ASSOCIATION OF FIRE FIGHTERS®

HAROLD A. SCHAITBERGER
General President

VINCENT J. BOLLON
General Secretary-Treasurer

March 16, 2007

Divya Bhati
c/o Gary Orwig, Stephen A. Sivo, Chairs
Department of Educational Research, Technology, and Leadership (ERTL)
The College of Education,
University of Central Florida (UCF)
4000 Central Florida Blvd. PO Box 161250
Orlando, FL 32816-1250

This letter affirms the support of the International Association of Fire Fighters (IAFF) for the research project; Factors that Influence the Transfer of Training: the Perceptions of Selected Supervisors and Trainees, prepared by Ms. Divya Bhati, in partial fulfillment of the requirement for her PhD program.
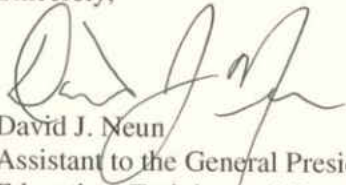
Based on Ms. Bhati's proposal and her presentation to our association, we understand the following:

1. Ms. Bhati will be the principal investigator for the project.

2. The approximate duration of the project with respect to data collection and analysis will be from mid March to the end of July 2007, barring any unforeseeable events.

3. It will be IAFF's responsibility, with Ms. Bhati's assistance, to select approximately ten sites representative of IAFF member locals, for the data collection. It is anticipated that she will require approximately 100 to 200 fire fighter subjects who have been trained within the last 15 months on Hazardous Material and approximately 15-25 fire fighter supervisors. IAFF will work with Ms. Bhati to contact selected fire department sites and locals as well as appropriate subjects.

4. IAFF will facilitate travel to sites, access to participating subjects and support data collection. IAFF will not intervene in the actual collection of research data nor influence the manner in which participating subjects respond to Ms. Bhati's questionnaires.

5. The IAFF understands that all data collection will be handled with complete confidentiality in accordance with University of Central Florida IRB rules and procedures.

6. The IAFF understands that any publication of the study results that refers to the IAFF or its members will be submitted to IAFF for review and approval prior to publication. The purpose for this is to protect IAFF and its members from any potential legal actions. It is IAFF's understanding that IAFF and its granting agencies, which provide support for these research endeavors will be identified and acknowledged in any publication related to this research project.

7. Given that the results of Ms. Bhati's study present a potential for adding to the knowledge base for helping fire fighters to effectively and safely deal with hazardous materials, IAFF is pleased to support Ms. Bhati's doctoral research effort. We are prepared, beyond facilitating assistance, to provide financial support for this endeavor. We accept to pay for communication, travel, accommodation, transportation and per diem allowance expenses directly related to the project. The total amount of related financial support shall not exceed $10,000. If the University of Central Florida requires further details of IAFF's support, please feel free to contact me at dneun@iaff.org or 202-737-8484.

Sincerely,

David J. Neun
Assistant to the General President
Education, Training and Human Relations

APPENDIX I: STATISTICS

Table I 1. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
Reinforcement on the Job	278	5	25	16.20	3.495	12.217
Little Interference from Immediate Work Environment	280	7	35	25.79	4.554	20.735
Supportive Organizational Culture	279	7	35	23.81	4.800	23.044
Practical Training Program	280	4	20	15.15	2.401	5.767
Relevant Training Content	280	6	30	24.10	3.259	10.624
Trainees being comfortable with change and associated efforts	279	4	20	15.32	2.447	5.988
Trainer being supportive and inspiring	275	6	30	23.10	3.584	12.844
Perception of Training being well designed and delivered	262	6	30	23.73	3.671	13.480
Peer Support	278	6	30	21.10	4.017	16.134
Total Transfer	177	17	84	55.73	13.771	189.653
Valid N (listwise)	156					

Table I 2. Group Statistics

	Personnel	N	Mean	Std. Deviation	Std. Error Mean
Reinforcement on the Job	Trainee	180	15.90	3.650	.272
	Supervisor	98	16.74	3.137	.317
Little Interference from Immediate Work Environment	Trainee	180	25.92	4.648	.346
	Supervisor	100	25.55	4.391	.439
Supportive Organizational Culture	Trainee	180	23.16	4.795	.357
	Supervisor	99	25.00	4.600	.462
Practical Training Program	Trainee	180	15.42	2.279	.170
	Supervisor	100	14.66	2.547	.255
Relevant Training Content	Trainee	180	24.35	3.149	.235
	Supervisor	100	23.66	3.421	.342
Trainees being comfortable with change and associated efforts	Trainee	179	15.49	2.378	.178
	Supervisor	100	15.02	2.550	.255
Trainer being supportive and inspiring	Trainee	176	23.59	3.322	.250
	Supervisor	99	22.24	3.878	.390
Perception of Training being well designed and delivered	Trainee	164	24.66	3.242	.253
	Supervisor	98	22.16	3.831	.387
Peer Support	Trainee	178	20.81	3.918	.294
	Supervisor	100	21.62	4.156	.416
Schooling	Trainee	181	3.81	1.159	.086
	Supervisor	100	3.80	1.015	.102
Employer	Trainee	181	1.14	.899	.067
	Supervisor	100	1.00	.000	.000
Experience-Years	Trainee	181	3.99	1.327	.099
	Supervisor	100	6.11	1.043	.104
Current Position	Trainee	180	2.03	1.057	.079
	Supervisor	100	6.66	1.047	.105
Ethinicity	Trainee	179	3.21	.928	.069
	Supervisor	100	3.12	.715	.071
Location	Trainee	181	6.55	3.182	.237
	Supervisor	100	5.83	3.358	.336

Table I 3. Independent Samples *t*-test of Perception of Trainees and Supervisors

		Levene's Test for Equality of Variances		*t*-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference		
		Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower
Schooling	Equal variances assumed	2.573	.110	.088	279	.930	.012	.138	-.260	.284
	Equal variances not assumed			.091	227.876	.927	.012	.133	-.250	.274
Employer	Equal variances assumed	9.787	.002	1.535	279	.126	.138	.090	-.039	.315
	Equal variances not assumed			2.066	180.000	.040	.138	.067	.006	.270
Experience-Years	Equal variances assumed	1.911	.168	-13.760	279	.000	-2.116	.154	-2.418	-1.813
	Equal variances not assumed			-14.733	246.660	.000	-2.116	.144	-2.398	-1.833
Current Position	Equal variances assumed	.474	.492	-35.229	278	.000	-4.627	.131	-4.885	-4.368
	Equal variances not assumed			-35.325	206.261	.000	-4.627	.131	-4.885	-4.368
Ethinicity	Equal variances assumed	6.379	.012	.809	277	.419	.087	.107	-.124	.298
	Equal variances not assumed			.871	250.022	.385	.087	.100	-.109	.283
Location	Equal variances assumed	1.393	.239	1.787	279	.075	.722	.404	-.074	1.519
	Equal variances not assumed			1.759	195.200	.080	.722	.411	-.088	1.532

APPENDIX J: LITERATURE REVIEW TABLE

Table J 1. Literature Review

Factor	Study	Key findings
Reinforcement on the job	1. Moorhead and Griffin** (1992)	• Trainees' satisfaction and reward system may transfer training to a greater degree.
	2. Andrzejewski, Kirby, Morral, and Iguchi** (2001)	• Examined the effects of feedback and positive reinforcement interventions on drug treatment counselors' behavior Counselor performance measures increased to 71% due to feedback.
	3. Kontoghiorghes** (2001)	• Rewards for teamwork were predictors for motivation to transfer.
	4. Taylor** (2000)	• Lack of reinforcement as the most significant barrier in supporting trainees to apply training to their jobs.
	5. Clarke** (2002)	• Lack of reinforcement from supervisors and peers impeded the transfer of their new skills back to their jobs
	6. Condly, Clark, and Stolovitch* (2003)	• Team-directed incentives had a positive effect on performance in comparison to individually-directed incentives
Little interference from immediate (work) environment	1. Brown and Leigh** (1996)	• Effort moderated the relationship between job involvement and performance and frequent interruption causes a trainee to lose concentration and might not be involved with task in hand, thereby affecting performance.
	2. Taylor** (2000)	• According to the trainer, one of the most significant barriers was interference by the immediate environment: time pressures, insufficient authority, ineffective work processes, or inadequate equipment.
	3. Parker and Coiera* (2000)	• Work in an interruption-driven environment causes failures of working memory, resulting lapse in concentration and new plans being forgotten
	4. Chisholm, Dornfeld, Nelson, & Cordell** (2001)	• Emergency physicians experienced more interruptions, thus requiring them to spend more time managing patients concurrently than primary care physicians who had higher work efficiency
	4. Mark, Gonzalez,	• Interruptions occurring outside of an

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	and Harris** (2005)	employee's current working sphere context are disruptive and most informants reported that they prefer to complete one task before moving to another
Supportive organizational culture	1. Greller** (1980)	• Employees ranked their supervisors as the most important source of feedback
	2. Baldwin and Ford* (1988)	• Reviewed seven studies that examined the relationship between environmental characteristics and the transfer of training and found supervisory support is a key environmental variable.
	3. Rouiller and Goldstein** (1993)	• Found that management trainees in supportive, compared to non-supportive workplaces, were more likely to demonstrate trained behaviors.
	4. Tracey Tannenbaum, and Kavanagh*(1995)	• Management support crucial for transfer of learned behavior
	3. Huczynski and Lewis** (1980)	• Found that supervisors influenced transfer by using facilitating methods such as openness, listening skills, and empowerment
	4. Ford, Quinones, Sego, and Sorra** (1992)	• Supervisors played a significant role in providing opportunities for trainees to apply newly learned knowledge and skills
	5. Foxon** (1993)	• One of the most commonly cited factors inhibiting transfer was supervisor not encouraging and reinforcing application of the work-related training.
	6. Brinkerhoff and Montesino** (1995)	• The trainees who received management support had significantly higher transfer and a more positive perception of the forces in the work environment encouraging transfer
	7. Hastings, Sheckley, and Nichols** (1995)	• Supervisory involvement was the only independent variable to significantly impact performance
	8. Xiao (1996) and Seyler, Holton, Bates, Burnett, &	• Supervisor and peer support were the most influential factors in transfer of training.

	Carvalho** (1998)	
	9. Gielen* (1996)	• Trainees' self-efficacy and supervisory support are important factors in training transfer
	10. Van der Klink, Gielen, and Nauta** (2001)	• The results showed that the experimental group trainees rated their supervisors significantly higher than the control group. The supervisors had been sent letters by training department encouraging them to have post discussion with the trainees regarding potential barriers and strategies to apply newly learned skills and knowledge.
	11. Gumuseli and Ergin** (2002)	• The trained behaviors are likely to be gradually put into practice if employees receive organizational support and absence of it might lead to decrease in performance.
	12. Montesino** (2002)	• Transfer related perceived presence of practices to support usage of training" and "perceived alignment of training with the strategic direction of the organization
	13. Belling, James, and Ladkin** (2004)	• Lack of managerial support; time and workload issues; resistance to new ideas; lack of opportunity and responsibility; physical structure of the organization; performance and reward; organizational politics and hidden agendas as barriers to transfer of training
	14. Chiaburu and Tekleab** (2005)	• The results suggest that there is a relationship between values and beliefs of an organization and supervisor support and impacts trainee's desire to apply and use newly learned skills in new situations.
	15. Nijman* (2006)	• Indirect relationship between supervisor support and transfer of training
	16. Lim and Morris** (2006)	• Trainee characteristics, instructional factors, organizational climate are influential to trainee's perceived learning and learning transfer
	17. Branderhorst and Wognum** (1995)	• The amount of transfer of training did not differ significantly among two groups: one which received supervisor support and one which did not.

		• Lack of tangible support from top and middle management a barrier for transfer
	18. Nijman** (2004)	• No significant difference in the amount of transfer between groups that were guided by supervisor and those who were not.
	19. Kluger and DeNisi* (1996)	• Need for a consistent and comprehensive theory of feedback to support action
	20. Porras and Hargis** (1982)	• Negative correlation between on-the-job skill use and factors such as role conflict, overload, and job-generated stress
	21. Pentland** (1989)	• Trainees' practice of newly learned skills led to retention of information for longer period of time.
	22. Decker and Nathan** (1985)	• Individual's workload was an important factor affecting training transfer
	23. Lim and Johnson** (2002)	• Relevant factors, lack of opportunity to use new learning affected transfer
Trainees' perception of training programs being practical	1. Clark, Dobbins, and Ladd** (1993)	• Perceived utility of training significantly predicted training motivation to transfer knowledge and skills.
	2. Cannon-Bowers, Salas, Tannenbaum, and Mathieu** (1995)	• Participation of trainees in decision-making and goal setting, as well as providing trainees with correct information about the nature of the training program helped trainees to be more enthusiastic and motivated to transfer of knowledge and skills
	3. Rodríguez and Gregory** (2005)	• Training transfer of the training was mediated by student workers' perceptions regarding the training being hands-on and directly related to the job and its content was relevant to the work
	4. Bates and Khasawneh** (2005)	• Supportive learning transfer climates are consistent with organizational cultures that believe in and value learning as an adaptive strategy
Trainees' perception of relevant training content	1. Axtell & Maitlis** (1997)	• Trainees felt that, for the course to be relevant to their jobs, organization must also be committed to their using what they have learned.
	2. Lim** (2000)	• One of the reasons for low transfer was lack of understanding of the content.
	1. Yamnill and	• Perceived content validity as most

	McLean**(2005)		important factor for transfer of training
Trainees' being comfortable with change and associated effort	1. Hastings, Sheckley, and Nichols** (1995)	•	For transfer to take place, trainees must be comfortable with targeted change and associated efforts.
	2. Yamnill and McLean** (2005)	•	Among other factors, learner willingness to participate in training, expectation of positive personal outcomes, anticipation about the opportunity to use the learning affect transfer of training.
Inspiration or support of the trainer	1. Creed, Hicks, and Machin** (1996)	•	Interpersonal relationships in the training environment between trainer and trainee are associated with higher levels of on-the-job performance.
Trainees' perception of training being well designed/delivered	1. Garavalia** (1993)	•	Training design factors accounted for 22% of the inhibiting factors and training delivery factors, such as inappropriate methods, media, and delivery style, represent for 13% of the total.
	2. Lim** (2000)	•	Several training design variables were found to influence the transfer of training.
Peer support	1. Facteau, Dobbins, Russell, Ladd, and Kudisch** (1995)	•	Trainees who perceived their peers and subordinates as supportive were likely to have higher transfer rate.
	2. Cromwell and Kolb** (2002)	•	Trainees who reported receiving higher level of organizational, management, and peer support in the form of feedback, coaching, rewards, follow-up reported applying, to a greater extent, the knowledge and skills learned in the supervisory training program.
	3. Curry, McCarragherb, and Dellmann-Jenkins** (2005)	•	Coworker support for training and transfer was a factor affecting less experienced workers. It may be that workers with high experience were more autonomous and less dependent upon both supervisors and coworkers.
	4. Chiaburu and Marinova** (2005)	•	Pre-training motivation and peer support are related to skill transfer.

**Published research study
 *Review of research or report of other researchers

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