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**AN ANALYSIS OF THE AIR FORCE BASIC COMMUNICATIONS OFFICER
TRAINING COURSE: THE IMPACT OF TRAINEE AND ORGANIZATION
CHARACTERISTICS ON TRAINING EFFECTIVENESS**

THESIS

Grace M. Beck, Captain, USAF

AFIT/GIR/ENV/04M-03

**DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY**

AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

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CHARACTERISTICS ON TRAINING EFFECTIVENESS

THESIS

Presented to the Faculty

Department of Systems and Engineering Management

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Air Education and Training Command

In Partial Fulfillment of the Requirements for the
Degree of Master of Science in Information Resource Management

Grace M. Beck, BS

Captain, USAF

March 2004

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CHARACTERISTICS ON TRAINING EFFECTIVENESS

Grace M. Beck, BS
Captain, USAF

Approved:

// Signed //
Rita A. Jordan, Col, USAF, PhD (Advisor)
Associate Dean, Graduate School of
Engineering and Management

10 Mar 04
Date

// Signed //
Kevin L. Elder, Civ., PhD (Reader)
Assistant Professor, Information Resource Management
Department of Systems and Engineering Management

10 Mar 04
Date

// Signed //
Richard M. Black, Capt, USAF (Reader)
Headquarters Air Force/ILC

6 Mar 04
Date

Abstract

In 1998, the Aerospace Communications and Information Expertise (ACE) program was implemented to provide a common operational foundation for new Air Force Communications and Information officers. Training's crucial role in providing Air Force effectiveness and efficiency in the officer corps is demonstrated by the formal training courses new officers are required to attend for instruction in their jobs. The importance of training, and subsequent training evaluation, is evident for two significant reasons: the skills required by Air Force Communications and Information officers and the amount of investment in training. Investment in training includes money, time, equipment, and any other significant factor that contributes to training and education of personnel in order for them to acquire the knowledge, skills, and attitudes needed to perform their job. While training and training evaluation research is progressing, there is still a lack of training evaluation as well as training effectiveness methodologies at this time. By developing and testing an appropriate training effectiveness model that will aid in determining whether or not training is effective; this research seeks to aid in increasing effectiveness of BCOT.

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Grace M. Beck

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AN ANALYSIS OF THE AIR FORCE BASIC COMMUNICATIONS OFFICER TRAINING COURSE: THE IMPACT OF TRAINEE AND ORGANIZATION CHARACTERISTICS ON TRAINING EFFECTIVENESS

I. Introduction

Overview

This chapter discusses the need for training Air Force Communications and Information (C&I) officers and the importance of evaluating the effectiveness of the Basic Communications Officer Training (BCOT) course as the first formal training received by Air Force C&I Officers in their professional training continuum. A brief description of the BCOT course as well as a theoretical argument supporting the need for training and training evaluation is developed by linking issues of training effectiveness and training performance to BCOT training. Next, the problem statement and research focus are presented. Finally, generalizability of this research is discussed.

Background

In 1998, the Aerospace Communications and Information Expertise (ACE) program was implemented to provide a common operational foundation for new Air Force Communications and Information officers. Basic Communications Officer Training (BCOT) is required within six months of new accessions being assigned to their ACE tour (Department of the Air Force, 1998). Enough time has passed since the inception of ACE to decide if BCOT is effective in training ACE accessions.

Training's crucial role in providing Air Force effectiveness and efficiency in the officer corps is demonstrated by the formal training courses new officers are required to attend for instruction in their jobs (Alliger & Tannenbaum, 1996). As mentioned earlier, new C&I officers attend BCOT. The intent of the BCOT course is to provide junior C&I officers a common foundation of Air Force communications skills (Department of the Air Force, 2002). Eleven blocks of instruction ranging from networking to deployable communications systems are taught in the BCOT course (Department of the Air Force, 2002). This curriculum supports the career plan for C&I officers developed at the 1998 Utilization and Training Workshop (Department of the Air Force, 1998).

The importance of training, and subsequent training evaluation, is evident for two significant reasons: the skills required by Air Force C&I officers and the amount of investment in training. Skill requirements for the C&I officer career field are listed in Air Force Manual 36-2105, Officer Classifications (Department of the Air Force, 2001). Training is used to solve numerous problems such as developing new skills, knowledge, understanding, and attitudes (Johnson, 1976). The need to evaluate training is identified in the Guidebook for Air Force Instructors which outlines the Instructional Systems Development (ISD) model used extensively in all Air Force training programs (Department of the Air Force, 1998). Unfortunately, training evaluation in the military is rarely completed because of misconceptions such as the environment preventing evaluation or the trainers disregarding evaluation because they are confident the training works without proof (Salas, Milham, & Bowers, 2003).

Investment in training includes money, time, equipment, and any other significant factor that contributes to training and education of personnel in order for them to acquire

the knowledge, skills, and attitudes needed to perform their job. One estimate indicates the amount of money spent on individual and collective training exceeds \$27.1 billion (Salas et al., 2003). The federal government alone is estimated to spend approximately \$633 million (Faerman & Ban, 1993). Financial commitments toward training support developing skills to meet a multitude of today's challenges (Tracey & Tews, 1995). With the amount of money and other resources used on training C&I officers to develop skills needed to perform their duties, it is important that the training be evaluated to ensure C&I officers are learning what is needed for performance in the field. It also stands to reason that those investing in training would want to know whether or not they are getting a return on their investment (Parry, 1996).

J. Kevin Ford (1997) observed how independent literature on training appeared during the 1920s and remained scant until the 1940s when, in 1949, the first review of training literature was completed. While training and training evaluation research is progressing, there is still a lack of training evaluation as well as training effectiveness methodologies at this time (Salas et al., 2003). Thus, the question remains, how is this return on investment measured? In other words, how is training effectiveness measured?

Problem Statement

In the Air Force, numerous parties are interested in whether or not training is effective. Senior leadership desires to have a professional work force. Initial training is the first step in developing such a force. Additionally, immediate supervisors desire highly competent workers enabling immediate missions to be accomplished. Further, training support personnel (i.e., trainers and curriculum builders) need to know if the

current training program is effective in training ACE accessions for their ACE tour and beyond. Finally, trainees need to feel confident the training provided to them is at the level needed to perform their respective jobs. By developing and testing an appropriate training effectiveness model that will aid in determining whether or not training is effective, this research seeks to aid in increasing effectiveness of BCOT.

Research Focus

Integrating constructs from the several studies and the Mathieu and Martineau (1997) theorized model, the research focus for this study is to investigate, in a military setting, the relationships between trainee characteristics, organization characteristics, and training outcomes as posited in the researcher's proposed training effectiveness measurement model presented in chapter two.

Survey data collected by the researcher from BCOT attendees will be used to assist in determining the proposed relationships identified earlier. The results of this study could aid training support personnel at BCOT in providing the most effective training to BCOT attendees. In turn, ACE accessions would be sufficiently prepared for their ACE tour and beyond. The specific research questions that will be addressed to examine the relationship between trainee characteristics, organization characteristics, and training outcomes are:

1. Based on the literature, which constructs are appropriate for measuring training effectiveness?
2. What is the relationship between trainee characteristics and training outcomes?
3. What is the relationship between organization characteristics and training outcomes?

This research posits that certain trainee characteristics and organization characteristics (i.e., affective organization commitment, task-related self-efficacy, learning self-efficacy, training motivation, organization support, organization constraints, and opportunity to perform skills learned) are related to training outcomes as measured by the trainee's performance, reaction to training, and motivation to transfer skills learned to the job. This study integrates selected models to examine the relationship between training and organization characteristics and immediate training outcomes as well as possible future training outcomes. Furthermore, training performance and reaction are expected to be indicators of immediate training effectiveness, while motivation to transfer is expected to be indicative of future job performance which may or may not be a further indication of training effectiveness.

Relationships between these constructs and training effectiveness may provide insight into issues that may be hindering training effectiveness. In turn, by identifying possible problems and potential solutions with the current training and training support, further development of future Air Force C&I Officers through training will be possible.

Generalizability

With one of the goals of training being the ability for the trainee to transfer learned knowledge, skills, and attitudes to the work environment, measuring training effectiveness becomes important in the evaluation of any training program. Apart from measuring task-related self-efficacy levels, great effort has been taken to develop and test a training effectiveness measure that may be used for any training program in any environment. From a systems perspective, when linking the individual to the

organization, training outcomes should bolster organizational goals. From a high level perspective, it logically follows that when a trainee strives to learn knowledge, skills, behaviors, and attitudes during training, the organization benefits from the transfer of that learning to the work environment. In turn, intent for the trainee to transfer such learned objectives could be an indication of effective training. While the focus group for this study was a military professional development and skills training course, it is hoped that future research will further the reliability and validity of the measurement instrument developed for this study in an effort to develop a generalized measure for training effectiveness that focuses on the appropriate trainee and organization characteristics.

Summary

This chapter introduced the proposed research to determine the effectiveness of BCOT training by measuring identified trainee and organization characteristics. Chapter two will discuss the literature identified to support such training evaluation and present the proposed research model. Chapter three will discuss the methodology used to conduct the research and propose in depth investigative questions to answer the research questions outlined in this chapter. Chapter four will discuss the results obtained from the research. Finally, a discussion of conclusions from the research and future research ideas will be presented in chapter five.

II. Literature Review

Overview

This chapter reports on the literature concerning training evaluation, trainee characteristics, organization characteristics, training outcomes, and training effectiveness. Previous research will be presented, as well as the studies used to examine the relationship between trainee characteristics, organization characteristics, and training outcomes. Following an in depth review of the research literature, a theoretical framework for measuring training effectiveness of the Basic Communications Officer Training (BCOT) course will be proposed. The utility of the proposed model will be geared towards supporting course development for BCOT and supporting force development of the Communications and Information (C&I) Officer career field.

Training Evaluation

Kirkpatrick's Framework.

According to Bennett, Alliger, Eddy, and Tannenbaum (2003), “[t]raining evaluation is the programmatic process whereby the outcomes of training are tracked and analyzed (p. 60)”. Donald Kirkpatrick’s (1976) 4-stage training evaluation model has been used continuously by the military to measure training effectiveness.

Kirkpatrick’s model uses a goal-based evaluation approach to measure reaction, learning, behavior, and results. Reaction is defined by Kirkpatrick as how well the trainee liked the training program. Two studies (Alliger, Tannenbaum, Bennet Jr., Traver, & Shotland, 1997; Warr & Bunce, 1995) discerned factorially distinct forms of

reaction. Alliger et al. distinguished between affective (i.e., how enjoyable the training was for the trainee) and utility (i.e., how useful the training was as judged by the trainee) reaction, finding the latter to be better associated with subsequent job performance. Warr and Bunce identified three forms of reaction, namely, enjoyment of training, perceived usefulness of training, and perceived difficulty of training. Reaction to training is the basic or lowest level of training evaluation.

At the higher levels of evaluation, Kirkpatrick defines the learning level of evaluation as the knowledge understood and retained by the trainee. The behavior level is defined by Kirkpatrick as job performance after completion of the training. Finally, the results level is defined as the outcomes that appear on the job as a result of training.

Expanding Kirkpatrick's Framework.

While Kirkpatrick's model provides a practitioner-friendly method for evaluating training, more recent studies have included measurements of individual and organization characteristics and their impact on training, escalating the complexity of an already intricate task (Noe, 1986; Tannenbaum & Yukl, 1992). Furthermore, evaluating training from a systems perspective, specifically focusing on how training transfers to the organization, is another recent addition to training evaluation and to training effectiveness measurement (Mathieu, Martineau, & Tannenbaum, 1993; Tannenbaum & Yukl, 1992).

Use of Kirkpatrick's model as a first, global heuristic for training evaluation has worked well (Alliger & Janak, 1989). However, as Watkins, Leigh, Foshay, and Kaufman (1998) and Alliger and Janak (1989) mention, there are assumptions associated with Kirkpatrick's model that may present the need to question this and other similar models. Assumptions of Kirkpatrick's model include arranging the four levels of

evaluation in an ascending order of value; causally linking the levels; and positively correlating the levels (Alliger & Janak, 1989). Nullmeyer and Spiker (2003) further contend that rigid adherence to Kirkpatrick's model has resulted in lost opportunities to measure training effectiveness. Alliger and Tannenbaum (1996) concur with Nullmeyer and Spiker by stating Kirkpatrick's well-known scheme is not the last word in training criteria, and that, if taken too literally, Kirkpatrick's model will hinder evaluation efforts.

Numerous research efforts have suggested ways to not only overcome the assumptions of Kirkpatrick's model, but to expand the model to include other equally important areas of study. Alliger and Janak (1989) suggests expanded measurement at each of Kirkpatrick's levels to include trainees, peers, subordinates, and supervisors in an effort to completely capture the criterion at each level. Kraiger, Ford, and Salas (1993) note that Kirkpatrick, among others, have ignored affectively based measures such as organizational commitment as indicators of learning. They further proposed a broader range of affectively or attitudinally based outcomes for measurement that may infer learning during training. Noe (1986) uses Kirkpatrick's model in a linear fashion where each level of evaluation affects the next level in the hierarchy. However, his theoretical discussion expands the research to include important motivational and situational factors from organizational behavior theory. He suggests that these constructs may attenuate or enhance the effectiveness of training. Tannenbaum and Woods (1992) note that expansion of the Kirkpatrick model to include attitude change can help identify trainee's beliefs, convictions, and attitudes toward training and possible transfer of training after course completion. In their meta-analysis of 34 studies, Alliger et al. (1997) developed an augmented framework using Kirkpatrick's taxonomy as a guide. They expanded

reactions to include affective and utility reactions; they expanded learning to include immediate knowledge, knowledge retention, and behavior/skill demonstration; they renamed behavior to transfer; and they left level four evaluation (i.e., results) the same. Kraiger et al. (1993) viewed training outcomes as multidimensional, meaning changes may occur in cognitive, affective, and skill capacities. Further, measurement of the effects of individual, organizational, and training-related factors may explain why training does or does not work supporting the need for training evaluation to measure training effectiveness. They note that learning outcomes are not discrete but often interrelated and thus changes in one learning outcome may involve changes in another. Kraiger et al. (1993) further discuss examining the relationship between changes in learning outcomes and other important training outcomes to advance understanding of training evaluation and training effectiveness. Colquitt, LePine, and Noe (2000) reviewed research that supported examining how personal characteristics related to training effectiveness providing support for the concept that what the trainee brings to training is important. They further emphasized the importance of conducting training studies that determine whether individual and situational characteristics explain any incremental variance in training outcomes. With Colquitt et al.'s (2000) training motivation meta-analysis, the necessity to integrate their work with earlier research on training settings and methods was identified to uncover other intervening mechanisms linking individual and situational characteristics with training motivation and learning.

Studies have also begun to consider the interface between the organization and training (Kozlowski & Salas, 1997). The incorporation of a systems perspective identifies issues that must be addressed to ensure training contributes to the

organization's goals. Furthermore, preparing individuals for training and encouraging transfer of learned skills to the work environment requires training to be delivered at the appropriate level and with the appropriate organization support. Salas, Cannon-Bowers, and Kozlowski (1997) identify that training theories now range from individual-level processes to organizational-level systems. They contend that training embodies a complex set of individual and organizational variables that interact dynamically to produce learning outcomes at all levels: individuals, groups, and organizations. In turn, training effectiveness has also expanded to incorporate individual and organizational characteristics. Ford (1997) contends there is a need to pay more attention to training as part of the organizational context to include examining pre-training and post-training environments and how they impact training success. With the broader issues involved in understanding training effectiveness, development of conceptual models are also important to identify factors prior to, during, and/or following training that may impact learning, retention, and transfer. Evaluation is now promoted as part of a cyclic process in the Instructional Systems Design process (Alliger & Tannenbaum, 1996). Alliger and Tannenbaum support an iterative process which includes planning, design, implementation, and evaluation in which evaluation should be a part of each step of the ISD process, not just a singular process at the end of the training. Alliger and Tannenbaum define training effectiveness evaluation as "the determination of the impact of training in terms of some dependent measure or measures, such that 'impact' means a change or improvement in those measures (p. 6)." They go on to state such measurement may assess declarative or procedural knowledge or may even be indicators of post-training behavior (i.e. transfer of learning to the job). An integrated training evaluation

approach may serve as early warning signs for trainers of trainee or curriculum problems preventing wasted training effort. Eseryel (2002) also identifies evaluation as an integral part of the instructional design model that may help determine the effectiveness of the instructional intervention. Eseryel emphasizes the complexity involved in evaluation with regard to learning, transfer, and organizational impact. He presented six general approaches to educational evaluation: goal-based, goal-free, responsive, systems, professional review, and quasi-legal. As stated earlier, Kirkpatrick's model follows the goal-based evaluation method. And, while systems-based models may be better for overall context, they may not be sufficient in representing interaction between training design and training evaluation. Overall, Eseryel concludes that evaluation is complex and not always well-structured and that future needs include a cyclical approach to incorporating training evaluation into the instructional design model (Eseryel, 2002). Furthermore, Bell and Kerr (1987) contend evaluation is needed even with its complexity and that lack of evaluation may lead to continuation or even proliferation of ineffective training programs.

Table 1 summarizes the most relevant research that has expanded on Kirkpatrick's training evaluation model. Overcoming the assumptions of Kirkpatrick's model and further expanding training evaluation research to include individual and organizational characteristics as supported by the above research will further training effectiveness research. The next section presents the trainee characteristics, organization characteristics, and training outcomes selected for research in this study.

Table 1. Summary of Research Relevant to Expanding Kirkpatrick's Framework

Researcher(s)	Trainee Characteristics	Organization Characteristics	Training Outcomes
Alliger and Janek (1989)		X	X
Alliger and Tannenbaum (1996)	X	X	X
Cannon-Bowers, Salas, Tannenbaum, and Mathieu (1995)	X		X
Colquitt, LePine, and Noe (2000)	X	X	X
Eseryel (2002)	X	X	X
Ford (1997)		X	X
Ford, Quinones, Sego and Sorra (1992)	X	X	X
Frayne and Latham (1988)	X		X
Kozlowski and Salas (1997)		X	X
Kraiger, Ford, and Salas (1993)	X	X	X
Mann (1996)	X		X
Mathieu, Martineau, and Tannenbaum (1993)		X	X
Mathieu, Tannenbaum, and Salas (1992)	X	X	X
Noe (1986)	X		X
Noe and Schmitt (1986)	X	X	X
Pintrich, Smith, Garcia, and McKeachie (1993)	X		X
Ryman and Biersner (1975)	X		X
Salas, Cannon-Bowers, and Kozlowski (1997)	X	X	X
Tannenbaum and Woods (1992)	X		X
Tannenbaum and Yukl (1992)	X	X	X
Tracey, Hinkin, Tannenbaum, and Mathieu (1997)	X	X	X
Warr, Allan, and Birdi (1999)	X		X
Warr and Bunce (1995)	X		X

Trainee Characteristics

Trainee Attitudes.

Affective Organization Commitment. Organization commitment has been linked to training effectiveness in several studies. By defining organization commitment as how much an individual identifies with and is involved with an organization, Tannenbaum, Mathieu, Salas, and Cannon-Bowers (1991) linked organization commitment to training effectiveness by studying how a trainee's level of organization commitment influenced his view of training usefulness. Tracey et al. (1997) agreed that when defined in this manner; organization commitment could positively influence pre-training self-efficacy, in turn, influencing training effectiveness. Tracey and Tews (1995) suggested that if an individual possesses a high degree of organization commitment, the individual may in turn view training as worthwhile and have more commitment to learning material in the course. Tracey further considered that organization commitment may affect the trainee's attitude toward work and have an affect on the trainee's preparation for and application of training. O'Connor, Peters, Pooyan, Weekley, Frank, and Erenkrantz (1984) conducted a field investigation and found a significant association between inhibiting situational constraints and turnover (i.e., very low organization commitment) at all managerial levels he investigated. Finally, Colquitt et al.'s (2000) review of research suggested that higher levels of organizational commitment may cause the trainee to view training as useful to themselves and the organization.

Meyer, Allen, and Gellatly (1990) contributed further to the organization commitment construct by developing scales to measure two distinct views of commitment, that is, affective and continuance commitment. Allen and Meyer (1990)

define affective organization commitment as the emotional attachment to, identification with, and involvement in the organization. Their research supports the employee's need to feel comfortable within the organization and competent in the work-role. Further, results of their study indicated that employees who did feel these two needs were met, expressed greater affective attachment to the organization. Meyer and Allen (1984) conducted two studies that posited the more investment the trainee makes to the organization (e.g., completing training courses for more job competence), the higher his affective organization commitment will be. Given the literature supporting affective organization commitment and considering the training effectiveness context of this research, affective commitment (i.e., commitment best predicted by personal competence and positive work experiences) is the more pertinent construct. Therefore, affective organization commitment was measured in this study.

Self-Efficacy. Self-efficacy refers to the belief that one has in his ability to confidently perform a specific task (Bandura, 1991). As reported by Salas and Cannon-Bowers (2001), several studies have identified self-efficacy as a strong indicator of performance (Mathieu et al., 1993; Mathieu et al., 1992; Stajkovic & Luthans, 1998). Additionally, Tannenbaum and Yukl (1992) and Mathieu et al. (1992) have discussed the importance of self-efficacy as an antecedent to and outcome of training. As a measure of training effectiveness, both task-related self-efficacy and learning self-efficacy are important.

Task-related (i.e., the specific tasks in which trainees are instructed) self-efficacy measurement has been supported in several research studies. Ford et al.'s (1992) research supported the concept of self-efficacy and its relationship with motivation to

transfer concluding that higher self-efficacy resulted in individuals performing more of the tasks they learned and at a more complex and difficult level. Stajkovic and Luthans (1998) conducted research that identified a significant positive correlation between self-efficacy and work-related performance. Mager (1992) emphasized the importance of strengthening self-efficacy for successful job performance. He concluded that skills unaccompanied by positive self-efficacy would lead to deficient or absent performance. Frayne and Latham (1987) conducted a study of state government employees that revealed higher performance (i.e., higher job attendance – the outcome expected in the study) was a result of higher perceived self-efficacy. Robertson and Sadri (1993) performed a study of task-related self-efficacy that focused on managerial skills and work performance. They predicted a positive correlation between task-related self-efficacy and work performance based on previous studies identified in their literature review. The results of their study confirmed their prediction. Robertson and Sadri further discussed the importance of measuring self-efficacy immediately after training as an early indication of job performance as well as a valuable assessment of training effectiveness.

Numerous studies have also supported learning or academic self-efficacy. Salas and Cannon-Bowers (2001) provided support for learning self-efficacy predicting performance, mediating other variables, and enhancing learning outcomes. Tannenbaum and Yukl (1992) acknowledged that trainee self-efficacy was another important construct and that individuals with high self-efficacy tended to outperform individuals with low self-efficacy. Further, self-efficacy can be a predictor of training success or even a desirable outcome of training (Tannenbaum & Yukl, 1992). Mathieu et al. (1993) conducted research to identify antecedents that affect self-efficacy development during

training. Results indicated the self-efficacy had significant positive influences on training reactions and subsequent performance. In Warr and Bunce's (1995) research, learning self-efficacy was shown to be significantly related to learning score. In their research, Warr and Bunce identified the importance of learning self-efficacy and its expectation to be positively related to learning performance. Kraiger et al. (1993) proposed that changes in trainees' self-efficacy may be a useful indicator of learning. Additionally, enhanced self-efficacy may be a formal training objective, moderating the relationship between learning and performance. Further, post-training self-efficacy beliefs may be useful indicators of transfer and changes in self-efficacy may infer evidence of development during training (Kraiger et al., 1993). Colquitt et al.'s (2000) meta-analysis further supported the idea revealed in previous research that a positive relationship between self-efficacy and training outcomes exists.

Research on self-efficacy in training is prevalent and measurement of the construct is supported on a widespread basis. Two facets of self-efficacy, learning and task-related, were measured in this study because both have been shown to predict performance outcome.

Training Motivation.

Another significant construct in training evaluation is training motivation or motivation to learn by the trainee. Training motivation has effects before, during, and after training (Salas & Cannon-Bowers, 2001). Baldwin, Magjuka, and Loher (1991) performed research that revealed how choice of training may influence trainee motivation. Baldwin et al. found that trainees who neither received nor had a choice in training were less motivated and thus performed at a lower level than those trainees who

received their choice of training. While the “choice of training” antecedent was not included in this research, Baldwin et al.’s study supports the need to study which antecedents influence trainee motivation and the relationship training motivation has to performance. Noe’s (1986) review of training literature led to the conclusion that learning motivation is a direct antecedent to learning. Noe and Schmitt (1986) also mentioned the relationship between motivation to learn and learning identified in previous research and included the construct in their exploratory model of motivational influences on training effectiveness. The purpose of their research was to investigate relationships between training effectiveness and training attitudes. Further research indicates that motivated trainees take a more active role in training thus gaining more experience than individual with low motivation levels (Tracey & Tews, 1995). It is also acknowledged in the literature that there is a wide acceptance of trainees learning and transferring what they’ve learned when motivation is high (Tannenbaum & Yukl, 1992). Warr and Bunce (1995) identified an individual’s motivation to learn as an important determinant of training outcomes. Colquitt et al. (2000) identified training motivation as a function of variables such as organizational commitment suggesting that further research of training motivation is needed. Because of the diverse effects training motivation may have before, during, and after training, the training motivation construct was included in this study.

Trainee Demographics.

According to Colquitt et al. (2000), demographics refers to the ascribed or achieved characteristics of individuals. They have identified that little theory exists linking demographics to training outcome. Further, they state that demographics are

most often used as statistical control variables. To further the limited research in the area of demographics and their link with training outcomes, this study solicited age, gender, rank, experience, assigned MAJCOM, and time in service from the research participants and suggested relationships between demographics and pre-training trainee characteristics that have been identified in the literature below.

Age. Empirical studies of age and training outcomes have been more consistent than other demographic information collected (Colquitt et al., 2000). Many studies have revealed a negative relationship between age and learning. Older trainees demonstrated lower motivation, learning, and post-training self-efficacy. Warr and Bunce (1995) also studied the relationship that age has with learning. They suggested that an age gradient to learning performance existed. Noe, Wilk, Mullen, and Wanek (1997) discussed the relationship between age and motivation to participate in employee development programs. Research indicated that younger workers were more willing to engage in employee development. This study suggests that older employees may have less training motivation and self-efficacy during training.

Gender. Studies of gender and its effects on learning have been ambiguous (Colquitt et al., 2000). Colquitt et al. state that failure to find consistent effects for gender on learning is not surprising given the lack of theory for such effects. Noe et al. (1997) noted observations where gender had a significant impact in certain situations. For example, women's career paths are much more complex and do not follow traditional models. Women are not offered the same opportunities to develop within organizations. Women also reported receiving less support than men from others in the work environment as being an obstacle in participating in development activities.

Taken in a training context, when given the opportunity to participate in employee development, this study asks if there are correlations between gender and training outcomes.

Prior Job Knowledge. Smith-Jentsch, Jentsch, Payne, and Salas (1996) conducted a study to examine effects of pre-training knowledge on performance. Results indicated a linear relationship between prior knowledge and performance. The study suggested that participants with pre-training knowledge had more motivation to learn than participants without prior knowledge (Smith-Jentsch et al., 1996). Warr and Bunce (1995) identified that prior job experience may be a factor in influencing learning. Their research showed a positive relationship between previous experience and work outcomes. However, it was undetermined whether lengthy experience in a particular job would have learning benefits. Warr and Bunce identified this area as having a need for further research. Ree, Carretta, and Teachout (1995) performed research that included studying the relationship of prior job knowledge and learning during training. Results of the study indicated that prior job knowledge had little influence on subsequent job knowledge, but direct influence on early work which in turn influenced performance. This indirect impact on performance through prior job knowledge provides reason for studying correlations between prior job knowledge and other trainee characteristics. Trainees with prior job knowledge should have better performance in training (Ree et al., 1995). Colquitt et al. (2000) and Salas and Cannon-Bowers (2001) support the idea identified in their research reviews that trainees' prior job knowledge has significant importance during the training intervention.

Environment/Climate. Support for the influence of learning outcomes and of the transfer climate on using knowledge, skills, and attitudes back on the job appears throughout the training literature (Salas & Cannon-Bowers, 2001). Factors in the work environment may enhance or inhibit transfer of training (Ford et al., 1992). Tracey, Tannenbaum, and Kavanagh's (1995) research supports studying how the work environment influences trainee perceptions and behavior. They suggested that climate may have a direct effect on self-efficacy and motivation to learn. Further, trainees in a less supportive work environment will be less likely to acquire new knowledge gained from any means, formal training or otherwise. Colquitt et al.'s (2000) review of training research found that climate may predict the extent to which trainee's transfer knowledge, skills, and attitudes to the job. Colquitt et al.'s review revealed that a positive relationship existed in several studies between the organization's climate and the transfer of learning to the job. However, Colquitt et al. noted that examination of situational characteristics is still rare. Research is needed to identify which facets of climate, culture, and context have the most positive relationships with training outcomes. This study classified the trainee's command assignment as the environment in which the trainee would work.

Time in Service. Warr and Bunce (1995) studied this individual factor to determine if there was an association between job tenure and learning. In their research, they made no prediction of the effect of job tenure on learning. Results of their research indicated that job tenure may have a negative correlation with other constructs identified to study training effectiveness. This study seeks to examine the relationship between time in service and trainee characteristics.

Organization Characteristics

Organization Support.

Due to differences in organizations (e.g., the organization's mission), the level of support received from the organization may have an effect on the trainees' opportunity to perform and subsequent transfer of skills learned to the work environment (Ford et al., 1992). Additionally, trainees may feel more comfortable performing learned tasks in a highly supportive environment. Organization support is also believed to promote participation in employee development activities (Noe et al., 1997). Tracey et al. (1995) revealed a consistent theme in their literature review that work environment may impact one's preparation for training and subsequently the transfer of training back to the work environment. Noe and Schmitt (1986) substantiated the idea that a supportive work environment would increase transfer of skills to the work environment. Finally, support for further research in the area of organization support was discussed by Tannenbaum and Yukl (1992) because of the possibility that the organization climate may be an important determinant of training effectiveness.

Organizational Constraints.

One underlying theme throughout the training literature is the idea that organizational constraints may impact performance. Constraints refer to any inhibitor perceived by a person and may differ from one person to another (Mathieu et al., 1993). Organizational constraints are believed to inhibit participation in employee development activities (Noe et al., 1997). Noe's (1986) analysis of training literature uncovered the concept that trainee's perceptions of the favorability of the work environment influence motivation to learn and transfer of skills. Other research supports organizational

constraint measurement in determining the impact on performance. Mathieu et al. (1992) researched a model that included a hypothesized relationship between performance and organizational constraints. Mathieu et al. concluded that if trainees believed that learning new skills would not add value to their job performance due to organizational constraints, trainees would have less motivation to perform well in training. O'Connor et al. (1984) conducted a field investigation of the impact of situational constraints on individual performance. They found significant association between inhibiting situational constraints and lower performance. Peters, O'Connor, Eulberg and Watson's (1988) research proposed that situational constraints could limit individual work performance. However, in their research, constraints were not shown to relate to performance and therefore, left a requisite to further the understanding of the determinants of performance. Hypotheses of the importance of measuring work-related situational constraints that directly or indirectly attribute to explaining the variance in performance, including those which affect training and development programs are also prevalent (Peters & O'Connor, 1980; Peters, O'Connor, & Eulberg, 1985). Two hypotheses relevant to this research include: a) situational constraints having a negative impact on performance and b) individual differences in abilities and motivation interacting with situational constraints in the prediction of performance. Finally, according to Tannenbaum and Yukl (1992), limitations in the work environment can also influence the events that occur after a trainee returns to the job. This study is interested in relationships that may exist between perceived organizational constraints and training outcomes.

Opportunity to Perform.

One issue that can affect the transfer of skills to the job is the opportunity the trainee is given to perform the task which relates to the organization climate and the trainee's self-efficacy (Ford et al., 1992). In a study of trainee attitudes and their effect on training effectiveness, Noe and Schmitt (1986) included the trainee's perception of opportunity to perform in their exploratory model. They identified that the trainee's belief regarding opportunity to perform skills or to use knowledge learned in training programs are of particular importance in evaluating training effectiveness. The untested assumption that all trainees will have the same opportunity to perform tasks learned has not been extensively measured. In the context of this study, opportunity to perform is defined as the extent to which the trainee feels he will have the opportunity to use the knowledge learned in BCOT on the job (Ford et al., 1992). This study measured the trainees perception of whether they will have the opportunity to perform each of the eleven course goals learned. Given the opportunity to perform the task, will the motivation to transfer the learned tasks correlate with the trainees' perceptions?

Training Outcomes

Training Performance.

Numerous methods are used to measure learning and immediate post-training knowledge (Alliger & Tannenbaum, 1996). Kirkpatrick (1978) acknowledged that it is appropriate to measure knowledge or attitude change with a paper-and-pencil test. He suggested the appropriateness of tailoring the test to cover the specific knowledge being taught. Any program where skills of some kind are being taught should use a systematic classroom evaluation to measure learning (Kirkpatrick, 1979). An analysis of techniques

to measure learning identified that measurement most often took place by a pre-post test measurement design as well as by paper-and-pencil tests to determine knowledge and understanding of concepts taught (Catalanello & Kirkpatrick, 1968). Alliger et al.'s (1997) meta-analysis of 34 studies also revealed that, by far, the most common measurement of immediate post-training knowledge was traditional tests such as multiple choice paper-and-pencil tests. Another consideration for training performance is when to measure. Kraiger et al. (1993) identified that measuring trainee's retention of declarative knowledge is most appropriate in the initial stages of training. In the BCOT course, grades, based on a 100-point scale, are given after each block of instruction. Some block grades are from paper-and-pencil tests; while others are from projects performed in the block. This study used the final course score (an average of the grades for each of the eleven blocks of training) for each trainee as a measure of training performance.

Training Reaction.

Research has shown a relationship between training participants' reactions and their behavioral change following training course completion (Faerman & Ban, 1993). Kirkpatrick (1978) iterated that reactions measurement should be done in a way so that the results may be tabulated and quantified. Warr and Bunce (1995) supported measurement of three kinds of reaction: enjoyment, usefulness, and difficulty. No relationship between perceived enjoyment reaction and learning was expected nor found. Perceived usefulness, however, was more likely to be associated with changes in work behavior because trainees who saw training as being more relevant to their work would likely want to transfer the learning to their work environment. Warr and Bunce's research results showed a positive correlation between training usefulness and

motivation. Perceived difficulty was expected to predict immediate learning. Research results showed a negative correlation between the two; however, this may have been because of the open learning forum that was used in the study. All three levels of reaction were seen as important for measuring training outcomes. Warr and Bunce further stated that predictors of reaction to training are dependent on which form of reaction is measured. Alliger and Tannenbaum (1996) identified the difference between affective and utility reaction. Their research supported correlations between reaction and job application. Their research results supported utility over affective reaction and found that utility reaction correlated more highly with on-the-job performance than with affective reaction. They concluded that measuring utility reaction would provide a better estimate of transfer. In a review of training literature, Alliger et al. (1997) performed a meta-analysis of 34 studies that yielded 115 correlations between training criteria. Their findings also supported that utility-type reaction was more strongly related to learning or transfer than affective reactions.

This study measured all three types of reactions from training and analyzed each reaction against other training outcomes as well as combining all three reactions into a single construct for comparison to either support or not support the measurement of three separate reactions that has been identified in previous research.

Motivation to Transfer.

Training literature not only supports motivation to transfer as an important outcome of training, but also identifies that there are numerous training constructs that may affect motivation to transfer (Salas & Cannon-Bowers, 2001). Noe (1986) defines motivation to transfer as the trainees' desire to use the knowledge and skills mastered in

the training program. Noe and Schmitt (1986) identified motivation to transfer as an outcome of training and a measure of training effectiveness. Motivation to transfer has been shown as an indication of success (Alliger & Tannenbaum, 1996). Ford et al. (1992) posited that the transfer of trained tasks to the job will be successful if given the opportunity to perform those tasks. Tracey et al.'s (1995) research showed that the work environment was an important contributor to the application of newly acquired behavior and skills. Kraiger et al. (1993) identified previous training effectiveness models that treated learning as a unidimensional construct where different learning outcomes were not defined, but learning was recognized an important pre-cursor to transfer. Kozlowski and Salas (1997) identified a high consensus that training is of little value if the knowledge, skills, behaviors, and attitudes acquired by the trainee are not transferred to the job setting. While acknowledging the importance of motivation to transfer has been consistent, too little attention has been given to assess transfer of learned knowledge, skills, and attitudes to the job (Faerman & Ban, 1993). This study seeks to examine motivation to transfer as a desired training outcome and a possible indicator for future job performance.

This section has identified the pertinent training constructs identified in the training literature that may be relevant in measuring training effectiveness. The next section will discuss previous research of training effectiveness models.

Prior Training Effectiveness Models

According to Alliger and Janak (1989), Kirkpatrick's model has met an organizational need for evaluating training. Admittedly, Kirkpatrick's model has been good for evaluation in the past (Watkins et al., 1998). Support for using Kirkpatrick's

simple, yet systematic evaluation has abounded; yet there remains a need to expand Kirkpatrick's model to include other pertinent constructs that may broaden the understanding of training effectiveness. For example, Alliger et al. (1997) suggested that there is a broader understanding of training evaluation needed by using training reaction to measure learning and transfer. Salas and Cannon-Bowers (2001) discussed the Kirkpatrick model weaknesses and suggested research in the area of training antecedents and their impact on training effectiveness. Warr and Bunce (1995) identified a need to study additional associations between immediate learning and later outcomes from learning. Additionally, Miller (1990) suggested that training and development of personnel can be used as a tool for furthering organization development supporting the idea of using a systems approach to look at training. This section will present recent training evaluation and effectiveness research that was used as the foundation for this study.

Noe and Schmitt (1986) conducted a study to test an exploratory model of the influence of trainee attitudes concerning their jobs and trainee perception of the organization climate on training outcomes. The study provided limited support for Kirkpatrick's model. In addition, the positive findings of their study supported expanding training effectiveness measurement to include trainee and organization characteristics and provided future direction for additional research of trainee attitudes which may attenuate or enhance training effectiveness. They identified the influence of employee reactions on motivation to learn during training and trainee perceptions of organization support as two important areas for future research.

Research conducted by Tannenbaum et al. (1991) studied training characteristics and the effect training fulfillment had on those characteristics. The research hypotheses stated that training fulfillment, trainee reactions, and training performance would be related to the development of post-training attitudes. They identified commitment, self-efficacy, and motivation as antecedents and outcomes of training. The results supported each of the hypotheses. Training fulfillment positively related to post-training attitudes and pre-training attitudes related to the development of post-training attitudes. The results of this research furthered the belief that commitment, self-efficacy, and motivation are important antecedents and outcomes of training and implied that training fulfillment enhances each. In addition, Tannenbaum et al. mentioned that developing these three trainee characteristics may result in higher performance and motivation to transfer, concepts for future research to expand the Tannenbaum et al. study. Tannenbaum et al.'s study supplied further support to measure commitment, self-efficacy, and motivation of the trainee and to identify how these trainee characteristics correlate with other training effectiveness constructs.

Theoretical support for expanding the factors of training effectiveness to include trainee characteristics is provided by Tannenbaum and Yukl (1992). Implications for improving training effectiveness included measuring trainee characteristics such as motivation, attitudes, abilities, skills, and aptitude treatment interactions. They stated that self-efficacy and motivation are central constructs in understanding training effectiveness. These characteristics can be influenced and influential before, during, and after the training process. Tannenbaum and Yukl emphasized that because of the

potential to help in explaining why training works, these constructs should receive particular attention during research.

Mathieu et al. (1992) performed a study that hypothesized relationships between individual and situational characteristics and training motivation and training effectiveness. Their findings supported relationships between learning and performance; and training motivation and reactions. They also identified antecedents of training motivation. Mathieu et al. revised their model to show the complex role those reactions to training play in measuring training effectiveness. Further, they suggested replication of the study in other settings and other training programs.

Cannon-Bowers et al. (1995) performed a study in a military setting in which the results indicated that several non-technical trainee-related factors had significant impact on training outcomes. They acknowledged that training effectiveness is a complex phenomena and that training variables are a critical part of the effectiveness equation. Their research studied pieces of a systems-oriented comprehensive model in which organization and trainee characteristics were crucial inputs for measuring training results. They selectively chose the more promising variables identified in the literature, such as motivation, self-efficacy, and expectation variables, to assess their impact on training effectiveness.

Mathieu and Martineau (1997) proposed a conceptual model (Figure 1) to posit implications of individual and situational influences on training motivation. Mathieu and Martineau emphasized expanding Kirkpatrick's framework beyond the immediate training program to provide a more complete understanding of training effectiveness. While Mathieu and Martineau's discussion focused on training motivation, they also

pointed out that self-efficacy is an important predictor of training outcomes, specifically training transfer. Additionally, Mathieu and Martineau identified individual influences such as demographics; knowledge, skills, abilities, and experiences; personality and needs; and work-related attitudes that may affect training motivation, in turn, influencing training effectiveness. Situational influences such as constraints, social-psychological influences, and maintenance systems were also predicted to have influences on motivation as well as training effectiveness. While unable to test their conceptual model, Mathieu and Martineau presented implications for research that focus on the complete context of training when evaluating effectiveness of training programs. They also stress the use of a systems-oriented approach in evaluation as well as training design. Therefore, according to Mathieu and Martineau, the training system should be viewed in the context of ongoing organizational processes, and the effectiveness of training depends on the program as well as relevant individual and situational factors.

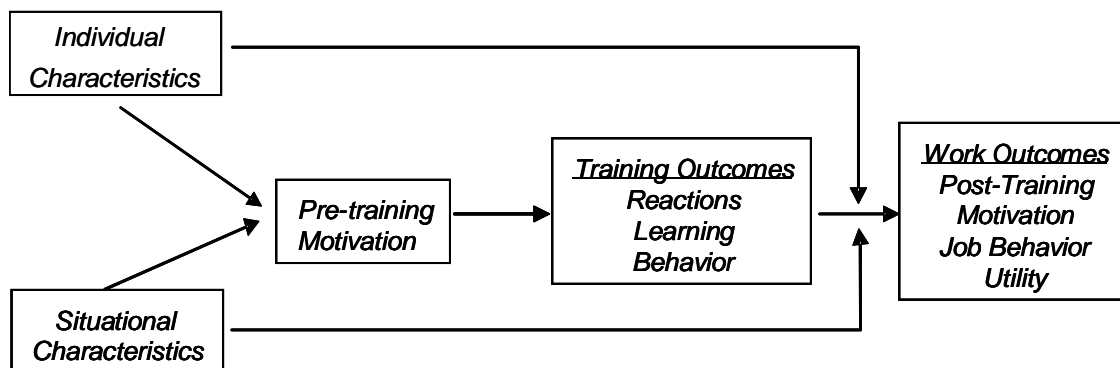


Figure 1. Mathieu and Martineau (1997) Conceptual Model

Research Model

Based on previous research and the conceptual model (Figure 1) proposed by Mathieu and Martineau (1997), ten constructs (i.e., affective organization commitment, learning and task-related self-efficacy, training motivation, organization support, organization constraints, opportunity to perform, training performance, training reaction, and motivation to transfer), as well as certain trainee demographics, were chosen to examine the impact of trainee and organization characteristics on the training outcomes of the BCOT course. The proposed research model for this study is depicted in Figure 2. The proposed research model identifies overarching relationships between trainee characteristics, organization characteristics, and training outcomes. The following section presents the hypotheses posited to answer the research questions identified in Chapter 1.

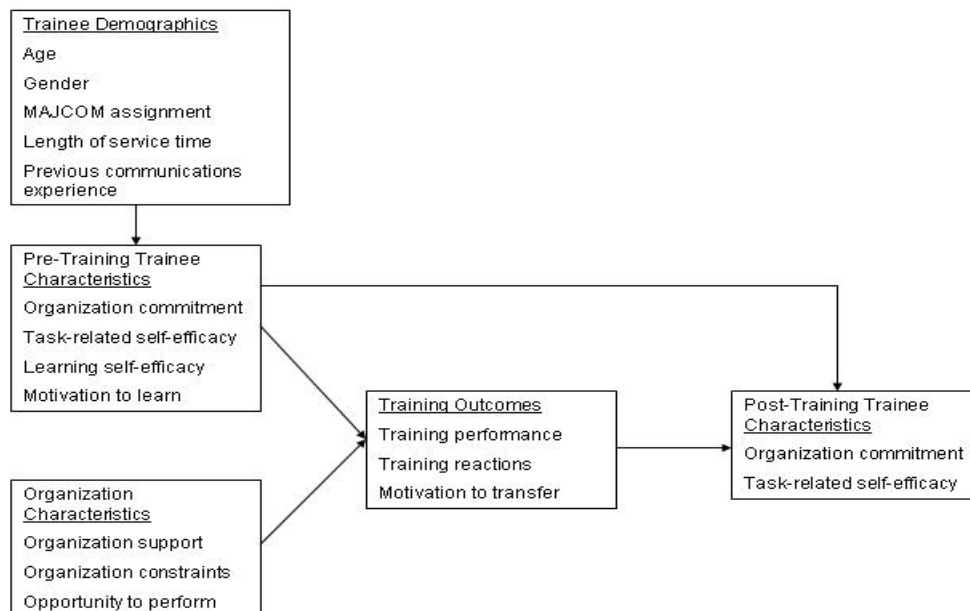


Figure 2. Proposed Research Model

Based on research supporting the ten training constructs selected for study and the proposed research model, the following hypotheses are presented:

Hypothesis 1 – Hypotheses to support relationships between trainee characteristics and training outcomes.

H1a: There is a positive relationship between organization commitment and training performance.

H1b: There is a positive relationship between task-related self-efficacy and training performance.

H1c: There is a positive relationship between learning self-efficacy and training performance.

H1d: There is a positive relationship between motivation to learn and training performance.

H1e: There is a positive relationship between organization commitment and training reactions.

H1f: There is a positive relationship between task-related self-efficacy and training reactions.

H1g: There is a positive relationship between learning self-efficacy and training reactions.

H1h: There is a positive relationship between motivation to learn and training reactions.

H1i: There is a positive relationship between organization commitment and motivation to transfer.

H1j: *There is a positive relationship between task-related self-efficacy and motivation to transfer.*

H1k: *There is a positive relationship between learning self-efficacy and motivation to transfer.*

H1l: *There is a positive relationship between motivation to learn and motivation to transfer.*

Figure 3 pictorially represents the proposed relationships for hypothesis 1.

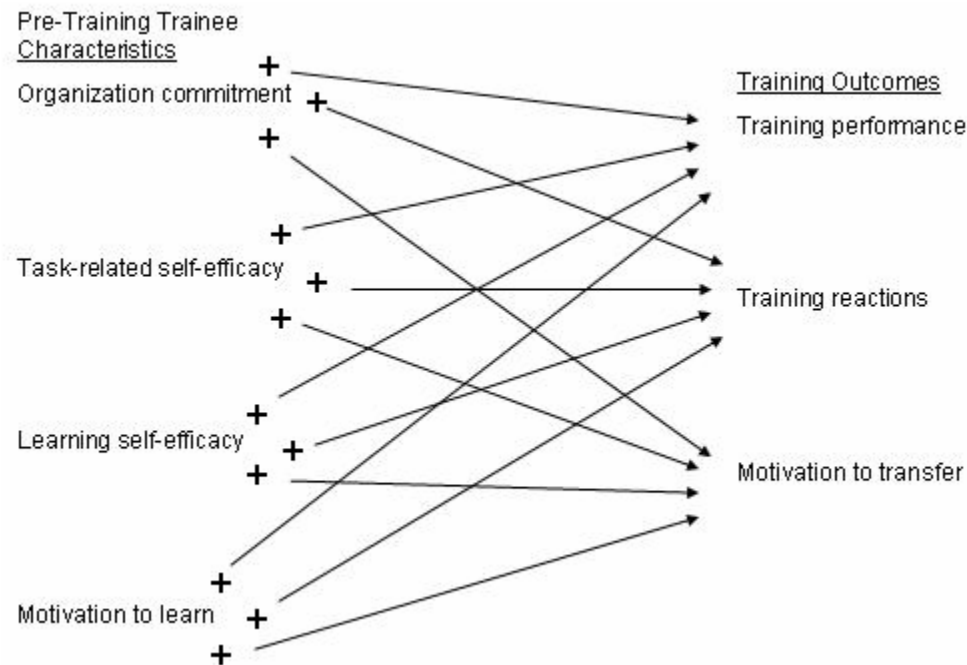


Figure 3. Proposed Hypothesis 1 Relationships

Hypothesis 2 – Hypotheses to support relationships between organization characteristics and training outcomes.

H2a: *There is a positive relationship between organization support and training performance.*

H2b: *There is a negative relationship between organization constraints and training performance.*

H2c: *There is a positive relationship between opportunity to perform and training performance.*

H2d: *There is a positive relationship between organization support and training reactions.*

H2e: *There is a negative relationship between organization constraints and training reactions.*

H2f: *There is a positive relationship between opportunity to perform and training reactions.*

H2g: *There is a positive relationship between organization support and motivation to transfer.*

H2h: *There is a negative relationship between organization constraints and motivation to transfer.*

H2i: *There is a positive relationship between opportunity to perform and motivation to transfer.*

Figure 4 pictorially represents the proposed relationships for hypothesis 2.

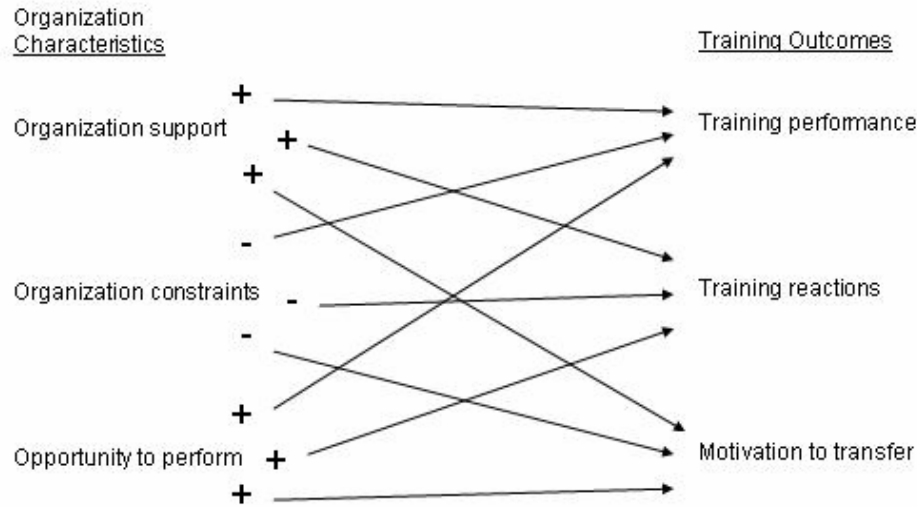


Figure 4. Proposed Hypothesis 2 Relationships

Hypothesis 3 – Hypotheses to support relationships between trainee demographics and trainee characteristics.

H3a: There is a positive relationship between age and organization commitment.

H3b: There is a relationship between gender and organization commitment.

H3c: There is a relationship between MAJCOM assignment and organization commitment.

H3d: There is a positive relationship between time in service and organization commitment.

H3e: There is a positive relationship between previous communications experience and organization commitment.

H3f: There is a positive relationship between age and task-related self-efficacy.

H3g: There is a relationship between gender and task-related self-efficacy.

H3h: There is a relationship between MAJCOM assignment and task-related self-efficacy.

H3i: *There is a positive relationship between time in service and task-related self-efficacy.*

H3j: *There is a positive relationship between previous communications experience and task-related self-efficacy.*

H3k: *There is a positive relationship between age and learning self-efficacy.*

H3l: *There is a relationship between gender and learning self-efficacy.*

H3m: *There is a relationship between MAJCOM assignment and learning self-efficacy.*

H3n: *There is a positive relationship between time in service and learning self-efficacy.*

H3o: *There is a positive relationship between previous communications experience and learning self-efficacy.*

H3p: *There is a negative relationship between age and motivation to learn.*

H3q: *There is a relationship between gender and motivation to learn.*

H3r: *There is a relationship between MAJCOM assignment and motivation to learn.*

H3s: *There is a positive relationship between time in service and motivation to learn.*

H3t: *There is a positive relationship between previous communications experience and motivation to learn.*

Figure 5 pictorially represents the proposed relationships for hypothesis 3.

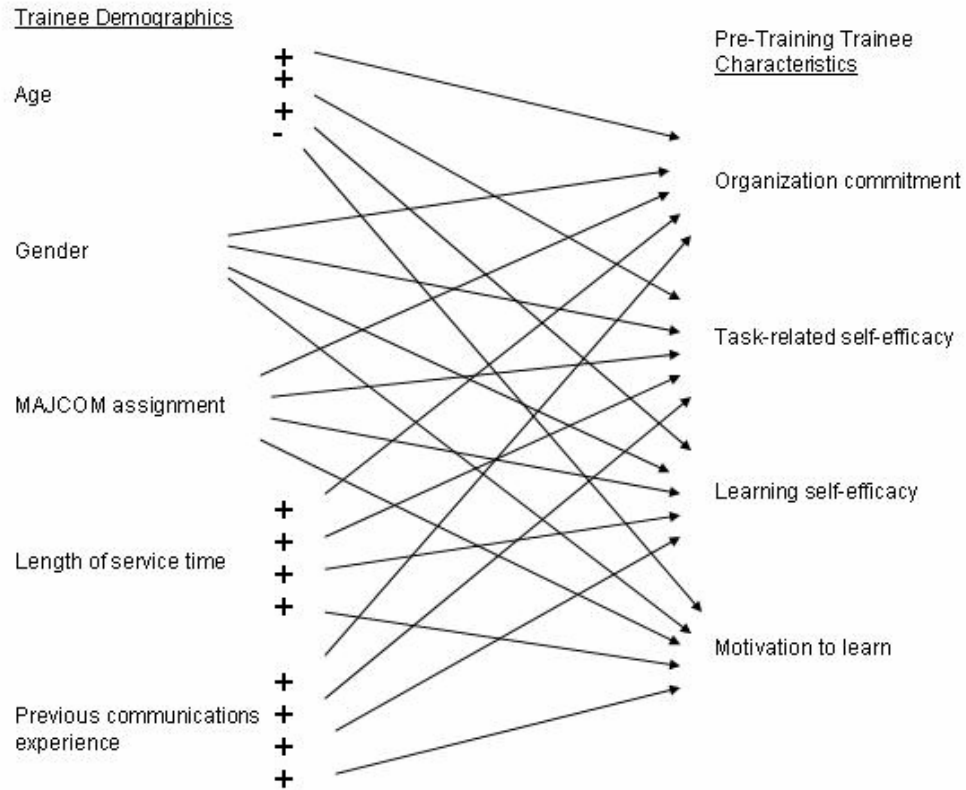


Figure 5. Proposed Hypothesis 3 Relationships

Hypothesis 4 – Hypotheses to support relationships between pre-training trainee characteristics and post-training characteristics.

H4a: There will be an increase in organization commitment from pre-training to post-training.

H4b: There will be an increase in task-related self-efficacy from pre-training to post-training.

Hypothesis 5 – Hypotheses supporting relationships between training outcomes and post-training characteristics.

H5a: There is a positive relationship between training performance and post-training organization commitment.

H5b: *There is a positive relationship between training reactions and post-training organization commitment.*

H5c: *There is a positive relationship between motivation to transfer and post-training organization commitment.*

H5d: *There is a positive relationship between training performance and post-training task-related self-efficacy.*

H5e: *There is a positive relationship between training reactions and post-training task-related self-efficacy.*

H5f: *There is a positive relationship between motivation to transfer and post-training task-related self-efficacy.*

Figure 6 pictorially represents the proposed relationships for hypotheses 5.

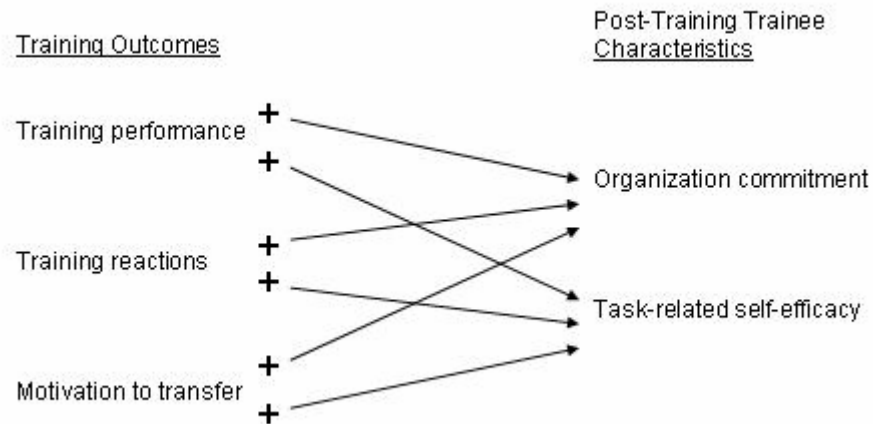


Figure 6. Proposed Hypothesis 5 Relationships

Summary

Training effectiveness models have repeatedly used trainee characteristics, organization characteristics, and training outcomes to measure the effectiveness of

training. While variable antecedents may vary from study to study, the premise is the same: trainee characteristics, organization characteristics, and training outcomes may be strong indicators of training effectiveness and, subsequently, trainee motivation to transfer learned skills to the work environment.

Kirkpatrick (1977) laid the ground work for measuring training effectiveness with his four-level model. A number of theoretical models are available to guide the measurement of training. Specifically, Tannenbaum et al. (1991) studied the effect of training characteristics on training effectiveness and Mathieu and Martineau (1997) incorporated organization characteristics and their effect on training effectiveness. This study integrates the trainee characteristics, organization characteristics, and training outcomes of these models to examine the relationship between said constructs and immediate training outcomes in support of Kirkpatrick's first and second levels of training effectiveness measurement: reaction and learning. Additionally, this study examines the relationship between said constructs and the possible future training outcome of the trainee's motivation to transfer learned skills to the work environment.

The military supports an iterative instructional systems development model where evaluation is part of the cyclical training process (Department of the Air Force, 1993). Lack of evaluation in the military due to misconceptions (Salas et al., 2003) or confusion about what to measure (Alliger & Tannenbaum, 1996) is common. BCOT evaluation includes immediate trainee reactions and post-training task-related self-efficacy measures. This study attempts to develop a robust training effectiveness model for use through the Air Force C&I officer's training career. The model used in this study integrates previous research findings and posits that certain trainee characteristics and

organization characteristics (i.e., affective organization commitment, task-related self-efficacy, learning self-efficacy, training motivation, organization support, organization constraints, and opportunity to perform skills learned) are related to training outcomes as measured by the trainee's performance, reaction to training, and motivation to transfer skills learned to the job. Furthermore, training performance and reaction are expected to be indicators of immediate training effectiveness, while motivation to transfer is expected to be indicative of future job performance which may or may not be a further indication of training effectiveness.

Relationships between these constructs and training effectiveness may provide insight into issues that may be hindering training effectiveness. In turn, by identifying possible problems and potential solutions with the current training evaluation, further development of future Air Force C&I Officers through training may be possible. The following chapter will outline the research methodology used in this study. Chapter four will detail the analysis of the data, and chapter five will discuss the research findings, research limitations, and recommendations for further research in this area.

III. Methodology

Overview

The previous chapters outlined the current problem statement and reviewed literature pertaining to training evaluation and training effectiveness. Trainee characteristics and organizations characteristics were combined into one model to further the study of training effectiveness. This chapter outlines the methodology used to develop and deploy the training effectiveness surveys, which were designed to measure the research questions presented in chapter one and the hypotheses presented in chapter two. The training effectiveness surveys addressed each of the constructs outlined in the proposed research model (Figure 2). This chapter covers information regarding the following areas: samples size; survey procedures; development and reliability of the survey instruments; and data analysis methods.

Sample

The targeted participants for this study were Air Force Communication and Information (C&I) Officers attending BCOT whose class start dates were between September 15, 2003 and September 30, 2003. Three classes with a total of 49 students started during this time frame. These classes provided a representative sample of training students that attend BCOT throughout the year. Students were company grade officers (i.e., second lieutenants, first lieutenants, or captains), contractors, and foreign officers. Thirty-nine useable responses were obtained from the sample. Responses that did not include both a pre-training survey matched with a post-training survey were not included

in the data collection. Reasons for unmatchable surveys included students being unable to finish the course or students finishing the course early due to prior commitments.

Procedures

During the first day of BCOT class, the researcher was allotted time to conduct the pre-training survey. The researcher explained who was conducting the research, what the research concerned, why the students had been targeted as participants, and how the results would be used. She also explained that their responses would be collected anonymously and provided contact information. At this point in their training, the trainees were asked to complete a pre-training survey (see Appendix A) that assessed affective organization commitment, task-related self-efficacy, learning self-efficacy, and training motivation. Demographic information was also collected as part of the pre-training questionnaire. During the final week of attendance, the researcher asked the trainees to complete a post-training survey (see Appendix B) that assessed organization support, training reaction, motivation to transfer, situational (i.e., organization) constraints, and opportunity to perform. Additionally, affective organization commitment and task-specific self-efficacy were re-assessed. The re-assessment questions were randomly reordered to ensure participants answers were not memory based. Each survey was provided with an instruction set and completed in the presence of the researcher in order to bolster participation and to provide answers to any questions that may have arisen. The last five digits of the subject's social security number or student ID were used to record pre-training and post-training survey answers as well as to match performance records with appropriate survey responses.

Measures

Except where otherwise noted, all measurement responses were given using a 7-point Likert-type scale ranging from *strongly disagree* (1) to *strongly agree* (7) with *neither agree nor disagree* (4) as the midpoint. Kraiger et al. (1993) noted the most common method to measure attitude is with a scale that allows respondents to indicate preference or rejection of the object such as the one used. Both survey instruments for this study used questions taken from previously validated surveys to ensure validity. Appendix C summarizes the original questions; the researcher(s); the construct definition; the original scale measurement used; and the modified versions of each question used in this study.

Trainee Characteristics.

Given the context of this study and the extent of the literature, four trainee attitudes were examined. They were affective organization commitment, training self-efficacy, learning self-efficacy, and training motivation.

Affective Organization Commitment. Affective organization commitment was assessed with the eight-item self-report affective commitment scale (ACS) developed by Meyer and Allen (1984). Meyer and Allen tested the scale against previously used reliable, valid scales (viz., the Organizational Commitment Questionnaire, the Ritzen-Trice Scale, and the Hrebiniak-Alutto Scale). The ACS has shown acceptable reliability in research studies. Meyer and Allen, in two separate studies (Allen & Meyer, 1990; 1984), administered the scale and reported a coefficient alpha of .87. Tracey, Hinkin, Tannenbaum, and Mathieu's (2001) research reported a coefficient alpha of .75. Additionally, Meyer and Allen found the scale correlated highly ($r = .78$) with the

Organizational Commitment Questionnaire. This correlation provides some evidence of convergent validity. Construct validity was shown when affective commitment manipulation had the expected effect on all the scales measuring affective commitment including the newly developed ACS. Allen and Meyer's findings of correlation between the ACS and proposed antecedent variables, specifically skills, provide further evidence of validity. Scale items were modified for use in the Air Force setting. Four items were reverse-coded. Sample items include "The Air Force has a great deal of personal meaning to me" and "I do not feel 'emotionally attached' to the Air Force" (reversed). Table 2 presents the affective organization commitment scale items.

Table 2. Affective Organization Commitment Modified Scale Items

Affective Organization Commitment Scale

1. I would be very happy to fulfill a career in the Air Force.
2. I enjoy discussing the Air Force with those not in the Air Force.
3. I really feel as if the Air Force's problems are my own.
4. I think that I could easily become as attached to another organization as I am to the Air Force. (R)
5. I do not feel like 'part of the Air Force family'. (R)
6. I do not feel 'emotionally attached' to the Air Force. (R)
7. The Air Force has a great deal of personal meaning to me.
8. I do not feel a strong sense of belonging to the Air Force. (R)

NOTE: (R) indicates item is reverse coded.

Task-related Self-Efficacy. Task-related self-efficacy was assessed with a scale modeled after Robertson and Sadri's (1993) scale. Robertson and Sadri developed a 57-item managerial self-efficacy scale. They divided the odd- and even-numbered items into two versions of the scale during a pilot test and achieved a coefficient alpha of .97 for Version A and an coefficient alpha of .96 for Version B. Robertson and Sadri also conducted a separate validation study in which both versions were re-administered to a

different sample. Both versions of the scale showed ability to predict the mean job performance rating.

For this study, eleven items, one for each block of instruction, were developed to measure task-related self-efficacy of BCOT trainees. For example, for the Resource Management Block of instruction, the item read “When making my best effort, I would be able to successfully manage an Air Force communications project.” The scale was reviewed by two individuals familiar with the BCOT curriculum to provide some validation of the item content. After the review, minor adjustments were made to correct grammatical errors. The questions were also modified so that respondents would be able to answer using a 7-point Likert-type scale. Table 3 presents the task-related self-efficacy scale items.

Table 3. Task-Related Self-Efficacy Modified Scale Items

<i>Task-Related Self-Efficacy Scale</i>	
When making my best effort, I would be able to -	
1.	- identify the role of CI officers and civilian professionals within the framework of the Air Force Mission.
2.	- identify current communications systems employed to support the US Air Force mission.
3.	- discuss the facets of life cycle management from a communications perspective.
4.	- explain how to treat Air Force communications systems as weapons systems.
5.	- discuss the facets of network operating systems and the roles and responsibilities of the Network Control Center (NCC).
6.	- configure and manage a UNIX-based network operating system.
7.	- confidently install, configure, and manage the Windows NT operating system.
8.	- successfully manage an Air Force communications project.
9.	- discuss CI authority and responsibility from the MAJCOM level down to the CI Systems Officer at the base level, including deployed operations and expeditionary aerospace forces.
10.	- describe the Military Satellite Communication systems and explain how commercial satellite systems impact the DOD.
11.	- plan and deploy a communications network.

Learning Self-Efficacy. Learning self-efficacy was assessed using a scale developed by Pintrich et al. (1993). Their scale assessed a student's expectancy for success and self-efficacy. Expectancy for success relates to task performance, while self-efficacy is the self-appraisal of one's ability to master a task. Pintrich et al. (1993) reported a coefficient alpha of .93 for their scale. Slight modification for the Air Force training environment was needed for these items. Table 4 presents the learning self-efficacy scale items.

Table 4. Learning Self-Efficacy Modified Scale Items

<i>Learning Self-Efficacy Scale</i>
1. I believe I will receive an excellent grade in this course.
2. I'm confident I can do an excellent job on the assignments and tests in this training course.
3. I expect to do well in this training.
4. Considering the difficulty of the blocks, the instructors, and my skills, I think I will do well in this course.
5. I'm certain I can understand the most difficult material presented in the readings for this course.
6. I'm confident I can understand the basic concepts taught in this course.
7. I'm confident I can understand the most complex material presented by the instructor in this course.
8. I'm certain I can master the skills being taught in this course.

Training Motivation. Training motivation was assessed using a 6-item scale that has been administered in two previous studies (Warr, Allan, & Birdi, 1999; Warr & Bunce, 1995). Coefficient alphas .94 and .76 were achieved for these studies. An illustrative item is "Generally, I am enthusiastic about learning new things." The scale was originally developed by Warr and Bunce (1995). Items cover perceived personal gains and interest in the material being taught. Slight modification for the Air Force environment was needed for these items. Table 5 presents the training motivation scale items.

Table 5. Training Motivation Modified Scale Items

<i>Training Motivation Scale</i>
1. Generally, I am enthusiastic about learning new things.
2. Generally, I prefer to keep away from training courses (R).
3. Generally, I am keen to take up any learning opportunity offered to me.
4. I am keen to learn more about the subjects covered in this training.
5. I expect that this training will help me a lot in the future.
6. This training is really a waste of time (R).

NOTE: (R) indicates item is reverse coded.

Organization Characteristics.

Three organization characteristics were identified as appropriate measures of training effectiveness: organization support, organization constraints, and opportunity to perform.

Organization Support. Organization support was assessed using a 5-item scale based on research by Tracey et al. (2001). In Tracey et al.'s study, the organization support scale was part of a larger work environment measurement. Individual internal reliability was not reported for the organization support piece of the scale; however, the entire scale achieved a coefficient alpha of .86. Tracey (2003) establishes further construct validity for the scale in his study reporting a coefficient alpha of .90 for the organization support scale. Items used in this scale had been factor analyzed in a previous study by Tracey et al. (1995). An example item is as follows: "In this store, coworkers encourage each other to use new knowledge and skills on the job." Items were modified for the Air Force setting. Table 6 presents the organization support scale items.

Table 6. Organization Support Modified Scale Items

Organization Support Scale

1. There is a performance appraisal system that ties rewards to the use of newly acquired knowledge and skills.
 2. The Air Force offers excellent training programs.
 3. CI officers are provided with resources necessary to acquire and use new knowledge and skills.
 4. There are rewards and incentives for acquiring and using new knowledge and skills in one's job.
 5. The Air Force rewards CI officers for using newly acquired knowledge and skills on the job.
-

Organizational Constraints. Organizational constraints were assessed using a 16-item scale used in Mathieu, Martineau, and Tannenbaum's (1992) study. The sixteen items in this scale measured the extent to which employees perceived they would be constrained in the areas of information sources; equipment and supplies; authority to complete their jobs; and time to complete their jobs. These items were modified to measure the BCOT trainee's expectation of adequate equipment, time, and encouragement they would receive at their duty station after the training. Mathieu et al.'s scale achieved a coefficient alpha of .85 after two items that exhibited low average interitem correlations were dropped. An example of an item read "I will have adequate equipment (e.g., computers, software) for performing my job." Table 7 presents the organization constraints scale items.

Table 7. Organization Constraints Modified Scale Items

<i>Organization Constraints Scale</i>
1. I will receive adequate information from other sources (e.g., co-workers, departments, outside companies or agencies, etc.) needed to perform my job well.
2. I will have adequate equipment (e.g., computers, software) for performing my job.
3. I will have adequate supplies (e.g., paper, equipment parts) for performing my job.
4. There is a shortage of help in my unit.
5. I will have the opportunity to receive adequate educational and/or training experiences necessary to perform my job well.
6. There will be enough time available to complete my job duties as assigned.
7. The physical aspects of my unit (e.g., space, lighting, etc.) will be adequate.
8. My job duties and tasks will be scheduled in an efficient manner.
9. I will have sufficient authority to complete the tasks that are assigned to me.
10. The operating budget in my unit is sufficient to cover the amount of work produced in my unit.
11. Administrative rules or policies will hinder my effectiveness on the job.
12. I will receive sufficient forewarning to plan my work activities.
13. My supervisor will encourage me to learn new skills or to try out new ideas.
14. My co-workers will resist new ideas or the use of new work procedures.
15. My unit has prescribed ways of doing things that must be followed.
16. Time will be made available to me in order to practice new skills or to experiment with different work procedures.

Opportunity to Perform. Opportunity to perform was assessed using an 11-item scale modeled after Ford et al.'s (1992) scale. Their scale was developed specifically for the Aerospace Ground Equipment (AGE) Airman Basic-in-Residence technical training course. The scale was developed to measure the breadth, activity level, and type of tasks for the AGE career field. The internal reliability for this scale was .74. This scale was modified to represent the tasks expected to be performed by new C&I officers. Ford et al. (1992) contend that measurement should be at the appropriate level. While the AGE survey measured tasks learned, the BCOT course focuses more at the knowledge level. Therefore, measurement items were developed in an effort to measure how much knowledge learned in BCOT would be transferred and used on the job. For example, the item for measuring the knowledge learned about project management skills read "I will

have to opportunity to manage an Air Force communications project.” Table 8 presents the opportunity to perform scale items.

Table 8. Opportunity to Perform Modified Scale Items

<i>Opportunity to Perform Scale</i>
I will have the opportunity to -
1. - work as a CI officer.
2. - work with current communications systems employed to support the US Air Force mission.
3. - perform life cycle management on a communications system.
4. - develop or use Air Force communications systems as weapons systems.
5. - work with network operating systems and the Network Control Center (NCC).
6. - configure and manage a UNIX-based network operating system.
7. - install, configure, and manage a Windows NT operating system.
8. - manage an Air Force communications project.
9. - work at the base level in an aerospace expeditionary force.
10. - work with the Military Satellite Communication system and commercial satellite systems.
11. - plan and deploy a communications network.

Training Outcomes.

Training Performance. Training performance was assessed using final course grades. The final course grade is an average of the grades received from the eleven blocks of instruction. This grade reflects the trainees’ learning of the academic material covered in the course. As mentioned previously, students were identified by the last five digits of their social security numbers or their student ID number. This measure was coded as a z-score where higher scores reflected better performance.

Training Reaction. Training reaction was assessed using a 9-item scale developed by Warr et al. (1999). The scale was developed to measure three distinct reaction areas: enjoyment, perceived usefulness, and perceived difficulty. Three items are used to measure each area. Factor analysis was undertaken to verify the three factors

of reaction. Eigenvalues above 1.00 were present for each factor and varimax rotation identified the three proposed components. Alpha coefficients of internal reliability were .76, .80, and .75, respectively. Sample items include “This course was extremely interesting” for enjoyment; “This course closely related to my job needs” for perceived usefulness; and “I found this course very hard to follow” for perceived difficulty. Items on this scale were modified for the Air Force setting. Table 9 presents the training reaction scale items.

Table 9: Training Reaction Modified Scale Items

Training Reaction Scale

Enjoyment

1. I really enjoyed this course.
2. This course was very good fun.
3. This course was extremely interesting.

Perceived usefulness

1. This course was very relevant to my job.
2. This course was of great practical value to me for my job.
3. This course was closely related to my job needs.

Perceived difficulty

1. I found this course very hard to follow.
 2. I thought this course was a tough one.
 3. I found this course difficult to understand.
-

Motivation to Transfer. Motivation to transfer was assessed using a 3-item scale developed by Warr et al. (1999). An example item is “I feel very committed to apply what I have learned to my job.” In Warr et al.’s research, the three items from this scale were included in a factor analysis with nine other reaction items. When extracting four factors, the items distributed as expected. The scale achieved a coefficient alpha of .79. Items on this scale were modified for the Air Force setting. Table 10 presents the motivation to transfer scale items.

Table 10: Motivation to Transfer Modified Scale Items

<i>Motivation to Transfer Scale</i>
1. I am keen to apply what I have learned in this course.
2. I intend to use what I have learned in this course.
3. I feel very committed to applying what I have learned in this course to my job.

Table 11 summarizes the reliability analysis statistics (i.e., Cronbach's alpha, mean, and standard deviation) for each scale used in this study (Leedy & Ormrod, 2001). All scales achieved a coefficient alpha above .71. Additionally, a combined scale was included in this table. Training Reaction – Total combines the three separate training reactions measured. Overall, a value of .70 is considered acceptable, with values above .90 desirable (Nunnally & Bernstein, 1994).

Table 11. Reliability Analysis Statistics for Measurement Scales

Scale	Cronbach's Alpha	Mean	Standard Deviation
Affective Organization Commitment (Time 1)	.85	5.34	0.96
Affective Organization Commitment (Time 2)	.88	5.38	0.98
Task-related Self-efficacy (Time 1)	.93	4.59	1.29
Task-related Self-efficacy (Time 2)	.89	5.29	0.81
Motivation to Learn	.73	5.85	0.75
Learning Self-efficacy	.91	6.15	0.69
Training Reaction – Perceived Usefulness	.89	4.56	1.40
Training Reaction – Perceived Difficulty	.81	2.97	1.30
Training Reaction – Enjoyment	.91	4.09	1.77
Training Reaction – Total	.73	3.87	0.95
Organizational Constraints	.71	4.71	0.49
Opportunity to Perform	.77	4.75	0.74
Organization Support	.75	4.83	0.80
Motivation to Transfer	.83	5.61	0.92

Instrument Review

As part of the development process, the surveys were reviewed by six C&I Officers familiar with BCOT to ensure clarity of wording and instructions. Feedback from the review resulted in minor wording adjustments.

Data Analysis

Descriptive Statistics.

Descriptive statistics for each construct will be reported. This will provide frequency distribution, central tendency (i.e., the mean), and variation for the sample studied. In turn, inferences from this data may be made of the population of all Basic Communications Officer Training (BCOT) students. Additionally, reporting these statistics may further the generalizability of the model beyond the military scope (Kachigan, 1991).

Correlation Analysis.

A correlation matrix will be presented that includes all variables measured. It should be noted that two scales, affective organization commitment and task-related self-efficacy, were measured twice during this study. Both measurements of these two variables will be reported in the correlation matrix. The correlation matrix will be reviewed for significant positive and negative relationships between each variable. Specifically, training and organization characteristics are expected to positively correlate with training outcomes. This review may lead to further regression analysis.

Analysis of Variance (ANOVA)

ANOVA will be used to analyze the relationships between the pre-training and post-training measurements of affective organization commitment and task-related self-

efficacy. Kraiger et al. (1993) identified that pre- and post-training measurement of attitudes that indicate a change during training may signal that learning has occurred. Evidence of success may be derived from mean differences between pre- and post-tests.

Regression Analysis.

Regression analysis will be used to provide mathematical equations for identified relationships in the correlation matrix using training performance, training reactions, and motivation to transfer as the dependent variables and affective organization commitment, task-related self-efficacy, learning self-efficacy, training motivation, organization support, organization constraints, opportunity to perform, and trainee demographics as the independent variables. For example, it is expected that task-related self-efficacy, learning self-efficacy, and training motivation will be positively correlated with training performance. If this is supported by the correlation analysis, a regression model using all three independent variables will be posited.

Summary

This chapter outlined the methodology used in developing and conducting the training effectiveness surveys used in this research. Both surveys were conducted in person at Keesler Air Force Base. The sample population included 49 students, from which 39 useable responses were received. After the data were collected, they were analyzed using correlation analysis, analysis of variance, and regression analysis. In the following chapter, the data are outlined and analyzed. Chapter five presents conclusions and recommendations for the overall study.

IV. Data Analysis

Overview

The previous chapters outlined the current problem statement, reviewed literature pertaining to training evaluation and training effectiveness, and presented the research questions and hypotheses tested in this study. In addition, chapter three outlined the methodology for collecting and analyzing data and outlined each of the nine measures that comprised the pre-training and post-training surveys used in this study. This chapter summarizes the surveys findings and presents the data analysis.

In an effort to answer research questions 2 and 3 (i.e., What is the relationship between trainee characteristics and training outcomes? What is the relationship between organization characteristics and training outcomes?) presented in chapter one, several data analysis techniques were used. To review, five hypotheses posited relationships among the constructs in the proposed research model. These hypotheses are summarized again in Table 12.

First, hypotheses 1 and 2, directly relating to research questions 2 and 3, were examined using correlation analysis. Hypotheses 3, 4, and 5 were posited as further relationships that may support and provide answers to research questions 2 and 3. They also were examined using correlation analysis. A correlation matrix will be presented later in this chapter. Additionally, further analysis for hypothesis 4, relationships between pre-training and post-training characteristics, was performed using analysis of variance (ANOVA). After correlation analysis and ANOVA were performed, the proposed research model was revised to support the findings of the analysis and propose

a more feasible training effectiveness model. Finally, in an effort to support predictive ability of the revised research model (Kachigan, 1991), regression analysis was used to propose mathematical equations for training effectiveness.

Table 12. Hypotheses Summary

<i>Hypothesis</i>	<i>Description</i>
Hypothesis 1	Hypotheses to support relationships between trainee characteristics and training outcomes.
Hypothesis 2	Hypotheses to support relationships between organization characteristics and training outcomes.
Hypothesis 3	Hypotheses to support relationships between trainee demographics and trainee characteristics.
Hypothesis 4	Hypotheses to support relationships between pre-training and post-training trainee characteristics.
Hypothesis 5	Hypotheses supporting relationships between training outcomes and post-training trainee characteristics.

Descriptive Statistics

Table 13 outlines the demographics of all participants who responded to the survey. Demographic information collected from respondents included age, gender, rank, time in service, prior job knowledge, and Major Command (MAJCOM) to which assigned. As seen in Table 13, demographics are shown for thirty-nine respondents. For this table, age was recoded into three groups: less than 25, 25 – 30, and over 30. Additionally, time in service was recoded into four groups of two years each, that is, less than 24 months, 24 – 48 months, 48 – 72 months, and more than 72 months.

Table 13. Sample Demographics Statistics

<i>Characteristic</i>	<i>n</i>	<i>%</i>	<i>Characteristic</i>	<i>n</i>	<i>%</i>
Age (in years)			Gender		
< 25	15	38.5	Female	7	17.9
25 – 30	14	35.9	Male	32	82.1
> 30	10	25.6			
Rank			Prior Job Knowledge		
2 nd Lieutenant	37	94.8	Some	5	12.8
1 st Lieutenant	1	2.6	None	34	87.2
Captain	1	2.6			
MajCom Assignment			Time in Service (in months)		
No Answer	6	15.4	< 24	18	46.2
ACC	8	20.5	24 – 48	3	7.7
AETC	5	12.8	48 – 72	6	15.4
AFMC	2	5.1	> 72	12	30.8
AFSPC	2	5.1			
AMC	8	20.5			
PACAF	3	7.7			
SPACE	2	5.1			
USAFE	3	7.7			

Correlation Analysis

Hypotheses one through five were analyzed using correlation analysis. Table 14 presents the means (M), standard deviations (SD), and observed correlations among all variables in this study. All thirty-nine respondents answered both the pre-training and post-training surveys; of which, thirty-eight were matched with a performance score by using the last five digits of their social security number or student ID (i.e., only one set of surveys did not have a corresponding performance score). In addition, two combined measurements are included in the correlation matrix: training reaction-total (TR-TTL) and training effectiveness (TNG-EFF). TR-TTL combines the three reaction measurements (perceived usefulness - PU, perceived difficulty - PD, and enjoyment - E)

into one score. TNG-EFF combines the training outcomes (performance, training reaction-total, and motivation to transfer) into a single score. Significant correlations will be described as each hypothesis is analyzed.

Table 14. Correlation Matrix for Study Measures

Measure	M	SD	Correlation Coefficients												
			1	2	3	4	5	6	7	8	9	10	11	12	13
1. Performance	91.03	5.36													
2. Age	26.97	4.36	.43**												
3. Gender	N/A	N/A	-.14	-.08											
4. Rank	N/A	N/A	.25	.33	-.09										
5. Time in Service (in months)	48.26	51.21	.36	.75**	-.18	.40*									
6. MAJCOM	N/A	N/A	.36*	.19	.13	-.14	.09								
7. Prior Job Knowledge	N/A	N/A	.32*	.20	-.22	.14	.37*	.04							
8. TRSE – Pre	4.59	1.29	.17	.14	.12	.02	.17	.25	-.17						
9. AOC – Pre	5.34	0.96	-.25	-.01	-.10	-.10	.21	-.05	-.06	.06					
10. TM - Pre	5.87	0.75	-.26	.11	-.16	.15	.08	-.05	-.30	.03	.61**				
11. LSE - Pre	6.15	0.69	.20	.35*	-.14	-.02	.30	.37*	-.16	.22	.16	.46**			
12. TR-PU	4.56	1.40	-.26	-.01	.05	.05	-.09	-.01	-.25	-.15	.20	.33*	-.09		
13. TR-PD	2.97	1.30	-.51**	-.20	.37*	-.09	-.22	-.36*	-.27	.03	-.03	.03	-.31	.07	
14. TR-E	4.09	1.77	-.18	.22	-.21	.11	.24	.01	-.14	.13	.44**	.41**	.10	.47**	-.28
15. TR-TTL	3.87	0.95	-.47**	.04	.06	.06	.00	-.16	-.33*	.02	.36*	.43**	-.13	.82	.32
16. OC-Post	4.73	0.49	.19	.20	-.07	.24	.17	.02	-.08	.10	-.06	.14	-.09	.22	-.08
17. AOC-Post	5.38	0.98	-.23	.11	-.22	.06	.23	-.07	-.07	.08	.71**	.63**	.07	.39*	-.17
18. OTP-Post	4.80	0.74	-.12	.05	-.06	-.07	.09	-.01	-.39*	.17	.12	.34*	.13	.56*	.15
19. TRSE-Post	5.29	0.81	-.02	.14	-.04	.14	.05	.08	-.20	.23	.20	.35*	.24	.32*	-.24
20. MTT – Post	5.61	0.92	-.20	.15	-.25	.02	.14	.08	-.17	.01	.56*	.60*	.26	.58**	-.25
21. OS-Post	4.82	0.80	-.40*	-.01	-.29	.24	.10	-.30	-.11	-.07	.22	.31	-.18	.44**	-.03
22. TNG-EFF	3.20	0.61	.23	.43**	-.13	.49**	.40*	.05	-.11	.17	.26	.45**	.17	.60**	-.25

Notes: a) ** Correlation is significant at the 0.01 level (2-tailed). b) * Correlation is significant at the 0.05 level (2-tailed). c) TRSE – Task-related self-efficacy, AOC – Affective organization commitment, TM – Training motivation, LSE – Learning self-efficacy, TR-PU – Training reaction-Perceived usefulness, TR-PD – Training reaction-Perceived difficulty, TR-E – Training reaction-Enjoyment, TR-TTL – Combined training reaction score, OC – Organizational constraints, OTP – Opportunity to perform, MTT – Motivation to transfer, OS – Organization Support, TNG-EFF – Training Effectiveness, Pre – Pre-training measure, Post- Post-training measure

Table 14 (cont'd). Correlation Matrix for Study Measures

Measure	Correlation Coefficients								
	14	15	16	17	18	19	20	21	22
15. TR-TTL	.72								
16. OC-Post	.21	.20							
17. AOC-Post	.62**	.50**	.16						
18. OTP-Post	.43**	.61**	.36*	.27					
19. TRSE-Post	.54**	.38*	.40*	.36*	.31				
20. MTT – Post	.71**	.62**	.18	.63**	.32*	.46**			
21. OS-Post	.58**	.57**	.49**	.46**	.41**	.47**	.40*		
22. TNG-EFF	.70**	.61**	.37*	.45**	.42**	.47**	.75**	.37*	

Hypothesis 1 Analysis

Hypothesis 1 stated that there would be positive relationships between pre-training trainee characteristics (affective organization commitment - AOC, task-related self-efficacy - TRSE, learning self-efficacy - LSE, and training motivation - TM) and training outcomes (performance, training reaction - total – TR-TTL, and motivation to transfer - MTT). Twelve relationship predictions were made (see Table 15 for results summary). With respect to the proposed research model, four were supported: H1e stated a positive relationship between AOC-Pre and TR-TTL (training reaction-enjoyment was also positively correlated with AOC-Pre); H1h stated a positive relationship between TM and TR-TTL (training reaction-perceived usefulness and training reaction-enjoyment were also positively correlated with TM); H1i stated a positive relationship between AOC-Pre and MTT; and H1l stated a positive relationship between TM and MTT. Therefore, positive relationships between all pre-training trainee characteristics and performance were not supported. In addition, positive relationships between the pre-training trainee characteristics of TRSE and LSE and training outcomes of TR-TTL and MTT were not supported. However, pre-training AOC and TM were positively related to the training outcomes of TR-TTL (as well as training

reaction-perceived usefulness and training reaction-enjoyment) and MTT. Overall, only one-third of the proposed predictions were supported for hypothesis 1.

Table 15. Hypothesis 1 Results Summary

<i>Hypothesis</i>	<i>Predicted Relationship</i>	<i>Result</i>
H1a	As AOC-Pre +, Performance +	Not Supported
H1b	As TRSE-Pre +, Performance +	Not Supported
H1c	As LSE +, Performance +	Not Supported
H1d	As TM +, Performance +	Not Supported
H1e	As AOC-Pre +, TR +	Supported (E)
H1f	As TRSE-Pre +, TR +	Not Supported
H1g	As LSE +, TR +	Not Supported
H1h	As TM +, TR +	Supported (PU, E)
H1i	As AOC-Pre +, MTT +	Supported
H1j	As TRSE-Pre +, MTT +	Not Supported
H1k	As LSE +, MTT +	Not Supported
H1l	As TM +, MTT +	Supported

Hypothesis 2 Analysis

Hypothesis 2 stated that there would be certain relationships between organization characteristics (organization support - OS, organization constraints - OC, and opportunity to perform - OTP) and training outcomes (performance, training reaction-total - TR-TTL, and motivation to transfer - MTT). Nine relationship predictions were made (see Table 16 for results summary). With respect to the proposed research model, four were supported: H2d stated a positive relationship between OS and TR-TTL (training reaction-perceived usefulness and training reaction-enjoyment were also positively correlated with OS); H2f stated a positive relationship between OTP and TR-TTL (training reaction-perceived usefulness and training reaction-enjoyment were also positively correlated with OTP); H2g stated a positive relationship between OS and

MTT; and H2i stated a positive relationship between OTP and MTT. Therefore, none of the relationships between organization characteristics and performance were supported. In fact, analysis for hypothesis H2a, originally predicted as having a positive relationship between OS and performance, supported a negative correlation. Additionally, hypotheses predicting negative correlations between OC and training outcomes (TR-TTL and MTT) were not supported. However, OS and OTP were positively related to TR-TTL (including training reaction-perceived usefulness and training reaction-enjoyment) and MTT. Overall just under half of the proposed predictions were supported for hypothesis 2.

Table 16. Hypothesis 2 Results Summary

<i>Hypothesis</i>	<i>Predicted Relationship</i>	<i>Results</i>
H2a	As OS +, Performance +	Opposite
H2b	As OC +, Performance -	Not Supported
H2c	As OTP +, Performance +	Not Supported
H2d	As OS +, TR +	Supported (PU, E)
H2e	As OC +, TR -	Not Supported
H2f	As OTP +, TR +	Supported (PU, E)
H2g	As OS+, MTT +	Supported
H2h	As OC +, MTT -	Not Supported
H2i	As OTP +, MTT +	Supported

Hypothesis 3 Analysis

Hypothesis 3 stated that there would be certain relationships between trainee demographics (age, gender, MAJCOM Assignment, Time in Service, and Prior Job Knowledge) and pre-training trainee characteristics (affective organization commitment - AOC-Pre, task-related self-efficacy - TRSE-Pre, learning self-efficacy - LSE, and training motivation - TM). Twenty relationship predictions were made (see Table 17 for

results summary). With respect to the proposed research model, two were supported: H3k stated a positive relationship between age and LSE and H3m stated a relationship between MAJCOM and LSE. Therefore, none of the relationships between AOC-Pre, TRSE-Pre, and TM and trainee demographics were supported. Additionally, no relationship between gender and LSE was determined; and positive relationships between Time in Service, Prior Job Knowledge and LSE were not supported. However, age was positively related to LSE and MAJCOM was related to LSE. Overall only two of the proposed predictions were supported for hypothesis 3.

Table 17. Hypothesis 3 Results Summary

<i>Hypothesis</i>	<i>Predicted Relationship</i>	<i>Results</i>
H3a	As Age +, AOC-Pre +	Not Supported
H3b	Gender ?, AOC-Pre ?	Not Supported
H3c	MAJCOM ?, AOC-Pre ?	Not Supported
H3d	As Time in Service +, AOC-Pre +	Not Supported
H3e	As Prior Job Knowledge +, AOC-Pre +	Not Supported
H3f	As Age +, TRSE-Pre +	Not Supported
H3g	Gender ?, TRSE-Pre ?	Not Supported
H3h	MAJCOM ?, TRSE-Pre ?	Not Supported
H3i	As Time in Service +, TRSE-Pre +	Not Supported
H3j	As Prior Job Knowledge +, TRSE-Pre +	Not Supported
H3k	As Age +, LSE +	Supported
H3l	Gender ?, LSE ?	Not Supported
H3m	MAJCOM ?, LSE ?	Supported
H3n	As Time in Service +, LSE +	Not Supported
H3o	As Prior Job Knowledge +, LSE +	Not Supported
H3p	As Age -, TM +	Not Supported
H3q	Gender ?, TM ?	Not Supported
H3r	MAJCOM ?, TM ?	Not Supported
H3s	As Time in Service +, TM +	Not Supported
H3t	As Prior Job Knowledge +, TM +	Not Supported

Hypothesis 4 Analysis

Hypothesis 4 stated there would be an increase between pre-training and post-training measures of affective organization commitment (AOC) and task-related self-efficacy (TRSE). Based on correlation analysis, high correlation existed between pre- and post-training measures of AOC, indicating no change or a slight change between the two measurements. On the other hand, low correlation existed between pre- and post-training measures of TRSE, indicating a signification change between measurements. Further support for these results is presented below in the analysis of variance section. Table 18 presents the summary of results for hypothesis 4.

Table 18. Hypothesis 4 Results Summary

<i>Hypothesis</i>	<i>Predicted Relationship</i>	<i>Results</i>
H4a	AOC will increase from T1 to T2	Not Supported
H4b	TRSE will increase from T1 to T2	Supported

Hypothesis 5 Analysis

Hypothesis 5 stated that there would be positive relationships between training outcomes (performance, training reaction-total - TR-TTL and motivation to transfer - MTT) and post-training trainee characteristics (task-related self-efficacy – TRSE-Post and affective organization commitment – AOC-Post). Six relationship predictions were made (see Table 19 for results summary). With respect to the proposed research model, four were supported: H5b stated a positive relationship between TR-TTL and AOC-Post (training reaction-perceived usefulness and training reaction-enjoyment were also positively correlated with AOC-Post); H5c stated a positive relationship between MTT and AOC-Post; H5e stated a positive relationship between TR-TTL and TRSE-Post

(training reaction-perceived usefulness and training reaction-enjoyment were also positively correlated with TRSE-Post); and H5f stated a positive relationship between MTT and TRSE-Post. Therefore, none of the relationships between performance and post-training trainee characteristics were supported. However, TR-TTL (including training reaction-perceived usefulness and training reaction-enjoyment) and MTT were positively related to AOC-Post and TRSE-Post. Overall two-thirds of the proposed predictions were supported for hypothesis 5.

Table 19. Hypothesis 5 Results Summary

<i>Hypothesis</i>	<i>Predicted Relationship</i>	<i>Results</i>
H5a	As Performance +, AOC-Post +	Not Supported
H5b	As TR +, AOC-Post +	Supported (PU, E)
H5c	As MTT +, AOC-Post +	Supported
H5d	As Performance +, TRSE-Post +	Not Supported
H5e	As TR +, TRSE-Post +	Supported (PU, E)
H5f	As MTT +, TRSE-Post +	Supported

Analysis of Variance (ANOVA)

Hypothesis four was also analyzed using analysis of variance (ANOVA). Table 20 summarizes the statistics and tests for the paired samples between pre- and post-training measures of task-related self-efficacy (TRSE) and affective organization commitment (AOC). TRSE means changed significantly between pre- and post-training measures; while AOC means did not. This test further supports the correlation analysis conducted earlier.

Table 20. Paired Samples Statistics and Test Results

	<i>Sample</i>	<i>Mean</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>Sig. (2-tailed)</i>
Pair 1	TRSE-Pre	4.59	1.29	-3.22	38	.003
	TRSE-Post	5.29	0.81			
Pair 2	AOC-Pre	5.34	0.96	-.32	38	.748
	AOC-Post	5.38	0.98			

Other Significant Relationships

This study measured 22 variables which provided 231 possible correlations. The proposed research model identified possible relationships for 76 of the 231 possible correlations. With regard to the proposed research model, of those 76 correlations, 26 were supported, 1 was incorrectly posited, and 49 were not supported. Further study of the correlation matrix identified 42 other significant correlations of the 155 possible correlations not identified by the proposed research model. Table 21 summarizes these 42 significant correlations. Given the magnitude of this finding, a revised research model is presented.

Table 21. Other Identified Study Variable Relationships

Relationship	Correlation	Relationship	Correlation
Performance with Age	Positive	TM with TNG-EFF	Positive
Performance with MAJCOM	Positive	TR-PU with TR-E	Positive
Performance with PJK	Positive	TR-PU with MTT	Positive
Performance with TR-PD	Negative	TR-PU with TNG-EFF	Positive
Performance with TR-TTL	Negative	TR-E with MTT	Positive
Age with Time in Service	Positive	TR-E with TNG-EFF	Positive
Age with TNG-EFF	Positive	TR-TTL with MTT	Positive
Gender with TR-PD	Positive (Males perceived course more difficult)	TR-TTL with TNG-EFF	Positive
Rank with Time in Service	Positive	OC-Post with OTP	Positive
Rank with TNG-EFF	Positive	OC-Post with TRSE-Post	Positive
Time in Service with PJK	Positive	OC-Post with OS	Positive
Time in Service with TNG-EFF	Positive	OC-Post with TNG-EFF	Positive
MAJCOM with TR-PD	Negative	AOC-Post with TRSE-Post	Positive
PJK with TR-TTL	Negative	AOC-Post with OS	Positive
PJK with OTP	Negative	AOC-Post with TNG-EFF	Positive
AOC-Pre with TM-Pre	Positive	OTP with OS	Positive
AOC-Pre with AOC- Post	Positive	OTP with TNG-EFF	Positive
TM with LSE	Positive	TRSE-Post with OS	Positive
TM with AOC-Post	Positive	TRSE-Post with TNG-EFF	Positive
TM with OTP	Positive	MTT with TNG-EFF	Positive
TM with TRSE-Post	Positive	OS with TNG-EFF	Positive

Revised Research Model

The revised research model is presented in Figure 7. The revised model reflects several observations based on analysis of the original proposed research model. Trainee demographic information, while important to gain insight of the sample population, did not lend itself as an important training effectiveness variable to the original model for various reasons. There was a lack of significant correlations with other variables identified by the proposed research model. Gender had only one significant relationship

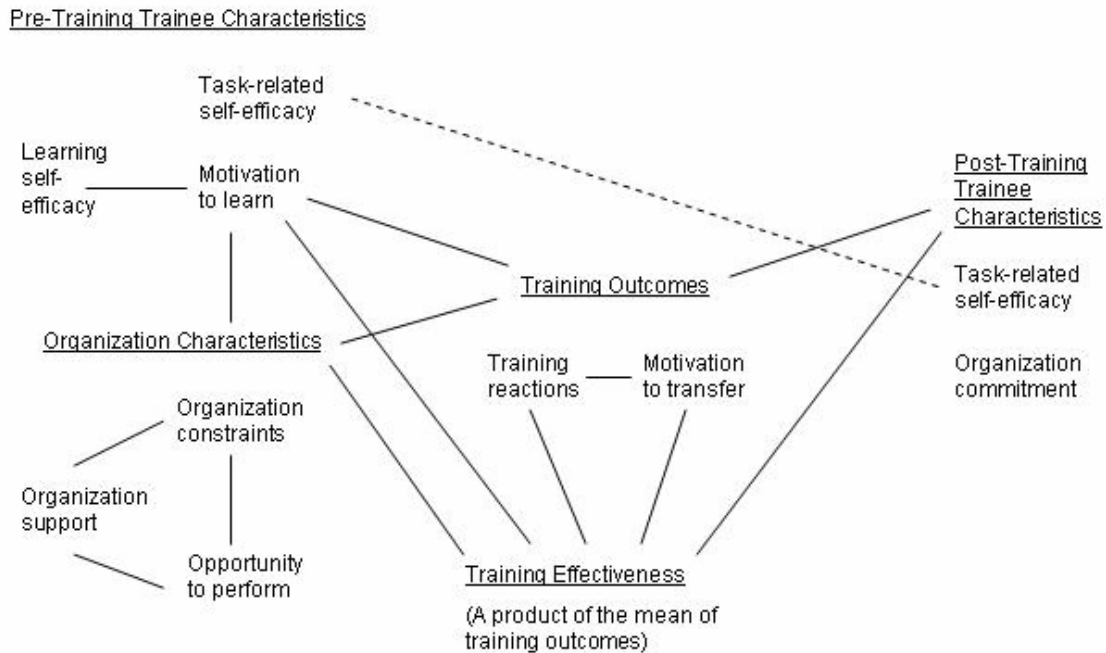


Figure 7. Revised Research Model

which was with training-perceived difficulty. This may be because of the limited number of survey respondents. The age demographic relationships did not lend themselves to further the study of training effectiveness, either. These relationships included: a) time in service positively related with age (expected); b) performance positively related to age (unexpected); and c) learning self-efficacy positively related to age (expected). Rank was discarded from the revised model because there was only one significant correlation: rank was positively correlated with time in service (expected). This may be because there were only two students who ranked higher than second lieutenant (i.e., one first lieutenant and one captain) in the sample. MAJCOM assignment was discarded from the revised model because of the large number of second lieutenants identified in the course. The three significant correlations identified had no meaning due to the lack of experience of

the students at their assignment stations. Prior job knowledge was discarded for the same reason as MAJCOM assignment. Finally, time in service was discarded because, like age, it did not lend itself to further the study. The three significant correlations identified with time in service were as expected, two of which were with other trainee demographic information.

Pre-training trainee characteristics were also modified. Due to the non-significant change in means from pre- to post-training measurement, affective organization commitment does not need to be measured twice. Therefore, it was removed from the pre-training trainee characteristics list. Further, while the pre-training measure of task-related self-efficacy did not correlate with any other measures, it was retained as an important measurement to determine a change in the pre- and post-training task-related self-efficacy measurement. Learning self-efficacy was also retained although it was identified to only correlate with motivation to learn (i.e., training motivation-TM). A final change for pre-training trainee characteristics in the revised model is the proposed correlations with organization characteristics in addition to training outcomes.

Training outcomes were modified to include only training reactions-total and motivation to transfer. Performance correlated with three trainee demographics (i.e., Age, MAJCOM, and PJK) and only two other characteristics in this study of training effectiveness and was removed from the revised model. Additionally, motivation to transfer was retained in the training outcomes section and removed from the post-training trainee characteristics list.

Finally, the training effectiveness (TNG-EFF) variable, a mean combined score of training reaction-total and motivation to transfer, is included in the revised model as it

had significant correlations with almost every variable studied in both models. Further, removing performance from the training effectiveness variable equation caused the mean for the variable to increase and the data to become more normally distributed (determined by an analysis of skewness and kurtosis). Table 24 provides a comparison of the training effectiveness variable for the original and revised models.

Table 22. Training Effectiveness Variable Statistics

	TNG-EFF (Original Model)	TNG-EFF (Revised Model)
N	39	39
Mean	3.20	4.74
SD	0.61	0.83
Variance	0.37	0.70
Skewness	0.58	-0.17
Std. Error of Skewness	0.38	0.38
Kurtosis	-0.80	-0.15
Std. Error of Kurtosis	0.74	0.74

The revised research model is presented as a simplification of the original proposed research model and provides significant relationships identified from research of the original proposed model. Of the forty-five possible correlations in the revised model, twenty-nine showed significant findings. See table 25 for the correlation matrix of the revised research model.

Table 23. Revised Model Correlation Matrix

Variable	M	SD	Correlation Coefficient									
			1	2	3	4	5	6	7	8	9	10
1. TM	5.87	0.75										
2. LSE	6.15	0.69	.46**									
3. TR	3.87	0.95	.43**	-.13								
4. OC	4.73	0.49	.14	-.09	.20							
5. AOC	5.38	0.98	.63**	.07	.50**	.16						
6. OTP	4.80	0.74	.34*	.13	.61**	.36*	.27					
7. TRSE	5.29	0.81	.35*	.24	.28*	.40*	.36*	.31				
8. MTT	5.61	0.92	.60**	.26	.62**	.18	.63**	.32*	.46**			
9. OS	4.82	0.80	.31	-.18	.57*	.49**	.46**	.41**	.47**	.40*		
10. TNG-EFF	4.74	0.84	.58**	.07	.90**	.21	.62**	.52**	.47**	.90**	.54**	

NOTE: Notes: a) ** Correlation is significant at the 0.01 level (2-tailed). b) * Correlation is significant at the 0.05 level (2-tailed). c) TM – Training motivation, LSE – Learning self-efficacy, TR - Training reaction, OC – Organizational constraints, AOC – Affective organization commitment, OTP – Opportunity to perform, TRSE – Task-related self-efficacy, MTT – Motivation to transfer, OS – Organization Support, TNG-EFF – Training Effectiveness

Regression Analysis

According to Kachigan (1991), a mathematical regression equation may be used to predict future outcomes and help in understanding correlation analysis. Using the revised research model and stepwise regression analysis, three regression equations are proposed for future research to support the revised research model. The three dependent variables used in the equations were the training outcomes (motivation to transfer and training reaction-total) and the training effectiveness variable. Each regression analysis started with all seven independent variables: affective organization commitment, learning self-efficacy, task-related self-efficacy, training motivation, organization constraints, opportunity to perform, and organization support.

The first regression analysis (Model 1) was performed for the dependant variable motivation to transfer. Three predictors (affective organization commitment, task-related self-efficacy, and training motivation) provide an R^2 of .51 (adjusted $R^2 = .46$). Adding additional predictors raised R^2 to .52 (adjusted $R^2 = .41$). The second regression analysis

(Model 2) was performed for the dependant variable training reaction-total. Three predictors (learning self-efficacy, opportunity to perform, and training motivation) provide an R^2 of .55 (adjusted $R^2 = .42$). Adding additional predictors raised R^2 to .64 (adjusted $R^2 = .56$). The third regression analysis (Model 3) was performed for the dependant variable training effectiveness. Two predictors (opportunity to perform and affective organization commitment) provide an R^2 of .52 (adjusted $R^2 = .50$). Adding additional predictors raised R^2 to .62 (adjusted $R^2 = .53$). A summary of the proposed regression models is shown in Table 24. Both unstandardized and standardized Beta weights are presented for each model.

Table 24. Regression Model Summary

		R^2	Adjusted R^2	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model				Beta	Std. Error	Beta		
1 for	MTT	.51	.46					
	(Constant)			0.31	0.97		0.32	.75
	TM			0.36	0.19	0.30	1.91	.07
	AOC			0.34	0.15	0.36	2.30	.03
	TRSE			0.26	0.15	0.23	1.78	.08
2 for	TR	.55	.52					
	(Constant)			0.83	1.15		0.72	.48
	LSE			-0.55	0.18	-0.40	-3.12	.00
	TM			0.56	0.17	0.44	3.29	.00
	OTP			0.65	0.15	0.51	4.26	.00
3 for	TNG-EFF	.52	.50					
	(Constant)			0.27	0.74		0.37	.71
	AOC			0.45	0.10	0.52	4.36	.00
	OTP			0.43	0.14	0.38	3.20	.00

Summary

This chapter outlined the results obtained during this study. Correlation analysis, ANOVA, and regression analysis were used to analyze the data collected. Correlation analysis was used for all five hypotheses to determine significant relationships between variables presented in the original proposed research model. Few significant relationships were found. Further, ANOVA was used to examine hypothesis four and provided further support for the relationships found between the pre- and post-training measures of affective organization commitment and task-related self-efficacy in the correlation analysis. Given the minimal significant relationships identified from the original model, a revised model was proposed and analyzed using correlation analysis. Of the 45 possible correlations for the revised model, almost 65% (i.e., 29 correlations) were significant. With the revised model as a baseline, stepwise regression analysis was used to propose mathematical equations for determining the three training outcomes (motivation to transfer, training reaction-total, and training effectiveness) that were retained. The following chapter will provide conclusions and recommendations based on the results presented in this chapter.

V. Conclusion

Overview

The overall purpose of this study was to investigate the relationship between training effectiveness and trainee and organization characteristics using the BCOT course as a test bed. In doing so, this study developed two surveys (pre- and post-training) using previously validated instrument scales to obtain measurements that may be indicative of training effectiveness. In addition, a proposed research model was tested and found insufficient in identifying appropriate relationships for the measurements obtained. Furthermore, a revised model was proposed which appropriately identified the relationships between the variables retained and was subsequently supported by the measurements obtained. Finally, regression analysis was used to proposed mathematical equations for the prediction of training outcomes in the revised model.

Three classes of BCOT students were surveyed with a paper-and-pencil instrument that resulted in thirty-nine usable responses. From these responses, correlation analysis was conducted between the training effectiveness variables identified from the literature. ANOVA was conducted to examine the mean change between the pre- and post-training characteristics of affective organization commitment and task-related self-efficacy. Regression analysis was used to further the study with predictive models. This chapter presents conclusions, implications for the Air Force, implications for the researcher, limitations of the study, and recommendations for future research based on the analysis of the data.

Discussion

Research question one, “Based on the literature, which constructs are appropriate for measuring training effectiveness?”, was answered after an extensive review of the training evaluation literature. Based on that review, trainee demographics (viz., age, gender, MAJCOM assignment, time in service, and previous communications experience), trainee characteristics (viz., affective organization commitment, task-related self-efficacy, learning self-efficacy, and motivation to learn), and organization characteristics (viz., organization support, organization constraints, and opportunity to perform) were selected to examine relationships with training outcomes (viz., training performance, training reactions, and motivation to transfer). Support for each variable selected was presented in chapter two. After identifying the variables, a research model (Figure 2) was proposed to study the identified trainee and organization characteristics and their influence on certain training outcomes used to measure training effectiveness.

Research question two, “What is the relationship between trainee characteristics and training outcomes?”, was addressed with hypotheses one, three, four, and five. Hypothesis one was posited to examine the relationships between pre-training trainee characteristics and training outcomes. Hypothesis three was posited to examine relationships between trainee demographics and trainee characteristics. Hypothesis four was posited to examine the relationship between pre- and post-training trainee characteristics. And hypothesis five was posited to examine relationships between training outcomes and post-training trainee characteristics.

Hypothesis one addressed the relationships between pre-training trainee characteristics and training outcomes. All of the sub-hypotheses predicted positive

relationships between each trainee characteristic and each training outcome. In the original proposed research model, one-third of the twelve sub-hypotheses were supported. Training outcomes, training reaction-total (TR-TTL) and motivation to transfer (MTT), both had significant correlations with affective organization commitment (AOC) and training motivation (TM). Performance did not significantly correlate with any of the trainee characteristics. In the revised model, the expected correlations between TM and learning self-efficacy; TM and TR-TTL; and TM and MTT were all supported. Furthermore, TM and the proposed training effectiveness variable showed a significant positive correlation. These results indicate that, as supported by previous studies, training motivation is positively correlated with learning self-efficacy and training outcomes. Thus training motivation contributes positively to training effectiveness and should be considered in models studying training effectiveness.

Hypothesis three addressed the relationships between pre-training trainee characteristics and trainee demographics. All of the sub-hypotheses predicted positive relationships between each trainee characteristic and each trainee demographic except for gender and MAJCOM assignment. Relationships between gender and MAJCOM assignment and each trainee characteristic were suspected, but were not posited. In the original proposed research model, only two of the twenty sub-hypotheses were supported. Age was positively correlated with learning self-efficacy (LSE). This was an expected outcome given that older trainees should have more confidence in their learning ability. MAJCOM assignment also positively correlated with LSE. Given the poor results for correlations between trainee characteristics and demographics, examination of demographic information was not retained for the revised model. Further support for

eliminating demographic information from the model was revealed with additional examination of the correlation matrix. Of the six other significant demographics correlations, three were within the demographics characteristics and expected. Therefore, for this sample, demographics did not appear to have a significant role in determining training effectiveness.

Hypothesis four addressed the relationships between pre-training trainee characteristics and post-training trainee characteristics (viz., affective organization commitment – AOC and task-related self-efficacy - TRSE). Correlation analysis and ANOVA were used to examine the data collected. Both were expected to increase from the pre-training measure to the post-training measure. However, only TRSE showed a significant increase over time. This may be indicative of learning during the course which is a desired result of training. Both pre- and post-training measures of TRSE were retained in the revised model. Pre- and post-training AOC measurements did not show a statistically significant change and resulted in the measure being retained for the revised model, but only as a post-training measure because of positive correlations with training outcomes. Pre- and post-training TRSE measurement should be retained for the purpose of measuring immediate learning of the training course.

Hypothesis five addressed the relationships between post-training trainee characteristics and training outcomes. All of the sub-hypotheses predicted positive relationships between each trainee characteristic and each training outcome. In the original proposed research model, four of the six sub-hypotheses were supported. Training outcomes (training reaction-total – TR-TTL and motivation to transfer –MTT) both had significant correlations with affective organization commitment (AOC) and

task-related self-efficacy (TRSE). Performance did not significantly correlate with either of the trainee characteristics and was not retained in the revised model. In the revised model, the expected correlations between training characteristics and training outcomes were all supported. Furthermore, AOC and TRSE and the proposed training effectiveness variable showed significant positive correlations. These results indicate that AOC and TRSE also have positive effects on training outcomes. Thus AOC and TRSE should be considered when studying training effectiveness.

Research question three, “What is the relationship between organization characteristics and training outcomes?”, was addressed directly by hypothesis two. Hypothesis two addressed the relationships between organization characteristics and training outcomes. All of the sub-hypotheses predicted positive relationships between each organization characteristic and each training outcome, except for organization constraints. Organization constraints (OC) were predicted to correlate negatively with training outcomes. In the original proposed research model, four of the nine sub-hypotheses were supported. Training outcomes (training reaction-total – TR-TTL and motivation to transfer –MTT) both had significant correlations with organization support (OS) and opportunity to perform (OTP). Performance did not significantly correlate with any of the organization characteristics and was not retained in the revised model. OC did not have significant negative correlations as expected, but because of the significant correlations with the other two organization characteristics, was retained as a possible moderating variable. In the revised model, the expected correlations between organization characteristics and training outcomes were all supported. Furthermore, OS and OTP and the proposed training effectiveness variable showed significant positive

correlations. These results indicate that OS and OTP may have positive effects on training outcomes. Thus OS and OTP (and OC as a possible moderating variable) should be considered when studying training effectiveness.

Furthermore, regression analysis for the revised model was performed to provide mathematical models for prediction of training outcomes, training reaction-total and motivation to transfer, and the new training effectiveness variable. Testing of the mathematical models for their predictive capabilities will be discussed in the future research section.

Implications for the Air Force

This study demonstrated the importance between trainee and organization characteristics and training outcomes. Findings indicated training motivation, moderated by learning self-efficacy, task-related self-efficacy, and affective organization commitment are important trainee characteristics for training effectiveness measurement. Also, organization support and opportunity to perform, possibly moderated by organization constraints, are important organization characteristics for training effectiveness measurement. Furthermore, training reaction and motivation to transfer are pertinent training outcomes and should be studied as training effectiveness measures. Subsequently, a more streamlined training effectiveness model was appropriate and presented for future research.

Identifying these important characteristics as influential to training effectiveness may help supervisors and leadership in positively affecting trainees before, during, and after training courses. Indications that performance scores may not be the only measure

of training effectiveness are prevalent in this study. While performance scores are the most common way the Air Force measures training performance, identifying other influential characteristics may increase overall training performance as well as post-training performance. Additionally, affective reactions are not without their use. As Alliger et al. (1997) suggested, reactions may influence political decisions such as training attendance, training funding and even whether training is offered or discontinued. Finally, as suggested by Miller (1990), even if training has no measurable effect, employees gain in other ways. For instance, possible affects on quality of life, a highly visible Air Force concern, may occur if the employee feels fulfilled, more productive, and thus happier with their jobs possibly reaching a form of self-actualization on Maslow's hierarchy.

Implications for Researchers

First, this study proposed a research model integrating previous research and hypothesized discussions to measure training effectiveness. After initial analyzation of the data to the proposed research model, a revised model was proposed that more effectively captured the characteristics proposed to measure training effectiveness. As observed by Tracey and Tews (1995), training does not occur in a vacuum. All aspects of the trainee and the trainee's environment need to be considered. Effective training depends on events that occur before, during, and after training. Factors beyond the traditional view of effective training that may influence the extent to which individuals ultimately transfer training to the job need to be identified and investigated. Validity and reliability of the revised model is left for future research.

In addition, the study proposed a new training effectiveness variable, a product of training reaction and motivation to transfer, that positively correlated with all the selected training characteristics in the revised model. Also, implications of the inability to effectively and accurately measure the constructs identified as variables of training effectiveness needs to be addressed (Miller, 1990). Miller suggests that even with the strictest of methodological designs and the best possible variable control, measurement of such constructs may not be possible. Other implications may include not only what to measure but when to measure appropriate training effectiveness variables. Further research in order to increase the reliability and validity of measurement scales, as well as to determine the appropriate time to measure, needs to continue in this area if we desire accuracy in measuring training effects on human subjects.

Limitations

There are several limitations to this study. First, data collected was self-reported by the trainees. Self-report data hinge on the accuracy of the perceptions of the participants in the training program (Sadri & Snyder, 1995). Researchers want alpha change which is caused by an actual change in the construct over the measurement period. Beta change during self-report refers to the measuring instrument being recalculated by the participant during the measurement intervals. Gamma change refers to a participant redefining some relevant information at the post-test measurement resulting in a lower self-assessment and while change may have occurred, it may be non-existent or minimized at the post measurement. As suggested by Miller (1990), an attempt to control response bias can be made by using special instructions to participants

on how to complete the survey. This study attempted to control response-shift bias by providing such instructions. However, it is unclear whether there was a response-shift bias due to trainees' reinterpretation of the response scale. Additionally, Noe and Schmitt (1986) suggest that interviews with supervisors, mentors, and peers may strengthen the validity of the self-report information. Due to time limitations, such interviews were unable to be conducted.

Next, the most common taxonomy for measuring training evaluation is by measuring change (Sackett & Mullen, 1993). However, Sackett and Mullen propose other more effective methods to measure training effectiveness using pre-experimental design as opposed to quasi-experimental design. Design is dependant on the organizations required outcome. Is a precise change in level of knowledge, skills, and attitudes required, or will measurement of specific level of achievement be enough? If the latter is the case, a pretest-posttest no control group only design is adequate. Sackett and Mullen further contend that many perceived limitations may be logically ruled out. For example, maturation effects due to short time duration of a training program may be ruled out. Therefore, Sackett and Mullen's argument for use of pre-experimental design, paired with careful investigation of the plausibility of various threats, is better than no evaluation due to design limitations. In order to determine if support for the hypotheses identified in the previous chapter existed, a pre-experimental design commonly used for training evaluation was developed. According to Tannenbaum and Woods (1992), the case study is used to examine one set of trainees without comparing them to any other group. Collection of pre- and post-training measures at several points may establish a clearer baseline for comparison when time permits. Research design to measure behavior

change in which no partitioning is possible is further supported by Tannenbaum and Woods' study. A single, trained group measurement can provide a dependent training effect estimate (Alliger & Tannenbaum, 1996).

Additionally, small sample size was a limitation. As the magnitude of the evaluation increases, ambiguity of interpretation usually decreases (Tannenbaum & Woods, 1992). However, Sackett and Mullen (1993) present the trade-offs between internal validity and statistical conclusion validity when a large sample size is not available. Acknowledging that small sample sizes usually have low statistical power, they argue that statistical power is higher with a pre-experimental design and elimination of the control group. Further, because sample size may be limited by certain money and time constraints as was the case in this study, it may be reasonable to trade-off internal validity for statistical conclusion validity. They conclude that creation of a control group to achieve greater internal validity may extract too great a price in terms of threats to statistical conclusion validity.

Finally, Kirkpatrick (1977) stresses the point that proof of training effectiveness comes from eliminating all other factors that could cause outcomes perceived to come from training. While this may seem the case with this training because of the course length and given the fact that the only requirement during this period was for the trainees to attend the BCOT course, it cannot be ruled out that other confounding variables that were not measured may have affected training outcomes. For instance, this course was slightly shortened to twelve weeks in some instances to graduate students prior to the holiday season. Trainees were not asked about their perception about whether they received quality training given this fact. Thus, affects from a possible negative impact

due to the shortened course was not captured. Also, quality of life issues were not evaluated. Some trainees mentioned issues with their living quarters that may have negatively affected their performance. Again, affects from this possible negative impact were not measured, either. It may be appropriate to include these two areas as well as others in future research.

Future Research

There are several opportunities for future research in this area. First, validation of the revised research model may provide support for the training effectiveness variable proposed in this study. Additionally, generalizability for the model may be supported by using other occupational training courses in military and civilian settings. With such diversity, further understanding of organization constraints, organization support, and opportunity to perform and their affect on training outcomes may develop (Peters et al., 1988). It may also be beneficial to use this model as a first step in the development of longitudinal approaches to training evaluation to go beyond the traditional pre-post designs (Alliger & Tannenbaum, 1996). Proper planning to follow a trainee's progress before, during, and after training will be required to collect the multiple samples required to identify appropriate trends.

Next, research concerning influences on training effectiveness beyond the focus of the training program and its attributes along with adopting a more global or systems perspective is needed (Tannenbaum & Yukl, 1992). Research to measure the benefits that accrue after training has been completed as well as over the life of the trainee's career are supported in the literature (Parry, 1996). Further, in the Air Force, there is a

shifting paradigm of how and when to provide an officer with training for professional development. With the realization that training and education throughout an officer's career is required, continuous training evaluation is needed in order to ensure appropriate training is provided. Therefore, knowing what to measure, and in what context, is also important.

In addition, through regression analysis, three mathematical equation models were developed to use as prediction models for training outcomes and the training effectiveness variable. Support and validation of these models is needed in future studies. If these models may be used to predict training outcomes and training effectiveness, further variable reduction would enhance training evaluation measurement and produce a more efficient training effectiveness model.

Finally, knowing when to measure the variables concerned with training effectiveness is needed. Bell and Kerr (1987) note that behavior change should be measured from 3 to 23 months after completion of the training program. Alliger et al. (1997) note that utility reaction measurement may be better measured at times other than immediately following training. Research in this area may provide insight on the best time to measure the training effectiveness characteristics posited in this study.

Summary

Lack of training evaluation due to misconceptions may be more harmful than suspected. In the military setting, a captive audience for measurement is presented and offers the perfect opportunity to study the training effectiveness construct. Not knowing whether training is effective is wasteful not only to the trainee, but to the organization for

which the trainee is expected to work. Identifying variables that may be indicative of training effectiveness other than a quantitative performance score may prove to provide the most benefits from training in that supervisors and leadership will be able to have more influence over officers (in the military setting) before, during, and after training. Therefore, having the capability to increase training effectiveness by understanding what to influence would benefit any organization.

Results of this study suggest that certain trainee characteristics, organization characteristics, and training outcomes are pertinent to training effectiveness. On first review, several variables from the original proposed research model could be eliminated. A revised model was presented that more completely supported the characteristics identified as influential to training effectiveness. Identifying these influences on training effectiveness may prove to be beneficial in that organizations may be able to positively affect trainees before, during, and after training, thus increasing training effectiveness. Finally, immediate training outcomes may be more indicative of future performance than was previously thought and deserves future research.

Appendix A

A Study of Training Effectiveness

There has been widespread support for the positive effects in training effectiveness identified by measuring trainee and organization characteristics in civilian and military groups. Within military organizations, research findings have lent support to the importance of measuring training effectiveness to determine certain training courses are meeting their goals. In addition to increased performance there is evidence that immediate measures of training effectiveness may be indicative of the level of training skills that transfer to the work environment.

Considering the body of evidence that touts the influence of trainee and organization characteristics on training effectiveness, it is not surprising that military leaders are interested in the evaluation of training effectiveness to determine whether training provided is appropriate and influential on trainees and their ability to transfer skills learned to the work environment. With this in mind, the Basic Communications Officer Training (BCOT) course was designed to provide training to new Communications and Information Officers to ensure they have a solid foundation in communications and information skills to be successful in the United States Air Force.

However, there is still some question about what to measure to determine training effectiveness. This research will test a proposed model to measure trainee and organization characteristics that may have predicative capability in determining training effectiveness of the BCOT course.

Capt. Grace M. Beck
AFIT/ENV BLDG 640 Box 4019
2950 Hobson Way
Wright-Patterson AFB OH 45433-7765
Email: grace.beck@afit.edu
Phone: DSN 785-3636 ext. 6019, commercial (937) 255-3636 ext. 6019
Fax: DSN 986-4699; commercial (937) 656-4699

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Participation: Participation is VOLUNTARY. No adverse action will be taken against any member who does not participate in this survey or who does not complete any part of the survey.

Anonymity: We would greatly appreciate your participation. Your input is important for us to completely understand your trainee and organization characteristics. **ALL ANSWERS ARE STRICTLY ANONYMOUS.** Thus, your name will not be included anywhere on this questionnaire.

INSTRUCTIONS

- Base your answers on your own thoughts & experiences
- Please print your answers clearly when providing comments
- Make dark marks when asked to use specific response options (feel free to use an ink pen)
- Avoid stray marks and if you make corrections erase marks completely or clearly indicate the errant response if you use an ink pen

MARKING EXAMPLES

Right



Wrong



IDENTIFICATION

As part of this study, we will need to match your responses to the pre-training and post-training surveys, as well as to the final course grade you achieve. In order to do this, we will be asking for part of your social security number. At the end of the data collection period, this information will be discarded from the data to ensure the promised anonymity.

PLEASE ENTER THE LAST 5 DIGITS OF YOUR SOCIAL SECURITY NUMBER BELOW:

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Section I PRE-TRAINING SURVEY

This section asks questions concerning commitment, self-efficacy and motivation. For each statement, please fill in the circle for the number that indicates the extent to which you agree the statement is true. Use the scale below for your responses.

	① Strongly Disagree	② Disagree	③ Slightly Disagree	④ Neither Agree nor Disagree	⑤ Slightly Agree	⑥ Agree	⑦ Strongly Agree
1. When making my best effort, I would be able to discuss Communication and Information (CI) authority and responsibility from the MAJCOM level down to the CI Systems Officer at the base level, including deployed operations and expeditionary aerospace forces.	①	②	③	④	⑤	⑥	⑦
2. The Air Force has a great deal of personal meaning to me.	①	②	③	④	⑤	⑥	⑦
3. This training is really a waste of time.	①	②	③	④	⑤	⑥	⑦
4. I think that I could easily become as attached to another organization as I am to the Air Force.	①	②	③	④	⑤	⑥	⑦
5. When making my best effort, I would be able to explain how to treat Air Force communications systems as weapons systems.	①	②	③	④	⑤	⑥	⑦
6. Generally, I am enthusiastic about learning new things.	①	②	③	④	⑤	⑥	⑦
7. I'm certain I can understand the most difficult material presented in the readings for this course.	①	②	③	④	⑤	⑥	⑦
8. I would be very happy to fulfill a career in the Air Force.	①	②	③	④	⑤	⑥	⑦
9. When making my best effort, I would be able to confidently install, configure, and manage the Windows NT operating system.	①	②	③	④	⑤	⑥	⑦
10. I enjoy discussing the Air Force with those not in the Air Force.	①	②	③	④	⑤	⑥	⑦
11. I'm confident I can understand the basic concepts taught in this course.	①	②	③	④	⑤	⑥	⑦
12. I expect to do well in this training.	①	②	③	④	⑤	⑥	⑦
13. When making my best effort, I would be able to plan and deploy a communications network.	①	②	③	④	⑤	⑥	⑦
14. I do not feel like 'part of the Air Force family'.	①	②	③	④	⑤	⑥	⑦
15. I'm certain I can master the skills being taught in this course.	①	②	③	④	⑤	⑥	⑦
16. When making my best effort, I would be able to configure and manage a UNIX-based network operating system.	①	②	③	④	⑤	⑥	⑦

	① Strongly Disagree	② Disagree	③ Slightly Disagree	④ Neither Agree nor Disagree	⑤ Slightly Agree	⑥ Agree	⑦ Strongly Agree
17. I expect that this training will help me a lot in the future.	①	②	③	④	⑤	⑥	⑦
18. Considering the difficulty of the blocks, the instructors, and my skills, I think I will do well in this course.	①	②	③	④	⑤	⑥	⑦
19. I really feel as if the Air Force's problems are my own.	①	②	③	④	⑤	⑥	⑦
20. I am keen to learn more about the subjects covered in this training.	①	②	③	④	⑤	⑥	⑦
21. When making my best effort, I would be able to discuss the facets of life cycle management from a communications perspective.	①	②	③	④	⑤	⑥	⑦
22. I do not feel a strong sense of belonging to the Air Force.	①	②	③	④	⑤	⑥	⑦
23. When making my best effort, I would be able to successfully manage an Air Force communications project.	①	②	③	④	⑤	⑥	⑦
24. I'm confident I can do an excellent job on the assignments and tests in this training course.	①	②	③	④	⑤	⑥	⑦
25. When making my best effort, I would be able to identify the role of CI officers and civilian professionals within the framework of the Air Force Mission.	①	②	③	④	⑤	⑥	⑦
26. I do not feel 'emotionally attached' to the Air Force.	①	②	③	④	⑤	⑥	⑦
27. When making my best effort, I would be able to identify current communications systems employed to support the US Air Force mission.	①	②	③	④	⑤	⑥	⑦
28. Generally, I prefer to keep away from training courses.	①	②	③	④	⑤	⑥	⑦
29. When making my best effort, I would be able to discuss the facets of network operating systems and the roles and responsibilities of the Network Control Center (NCC).	①	②	③	④	⑤	⑥	⑦
30. I'm confident I can understand the most complex material presented by the instructor in this course.	①	②	③	④	⑤	⑥	⑦
31. When making my best effort, I would be able to describe the Military Satellite Communication systems and explain how commercial satellite systems impact the DOD.	①	②	③	④	⑤	⑥	⑦
32. I believe I will receive an excellent grade in this course.	①	②	③	④	⑤	⑥	⑦
33. Generally, I am keen to take up any learning opportunity offered to me.	①	②	③	④	⑤	⑥	⑦

Section II
BACKGROUND INFORMATION

This section contains items regarding your personal characteristics. These items are very important for statistical purposes. Respond to each item by WRITING IN THE INFORMATION requested or CHECKING THE BOX ☒ that best describes you.

1 Age: _____ years

2. Gender:

Male Female

3. Rank: _____

4. MAJCOM to which you are assigned: _____

5. Total length of service time in the Air Force (include prior enlisted time):
_____ years _____ months

6. If you have prior enlisted service, were you in the communications and information field prior to commissioning?

Yes No

THANK YOU FOR PARTICIPATING

COMMENTS (OPTIONAL)

For future development, please use this section to comment on the survey. Feel free to include any additional comments you have concerning this research or your training experience. Again, your honest and frank response is requested. You may contact me via the e-mail and phone number provided on the cover sheet. Thanks again for your participation.

USE THE BACK OF THIS SHEET IF ADDITIONAL SPACE IS NEEDED
Thank You for your Participation!

Appendix B

A Study of Training Effectiveness

There has been widespread support for the positive effects in training effectiveness identified by measuring trainee and organization characteristics in civilian and military groups. Within military organizations, research findings have lent support to the importance of measuring training effectiveness to determine certain training courses are meeting their goals. In addition to increased performance there is evidence that immediate measures of training effectiveness may be indicative of the level of training skills that may transfer to the work environment.

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INSTRUCTIONS

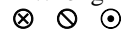
- Base your answers on your own thoughts & experiences
- Please print your answers clearly when providing comments
- Make dark marks when asked to use specific response options (feel free to use an ink pen)
- Avoid stray marks and if you make corrections erase marks completely or clearly indicate the errant response if you use an ink pen

MARKING EXAMPLES

Right



Wrong



IDENTIFICATION

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PLEASE ENTER THE LAST 5 DIGITS OF YOUR SOCIAL SECURITY NUMBER BELOW:

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POST-TRAINING SURVEY

This section asks questions concerning commitment, self-efficacy, training reaction, motivation to transfer, organization support, situational constraints, and opportunity to perform. For each statement, please fill in the circle for the number that indicates the extent to which you agree the statement is true. Use the scale below for your responses.

	① Strongly Disagree	② Disagree	③ Slightly Disagree	④ Neither Agree nor Disagree	⑤ Slightly Agree	⑥ Agree	⑦ Strongly Agree
1. This course was very relevant to my job.	①	②	③		④	⑤	⑥ ⑦
2. My supervisor will encourage me to learn new skills or to try out new ideas.	①	②	③		④	⑤	⑥ ⑦
3. The Air Force has a great deal of personal meaning to me.	①	②	③		④	⑤	⑥ ⑦
4. I will have the opportunity to manage an Air Force communications project.	①	②	③		④	⑤	⑥ ⑦
5. When making my best effort, I will be able to confidently install, configure, and manage the Windows NT operating system.	①	②	③		④	⑤	⑥ ⑦
6. When making my best effort, I will be able to successfully manage an Air Force communications project.	①	②	③		④	⑤	⑥ ⑦
7. I will receive adequate information from other sources (e.g., co-workers, departments, outside companies or agencies, etc.) needed to perform my job well.	①	②	③		④	⑤	⑥ ⑦
8. I really feel as if the Air Force's problems are my own.	①	②	③		④	⑤	⑥ ⑦
9. This course was of great practical value to me for my job.	①	②	③		④	⑤	⑥ ⑦
10. When making my best effort, I will be able to identify the role of CI officers and civilian professionals within the framework of the Air Force Mission.	①	②	③		④	⑤	⑥ ⑦
11. When making my best effort, I will be able to discuss the facets of network operating systems and the roles and responsibilities of the Network Control Center (NCC).	①	②	③		④	⑤	⑥ ⑦
12. I will have the opportunity to develop or use Air Force communications systems as weapons systems.	①	②	③		④	⑤	⑥ ⑦
13. I intend to use what I have learned in this course.	①	②	③		④	⑤	⑥ ⑦
14. I found this course difficult to understand.	①	②	③		④	⑤	⑥ ⑦

① Strongly Disagree	② Disagree	③ Slightly Disagree	④ Neither Agree nor Disagree	⑤ Slightly Agree	⑥ Agree	⑦ Strongly Agree
15. When making my best effort, I will be able to identify current communications systems employed to support the US Air Force mission.	①	②	③	④	⑤	⑥ ⑦
16. There is a shortage of help in my unit.	①	②	③	④	⑤	⑥ ⑦
17. This course was closely related to my job needs.	①	②	③	④	⑤	⑥ ⑦
18. I do not feel 'emotionally attached' to the Air Force.	①	②	③	④	⑤	⑥ ⑦
19. The physical aspects of my unit (e.g., space, lighting, etc.) will be adequate.	①	②	③	④	⑤	⑥ ⑦
20. There are rewards and incentives for acquiring and using new knowledge and skills in one's job.	①	②	③	④	⑤	⑥ ⑦
21. When making my best effort, I will be able to describe the Military Satellite Communication systems and explain how commercial satellite systems impact the DOD.	①	②	③	④	⑤	⑥ ⑦
22. There will be enough time available to complete my job duties as assigned.	①	②	③	④	⑤	⑥ ⑦
23. I will have to opportunity to perform life cycle management on a communications system.	①	②	③	④	⑤	⑥ ⑦
24. I will receive sufficient forewarning to plan my work activities.	①	②	③	④	⑤	⑥ ⑦
25. I do not feel like 'part of the Air Force family'	①	②	③	④	⑤	⑥ ⑦
26. My co-workers will resist new ideas or the use of new work procedures.	①	②	③	④	⑤	⑥ ⑦
27. I will have the opportunity to work as a CI officer.	①	②	③	④	⑤	⑥ ⑦
28. I will have the opportunity to work with current communications systems employed to support the US Air Force mission.	①	②	③	④	⑤	⑥ ⑦
29. I do not feel a strong sense of belonging to the Air Force.	①	②	③	④	⑤	⑥ ⑦
30. CI officers are provided with resources necessary to acquire and use new knowledge and skills.	①	②	③	④	⑤	⑥ ⑦

	① Strongly Disagree	② Disagree	③ Slightly Disagree	④ Neither Agree nor Disagree	⑤ Slightly Agree	⑥ Agree	⑦ Strongly Agree
31. The operating budget in my unit is sufficient to cover the amount of work produced in my unit.					① ② ③ ④ ⑤	⑥ ⑦	
32. I will have sufficient authority to complete the tasks that are assigned to me.					① ② ③ ④ ⑤	⑥ ⑦	
33. I feel very committed to applying what I have learned in this course to my job.					① ② ③ ④ ⑤	⑥ ⑦	
34. This course was very good fun.					① ② ③ ④ ⑤	⑥ ⑦	
35. I will have to opportunity to work at the base level in an aerospace expeditionary force.					① ② ③ ④ ⑤	⑥ ⑦	
36. Administrative rules or policies will hinder my effectiveness on the job.					① ② ③ ④ ⑤	⑥ ⑦	
37. I thought this course was a tough one.					① ② ③ ④ ⑤	⑥ ⑦	
38. When making my best effort, I will be able to explain how to treat Air Force communications systems as weapons systems.					① ② ③ ④ ⑤	⑥ ⑦	
39. I will have the opportunity to work with network operating systems and the Network Control Center (NCC).					① ② ③ ④ ⑤	⑥ ⑦	
40. My unit has prescribed ways of doing things that must be followed.					① ② ③ ④ ⑤	⑥ ⑦	
41. I will have the opportunity to configure and manage a UNIX-based network operating system.					① ② ③ ④ ⑤	⑥ ⑦	
42. The Air Force offers excellent training programs.					① ② ③ ④ ⑤	⑥ ⑦	
43. My job duties and tasks will be scheduled in an efficient manner.					① ② ③ ④ ⑤	⑥ ⑦	
44. I will have the opportunity to plan and deploy a communications network.					① ② ③ ④ ⑤	⑥ ⑦	
45. There is a performance appraisal system that ties rewards to the use of newly acquired knowledge and skills.					① ② ③ ④ ⑤	⑥ ⑦	
46. I think that I could easily become as attached to another organization as I am to the Air Force.					① ② ③ ④ ⑤	⑥ ⑦	
47. I will have adequate supplies (e.g., paper, equipment parts) for performing my job.					① ② ③ ④ ⑤	⑥ ⑦	

① Strongly Disagree	② Disagree	③ Slightly Disagree	④ Neither Agree nor Disagree	⑤ Slightly Agree	⑥ Agree	⑦ Strongly Agree
48. I really enjoyed this course.				① ② ③ ④ ⑤ ⑥ ⑦		
49. I will have to opportunity to install, configure, and manage a Windows NT operating system.				① ② ③ ④ ⑤ ⑥ ⑦		
50. When making my best effort, I will be able to configure and manage a UNIX-base network operating system.				① ② ③ ④ ⑤ ⑥ ⑦		
51. I found this course very hard to follow.				① ② ③ ④ ⑤ ⑥ ⑦		
52. When making my best effort, I will be able to discuss the facets of life cycle management from a communications perspective.				① ② ③ ④ ⑤ ⑥ ⑦		
53. This course was extremely interesting.				① ② ③ ④ ⑤ ⑥ ⑦		
54. The Air Force rewards CI officers for using newly acquired knowledge and skills on the job.				① ② ③ ④ ⑤ ⑥ ⑦		
55. When making my best effort, I will be able to discuss CI authority and responsibility from the MAJCOM level down to the CI Systems Officer at the base level, including deployed operations and expeditionary aerospace forces.				① ② ③ ④ ⑤ ⑥ ⑦		
56. When making my best effort, I will be able to plan and deploy a communications network.				① ② ③ ④ ⑤ ⑥ ⑦		
57. I would be very happy to fulfill a career in the Air Force.				① ② ③ ④ ⑤ ⑥ ⑦		
58. I will have the opportunity to work with the Military Satellite Communication system and commercial satellite systems.				① ② ③ ④ ⑤ ⑥ ⑦		
59. I enjoy discussing the Air Force with those not in the Air Force.				① ② ③ ④ ⑤ ⑥ ⑦		
60. I am keen to apply what I have learned in this course.				① ② ③ ④ ⑤ ⑥ ⑦		
61. I will have adequate equipment (e.g., computers, software) for performing my job.				① ② ③ ④ ⑤ ⑥ ⑦		
62. Time will be made available to me in order to practice new skills or to experiment with different work procedures.				① ② ③ ④ ⑤ ⑥ ⑦		
63. I will have the opportunity to receive adequate educational and/or training experiences necessary to perform my job well.				① ② ③ ④ ⑤ ⑥ ⑦		

THANK YOU FOR PARTICIPATING

COMMENTS (OPTIONAL)

For future development, please use this section to comment on the survey. Feel free to include any additional comments you have concerning this research or your training experience. Again, your honest and frank response is requested. If you have questions or would like a response to a comment, please include your e-mail address or phone number. Any personal information you provide will be immediately destroyed after a response is given to ensure anonymity. Thanks again for your participation.

USE THE BACK OF THIS SHEET IF ADDITIONAL SPACE IS NEEDED
Thank You for your Participation!

Appendix C

Scale Item Summary

<i>Scale Item</i>	<i>Author Reliability</i>	<i>Original Scale</i>	<i>Modified Item</i>
Affective Commitment Scale Items Definition: How much an individual identifies with and is involved with an organization. 1. I would be very happy to spend the rest of my career with this organization. 2. I enjoy discussing my organization with people outside it. 3. I really feel as if this organization's problems are my own. 4. I think that I could easily become as attached to another organization as I am to this one. (R) 5. I do not feel like 'part of the family' at my organization.(R) 6. I do not feel 'emotionally attached' to this organization. (R) 7. This organization has a great deal of personal meaning to me. 8. I do not feel a strong sense of belonging to my organization. (R)	by Meyer and Allen (1984; 1990) alpha = .87	7-point Likert Scale from 1 (strongly agree) to 7 (strongly disagree).	1. I would be very happy to fulfill a career in the Air Force. 2. I enjoy discussing the Air Force with those not in the Air Force. 3. I really feel as if the Air Force's problems are my own. 4. I think that I could easily become as attached to another organization as I am to the Air Force. (R) 5. I do not feel like 'part of the Air Force family'. (R) 6. I do not feel 'emotionally attached' to the Air Force. (R) 7. The Air Force has a great deal of personal meaning to me. 8. I do not feel a strong sense of belonging to the Air Force. (R)
Task-related Self Efficacy Definition: Trainees' beliefs in their ability to perform a specific task	by Robertson and Sadri (1993) alpha = .97 (Version A) and .96 (Version B)	How well performed on a 100-point range	When making my best effort, I would be able to -

<i>Scale Item</i>	<i>Author Reliability</i>	<i>Original Scale</i>	<i>Modified Item</i>
1. Foundations for the CI Officer			- identify the role of CI officers and civilian professionals within the framework of the Air Force Mission.
2. Communications Fundamentals			- identify current communications systems employed to support the US Air Force mission.
3. Computer Fundamentals			- discuss the facets of life cycle management from a communications perspective.
4. Information Assurance			- explain how to treat Air Force communications systems as weapons systems.
5. Network Fundamentals			- discuss the facets of network operating systems and the roles and responsibilities of the Network Control Center (NCC).
6. Network Operation Systems Lab			- configure and manage a UNIX-based network operating system.
7. Network Applications Lab			- confidently install, configure, and manage the Windows NT operating system.
8. Resource Management			- successfully manage an Air Force communications project.
9. Fixed Communications			- discuss CI authority and responsibility from the MAJCOM level down to the CI Systems Officer at the base level, including deployed operations and expeditionary aerospace forces.
10. Space			- describe the Military Satellite Communication systems and explain how commercial satellite systems impact the DOD.
11. Deployable Communications			- plan and deploy a communications network.

<i>Scale Item</i>	<i>Author Reliability</i>	<i>Original Scale</i>	<i>Modified Item</i>
Learning Self-Efficacy Definition: Trainees' beliefs in their ability to learn training material 1. I believe I will receive an excellent grade in this class. 2. I'm confident I can do an excellent job on the assignments and tests in this course. 3. I expect to do well in this class. 4. Considering the difficulty of this course, the teacher, and my skills, I think I will do well in this class. 5. I'm certain I can understand the most difficult material presented in the readings for this course. 6. I'm confident I can understand the basic concepts taught in this course. 7. I'm confident I can understand the most complex material presented by the instructor in this course. 8. I'm certain I can master the skills being taught in this class.	by Pintrich et al. (1993) alpha = .93	7-point Likert scale from 1 (not at all true for me) to 7 (very true for me).	1. I believe I will receive an excellent grade in this course. 2. I'm confident I can do an excellent job on the assignments and tests in this training course. 3. I expect to do well in this training. 4. Considering the difficulty of the blocks, the instructors, and my skills, I think I will do well in this course. 5. I'm certain I can understand the most difficult material presented in the readings for this course. 6. I'm confident I can understand the basic concepts taught in this course. 7. I'm confident I can understand the most complex material presented by the instructor in this course. 8. I'm certain I can master the skills being taught in this course.
Motivation to Learn Definition: Trainee's belief in their motivation to learn in general. 1. Generally, I am enthusiastic about learning new things 2. Generally, I prefer to keep away from training courses (reverse scored)	by Warr, Allen & Birdi (1999) alpha = .76	5-point Likert scale from strongly agree to strongly disagree	1. Generally, I am enthusiastic about learning new things. 2. Generally, I prefer to keep away from training courses (reverse scored).

<i>Scale Item</i>	<i>Author Reliability</i>	<i>Original Scale</i>	<i>Modified Item</i>
3. Generally, I am keen to take up any learning opportunity offered to me			3. Generally, I am keen to take up any learning opportunity offered to me.
4. I am keen to learn more about the subjects covered in this course			4. I am keen to learn more about the subjects covered in this training.
5. I expect that this course will help me a lot in the future			5. I expect that this training will help me a lot in the future.
6. This course is really a waste of time (reverse scored)			6. This training is really a waste of time (reverse scored).
Training Reaction	by Warr, Allen & Birdi (1999)	5-point Likert scale from strongly agree to strongly disagree	
Definition: Reaction to the training course by three categories: enjoyment, perceived usefulness, and perceived difficulty.			
<u>Enjoyment</u>	alpha = .76		<u>Enjoyment</u>
1. I really enjoyed this course			1. I really enjoyed this course.
2. This course was very good fun			2. This course was very good fun.
3. This course was extremely interesting			3. This course was extremely interesting.
<u>Perceived usefulness</u>	alpha = .76		<u>Perceived usefulness</u>
1. This course was very relevant to my job			1. This course was very relevant to my job.
2. This course was of great practical value to me for my job			2. This course was of great practical value to me for my job.
3. This course was closely related to my job needs			3. This course was closely related to my job needs.
<u>Perceived difficulty</u>	alpha = .76		<u>Perceived difficulty</u>
1. I found this course very hard to follow			1. I found this course very hard to follow.
2. I thought this course was a tough one			2. I thought this course was a tough one.
3. I found this course difficult to understand			3. I found this course difficult to understand.
Motivation to Transfer	by Warr, Allen & Birdi (1999) alpha = .79	5-point Likert scale from strongly agree to strongly disagree	

<i>Scale Item</i>	<i>Author Reliability</i>	<i>Original Scale</i>	<i>Modified Item</i>
<p>Definition: The trainee's motivation to transfer skills learned in the training course to the job environment</p> <p>1. I am keen to apply what I have learned on this course</p> <p>2. I intend to use what I have learned on this course</p> <p>3. I feel very committed to applying what I have learned on this course to my job</p>			<p>1. I am keen to apply what I have learned in this course.</p> <p>2. I intend to use what I have learned in this course.</p> <p>3. I feel very committed to applying what I have learned in this course to my job.</p>
<p>Organization Support Items</p> <p>Definition: Perceived policies, practices, and procedures of the organization that demonstrates the importance of training and development efforts.</p> <p>1. There is a performance appraisal system that ties financial rewards to use of newly acquired knowledge and skills.</p> <p>2. This organization offers excellent training programs.</p> <p>3. Employees are provided with resources necessary to acquire and use new knowledge and skills.</p> <p>4. There are rewards and incentives for acquiring and using new knowledge and skills in one's job.</p> <p>5. This organization rewards employees for using newly acquired knowledge and skills on the job.</p>	<p>by Tracey et al. (2001) alpha = .90</p>	<p>5-point Likert scale from strongly agree to strongly disagree</p>	<p>1. There is a performance appraisal system that ties rewards to the use of newly acquired knowledge and skills.</p> <p>2. The Air Force offers excellent training programs.</p> <p>3. CI officers are provided with resources necessary to acquire and use new knowledge and skills.</p> <p>4. There are rewards and incentives for acquiring and using new knowledge and skills in one's job.</p> <p>5. The Air Force rewards CI officers for using newly acquired knowledge and skills on the job.</p>

<i>Scale Item</i>	<i>Author Reliability</i>	<i>Original Scale</i>	<i>Modified Item</i>
Situational Constraints Definition: Perceived situations in the work setting that may limit the trainee using the skills learned in the course. To what extent :	by Mathieu et al. (1992) (alpha = .85) Note: Only 14 of the 16 items were used after reviewing initial response.	7-point Likert scale from "not at all" to "to a very great extent"	
1. Do you receive adequate information from other sources (e.g., co-workers, departments, outside companies or agencies, etc.) needed to perform your job well?			1. I will receive adequate information from other sources (e.g., co-workers, departments, outside companies or agencies, etc.) needed to perform my job well.
2. Do you have adequate equipment (e.g., typewriters, software) for performing your job?			2. I will have adequate equipment (e.g., computers, software) for performing my job.
3. Do you have adequate supplies (e.g., paper, mailing envelopes) for performing your job?			3. I will have adequate supplies (e.g., paper, equipment parts) for performing my job.
4. Is there a shortage of help in your office?			4. There is a shortage of help in my unit.
5. Have you had the opportunity to receive adequate educational and/or training experiences necessary to perform your job well?			5. I will have the opportunity to receive adequate educational and/or training experiences necessary to perform my job well.
6. Is there enough time available to complete your job duties as assigned?			6. There will be enough time available to complete my job duties as assigned.
7. Are the physical aspects of your office (e.g., space, lighting, etc.) adequate?			7. The physical aspects of my unit (e.g., space, lighting, etc.) will be adequate.
8. Are your job duties and tasks scheduled in an efficient manner?			8. My job duties and tasks will be scheduled in an efficient manner.
9. Do you have sufficient authority to complete the tasks that are assigned to you?			9. I will have sufficient authority to complete the tasks that are assigned to me.

<i>Scale Item</i>	<i>Author Reliability</i>	<i>Original Scale</i>	<i>Modified Item</i>
10. Is the operating budget in your office sufficient to cover the amount of work produced in your unit?			10. The operating budget in my unit is sufficient to cover the amount of work produced in my unit.
11. Do administrative rules or policies hinder your effectiveness on the job?			11. Administrative rules or policies will hinder my effectiveness on the job.
12. Do you receive sufficient forewarning to plan your work activities?			12. I will receive sufficient forewarning to plan my work activities.
13. Does your supervisor encourage you to learn new skills or to try out new ideas?			13. My supervisor will encourage me to learn new skills or to try out new ideas.
14. Do your co-workers resist new ideas or the use of new work procedures?			14. My co-workers will resist new ideas or the use of new work procedures.
15. Does your office have prescribed ways of doing things that must be followed?			15. My unit has prescribed ways of doing things that must be followed.
16. Is time made available to you in order to practice new skills or to experiment with different work procedures?			16. Time will be made available to me in order to practice new skills or to experiment with different work procedures.
Opportunity to Perform	by Ford et al. (1992)		
Definition: Task level appraisal of perceived trainee opportunity to perform tasks related to skills/knowledge learned in the course.	alpha = .74	7-point Likert scale from strongly agree to strongly disagree	
1. Foundations for the CI Officer			I will have the opportunity to - - work as a CI officer.
2. Communications Fundamentals			- work with current communications systems employed to support the US Air Force mission.
3. Computer Fundamentals			- perform life cycle management on a communications system.
4. Information Assurance			- develop or use Air Force communications systems as weapons systems.
5. Network Fundamentals			- work with network operating systems and the Network Control Center (NCC).

<i>Scale Item</i>	<i>Author Reliability</i>	<i>Original Scale</i>	<i>Modified Item</i>
6. Network Operation Systems Lab			- configure and manage a UNIX-based network operating system.
7. Network Applications Lab			- install, configure, and manage a Windows NT operating system.
8. Resource Management			- manage an Air Force communications project.
9. Fixed Communications			- work at the base level in an aerospace expeditionary force.
10. Space			- work with the Military Satellite Communication system and commercial satellite systems.
11. Deployable Communications			- plan and deploy a communications network.

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Vita

Captain Grace M. Beck was born in Detroit, Michigan. She graduated from Monroe Jefferson High School in 1986 and entered the Air Force in 1988. She served ten years in the enlisted corps as a Secure Communications Systems Maintenance Specialist serving at Clark Air Base, Philippines; Malmstrom Air Force Base, Montana; and Goodfellow Air Force Base, Texas. She was accepted into the Airman Education and Commissioning Program in 1996 and completed her Bachelor of Science degree in Computer Science in 1998 from Angelo State University in San Angelo, Texas. Upon graduation, she attended Officer Training School at Maxwell Air Force Base, Alabama, and was commissioned as a second lieutenant in November 1998.

Captain Beck's first officer assignment was to MacDill Air Force Base, Florida, where she served as Deputy Flight Chief, Plans and Programs Flight, 6th Communications Squadron. In January 1999, she was selected to serve at United States Central Command (US CENTCOM) as the Commander-in-Chief's (CINC) Communications Team's Officer-in-Charge providing all deployed communications for the CINC, US CENTCOM, and his support team.

In August 2003, Captain Beck entered the Information Resource Management program at the Graduate School of Engineering and Management, Air Force Institute of Technology, Wright-Patterson Air Force Base, Ohio. Upon graduation, she will be assigned as an instructor in the Expeditionary Communication Officer Training Flight in the 333d Training Squadron, Keesler Air Force Base.

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14. ABSTRACT In 1998, the Aerospace Communications and Information Expertise (ACE) program was implemented to provide a common operational foundation for new Air Force Communications and Information officers. Training's crucial role in providing Air Force effectiveness and efficiency in the officer corps is demonstrated by the formal training courses new officers are required to attend for instruction in their jobs. The importance of training, and subsequent training evaluation, is evident for two significant reasons: the skills required by Air Force Communications and Information officers and the amount of investment in training. Investment in training includes money, time, equipment, and any other significant factor that contributes to training and education of personnel in order for them to acquire the knowledge, skills, and attitudes needed to perform their job. While training and training evaluation research is progressing, there is still a lack of training evaluation as well as training effectiveness methodologies at this time. By developing and testing an appropriate training effectiveness model that will aid in determining whether or not training is effective; this research seeks to aid in increasing effectiveness of BCOT..					
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