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The Effectiveness Of Homeland Security Training For Rural Communities: A Comparative Analysis Of Web-Based And Instructor-Led Training Delivery

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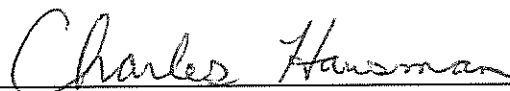
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THE EFFECTIVENESS OF HOMELAND SECURITY TRAINING FOR RURAL
COMMUNITIES: A COMPARATIVE ANALYSIS OF WEB-BASED AND
INSTRUCTOR-LED TRAINING DELIVERY

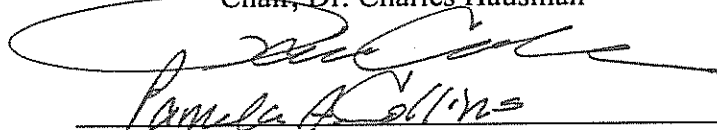
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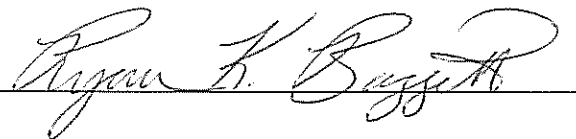


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COMMUNITIES: A COMPARATIVE ANALYSIS OF WEB-BASED AND
INSTRUCTOR-LED TRAINING DELIVERY

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DOCTOR OF EDUCATION
August, 2012

DEDICATION

I dedicate this work to my sons, Benjamin Ryan Baggett and Samuel Landon Baggett. It is my hope that you will always remember Gandhi's quote, "Live as if you were to die tomorrow. Learn as if you were to live forever." Always set your goals as high as you can, and work hard to achieve them. God will always see you through and has blessed me with both of you. I love you both very much!

-Daddy

P.S. We can play now!

ACKNOWLEDGMENTS

Throughout life, we each meet many people who play a role in helping us transform into the human beings we ultimately become. While it would be impossible to list all of the people who have played roles in my life, I would simply like to say “thank you” for playing a part. However, there are some specific folks I would like to recognize.

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Last, I would like to thank my committee and especially my chair, Dr. Charlie Hausman, for his calm demeanor, unending patience and overall support. Even in times of personal loss, he continued to push forward with me on this journey. Next, Dr. Debbie West exemplifies the concept of “pay it forward” and while details are not important on this document, know that I will never forget your efforts! Additionally, although our interactions were very limited prior to the dissertation, Dr. Jessica Hearn jumped right into the process and was always very flexible and upbeat. Last, I would like to thank my mentor and friend, Dr. Pam Collins. Words are difficult to express the immense admiration and gratitude that I have for you. You have supported me and my endeavors for the last twelve years and I hope to work with you for many more. My sincere gratitude to all of these remarkable academicians!

ABSTRACT

The development of advanced training technologies such as Web Based Training (WBT), coupled with the proliferation of computer and Internet availability, has increased training opportunities for rural communities. This advancement is critical to meeting the training needs of emergency response personnel in rural communities who routinely face the challenge of providing continuous services to their community with limited resources. Despite the perceived convenience of WBT for emergency responders, little research has been conducted in homeland security on the knowledge acquisition of those who are trained using an electronic medium as compared to those in a traditional, Instructor-Led Training (ILT) delivery.

For purposes of this study, data from two U.S. Department of Homeland Security (DHS) courses (each offering both a WBT and ILT version) were analyzed. Through the participant data from these nationally delivered awareness and management level courses, a comparative analysis was conducted to determine if significant differences existed between the delivery modalities. Results indicate that while ILT provided greater learner outcomes on course examinations, each modality was effective in increasing both gain scores and producing satisfactory scores on the course posttest. The findings can be used to further plan and develop strategies for training this nation's rural responders, especially in light of budget and human resource deficits.

KEYWORDS: Web Based Training (WBT), Instructor Led Training (ILT), Homeland Security, Small and Rural Communities

TABLE OF CONTENTS

CHAPTER	PAGE
I. INTRODUCTION	1
Problem Statement	2
Rationale for the Study	4
Purpose of the Study	5
Methods.....	6
Web-Based Training Research Overview.....	9
Definition of Terms.....	15
II. LITERATURE REVIEW	17
Training Defined.....	18
Instructor-Led Training (ILT)	19
Web-Based Training (WBT).....	21
Training the Adult Learner	28
Training the Homeland Security Practitioner	31
Evaluating Training Effectiveness.....	37
Effectiveness of Web-Based Training	42
Effectiveness of Web-Based Training as Compared to Instructor-Led Training.....	44
III. METHODS	48
Background of Study	48
Research Questions and Hypotheses	48
Research Design	49
Context of the Study / Site Selection	51
Sample / Participants	52
Variables and Measures	53
Data Collection	54
Data Analysis	55
Limitations of the Study.....	56
IV. RESULTS	58
Introduction	58
Demographic Information	59
Differences in Learner Outcomes Between WBT and ILT	61
Differences in Learner Outcomes of WBT and ILT Between Disciplines.....	64

	Differences in Learner Outcomes of WBT and ILT Between FEMA Regions	74
V.	DISCUSSION	83
	Overview of the Context and Sample	84
	Overview of Research Methods	85
	Interpretation of Major Findings	85
	Implications for Practice	94
	Implications for Policy	96
	Implications for Future Research	98
	Summary and Reflections	100
	LIST OF REFERENCES	102
	APPENDIXES	112
	A: FEMA Registration Form	112
	B: AWR 148 Pretest Instrument	114
	C: AWR 148 Posttest Instrument	118
	D: MGT 335 Pretest Instrument	122
	E: MGT 335 Posttest Instrument	127
	VITA	132

LIST OF TABLES

TABLE		PAGE
3.1	Sample Size.....	52
4.1	Participant Course Information.....	59
4.2	Participant Region Information.....	60
4.3	Participant Discipline.....	60
4.4	Independent Sample t-Test: AWR 148 and Gain Scores.....	62
4.5	Independent Sample t-Test: AWR 148 and Posttest Scores.....	62
4.6	Independent Sample t-Test: MGT 335 and Gain Scores.....	63
4.7	Independent Sample t-Test: MGT 335 and Posttest Scores.....	64
4.8	Pretest Scores: AWR 148 ILT – By Discipline.....	65
4.9	ANOVA: Disciplines and AWR 148 ILT Posttest Scores.....	65
4.10	ANOVA: Disciplines and AWR 148 ILT Gain Scores.....	66
4.11	Bonferroni Method: Disciplines and AWR 148 ILT Gain Scores.....	66
4.12	Pretest Scores: AWR 148 WBT – By Discipline.....	68
4.13	ANOVA: Disciplines and AWR 148 WBT Posttest Scores.....	68
4.14	ANOVA: Disciplines and AWR 148 WBT Gain Scores.....	69
4.15	Pretest Scores: MGT 335 ILT – By Discipline.....	69
4.16	ANOVA: Disciplines and MGT 335 ILT Posttest Scores.....	70
4.17	Bonferroni Method: Disciplines and MGT 335 ILT Posttest Scores.....	70
4.18	ANOVA: Disciplines and MGT 335 ILT Gain Scores.....	71
4.19	Bonferroni Method: Disciplines and MGT 335 ILT Gain Scores.....	72
4.20	Pretest Scores: MGT 335 WBT – By Discipline.....	73
4.21	ANOVA: Disciplines and MGT 335 WBT Posttest Scores.....	73
4.22	ANOVA: Disciplines and MGT 335 WBT Gain Scores.....	74
4.23	Pretest Scores: AWR 148 ILT – By Region.....	75
4.24	ANOVA: Regions and AWR 148 ILT Posttest Scores.....	76
4.25	Bonferroni Method: Regions and AWR 148 ILT Posttest Scores.....	76
4.26	ANOVA: Regions and AWR 148 ILT Gain Scores.....	77
4.27	Bonferroni Method: Regions and AWR 148 ILT Gain Scores.....	77
4.28	Pretest Scores: AWR 148 WBT – By Region.....	78
4.29	ANOVA: Regions and AWR 148 WBT Posttest Scores.....	79
4.30	ANOVA: Regions and AWR 148 WBT Gain Scores.....	79
4.31	Pretest Scores: MGT 335 ILT – By Region.....	80
4.32	ANOVA: Regions and MGT 335 ILT Posttest Scores.....	80
4.33	ANOVA: Regions and MGT 335 ILT Gain Scores.....	81
4.34	Pretest Scores: MGT 335 WBT – By Region.....	81
4.35	ANOVA: Regions and MGT 335 WBT Posttest Scores.....	82
4.36	ANOVA: Regions and MGT 335 WBT Gain Scores.....	82

LIST OF FIGURES

FIGURE	PAGE
2.1 Application of the CIPP Model to WBT.....	39
2.2 Application of the CIPP Model to Dissertation Study.....	39
2.3 IPO Model Framework	40
3.1 FEMA Regions	53

LIST OF ACRONYMS

ANOVA	Analysis of Variance
ARPA	Advanced Research Projects Agency
ASTD	American Society for Training and Development
AWR	Awareness Level Course
CBT	Computer Based Training
CDP	Center for Domestic Preparedness
CIPP	Context, Input, Process and Product Model
CY	Calendar Year
DHS	United States Department of Homeland Security
EKU	Eastern Kentucky University
EMI	Emergency Management Institute
EMS	Emergency Medical Services
EMT	Emergency Medical Technician
FEMA	Federal Emergency Management Agency
FLETC	Federal Law Enforcement Training Center
ILT	Instructor Led Training
IPO	Input, Process and Output Model
ISP	Independent Study Program
IT	Information Technology
LETN	Law Enforcement Television Network
LMS	Learning Management System
MGT	Management Level Course
NDPC	National Domestic Preparedness Consortium
NPS	Naval Postgraduate School
NTED	National Training and Education Division
NSF	National Science Foundation
OJT	On-The-Job Training
RDPC	Rural Domestic Preparedness Consortium
ROI	Return On Investment
SATNET	Satellite Network
WBT	Web Based Training

CHAPTER I

INTRODUCTION

Training and development describes the formal, ongoing efforts of organizations to improve the performance and self-fulfillment of their employees through a variety of methods and programs. The provision of effective training can potentially increase an individual's job knowledge and skills and may also lead to higher retention rates within companies (Ittner & Larcker, 2003), increased morale among employees (Rothwell, 2008), and higher productivity on organizational tasks and goals (Erickson, Noonan & McCall, 2012; Kress, Sharon & Bassan, 1981; Lim & Morris, 2006).

Despite the outlined benefits for employee training, companies are looking for more cost-effective methods in which to provide training opportunities as the United States' economic climate continues to suffer. In spite of unpredictable financial times, the training industry continues to be a multi-billion dollar endeavor with the American Society for Training and Development's (ASTD) *State of the Industry Report* (2011) estimating that U.S. organizations spent approximately \$171.5 billion on employee learning and development in 2010. Within this research, a consistent upward trend in technology-based delivery methods was noted with e-learning accounting for approximately 30% of learning content made available. E-learning includes a wide variety of technological tools that are web-based, web-distributed or web-capable for the purposes of education or training. Additionally, formats such as simulations, instructional games, and social networking sites are also becoming more widely used for learning (Paradise, 2008).

The advancement of new technologies, coupled with the affordability of last-generation technologies, has invigorated interest in distance learning that has undoubtedly impacted course delivery modalities. Researchers have identified a growing list of reasons for the adoption of e-learning to include: increased access to training, accommodation of learning styles which allow learners to complete the training at their own pace, flexibility with regards to taking the course, and improving the cost effectiveness of training by eliminating the need to travel for training opportunities (Gruca, 2010; Ho & Kuo, 2010; Merlino, 2010). This interest can be seen in several diverse areas such as academia, federal, state, tribal and local governments, and the private sector.

One specific community that has capitalized on the growth of e-learning has been those in emergency response. Specifically, the community consists of those individuals in federal, state, local, tribal, and nongovernmental agencies who work to protect and preserve life, property, evidence and the environment on a continuous basis across the United States. With an increased funding priority on preparedness in the United States in the 21st century, numerous training opportunities currently exist for the response community.

Problem Statement

Several studies have been completed in the past decade comparing the effectiveness of e-learning to traditional (face-to-face or Instructor-Led Delivery) deliveries (Coppola & Myre, 2002; Crews, Jinwei, Ming, Nunamaker & Burgoon, 2007; Platz, Liteplo, Hurwitz, & Hwang, 2011). Unfortunately, a dearth of comparative data in

this area regarding the homeland security community is available. This information deficiency indicates a lack of scholarly research and pedagogy on whether e-learning training is an effective method for training emergency responders on homeland security topics as compared to traditional, lecture-based or face-to-face training. Additionally, despite the federal funding available for homeland security since the tragic events of September 11, 2001, the level of responder preparedness is still largely unknown (Caruson & MacManus, 2007). While researchers seek answers to this vast question, significant attention must be paid to the provision of effective training. However, the majority of training that is developed and delivered in this country has been designed for larger, urban communities (Schafer, Burruss & Giblin, 2009).

Since the formation of the Department of Homeland Security (DHS) in 2002, the essential role of small and rural municipalities in providing for America's homeland security has been reinforced repeatedly by government officials, policy makers, and professional organizations (Ball, 2005; Caruson, MacManus, Kohen & Watson, 2005). Rural communities have a responsibility to provide a range of services at the local level, including, general protection services of life and property, first response to critical incidents, special event security, and public alert and notification (Friedmann & Cannon, 2007). With the majority of responders in this country coming from an agency with a small number of responders, these services may be more difficult to provide when compared to their urban counterparts (Falcone & Weisheit, 1999). In fact, nearly 90% of municipal law enforcement agencies employ fewer than 50 sworn personnel; almost half (45.5%) employ nine or fewer sworn officers (Hickman & Reaves, 2006). Similarly,

71% of all firefighters in the United States provide those services on a volunteer basis (Karter & Stein, 2010). Small agencies operate with limited organizational complexity (Crank, 1990), assigning the overwhelming majority of personnel, even supervisors and top executives, to line functions (Hickman & Reaves, 2006; Langworthy, 1983). In addition, small agencies face the added challenge of providing employees with adequate training opportunities (Weisheit et al., 1999), particularly in response to emergent public safety concerns such as homeland security.

Rationale for the Study

The following study is significant in that it not only adds to a growing body of knowledge on the effectiveness of e-learning, but it also provides information on the effectiveness of technology-assisted training for small and rural emergency response communities. The information provides further data regarding perceived differences in student achievement and performance in diverse learning environments. While several existing studies compare training modalities, there is a lack of studies that specifically examine training for the rural homeland security community.

There are two primary audiences for this research. First, there are homeland security leaders, who are often confronted with issues of training costs and accessibility. For this audience, studies such as this provide the information necessary to make informed decisions regarding the appropriate training modality for their employees. Related, it is anticipated that homeland security practitioners and volunteers in rural communities will also have a keen interest in the findings to determine what type of training modality may best suit their specific needs.

The second audience for the research is the training developers and instructors who are charged with delivering high quality, timely, and effective training to this nation's response communities. This audience may find the results useful in determining what types of courses can be integrated into a technological framework. If apparent, discrepancies between training modality and student achievement can possibly be mitigated in an effort to augment student success. Related, by gaining an understanding of training effectiveness, policy makers at various levels of government may use this information to better disperse training dollars to rural communities. As outcomes assessment has become an integral part of funding requirements, governments and training entities are being held accountable to provide evidence-based data concerning learning outcomes (Komives & Schoper, 2006). Given the existing anecdotal comparisons made between training modalities in homeland security, both audiences may benefit from the study.

Purpose of the Study

The purpose of this quantitative study is to determine whether Web-Based Training (WBT) represents a viable training option for homeland security responders in rural communities. The study is designed to identify whether differences in training modality affect knowledge obtainment across diverse disciplines and geographic locations. Specifically, are there significant differences in learning outcomes between two sections of the same course, one taught asynchronously online (WBT) and one taught using the traditional modality of Instructor-Led Training (ILT).

The research questions for this study were as follows:

1. Are there differences in learner outcomes between the Web-Based Training group and the Instructor-Led Training Group?
2. Are there differences in learner outcomes of students taught by Web-Based Training or Instructor-Led Training between disciplines?
3. Are there differences in learner outcomes of students taught by Web-Based Training or Instructor-Led Training between Federal Emergency Management Agency (FEMA) regions?

From these research questions emerged several null hypotheses:

1. There are no significant differences in gains from the pre and posttest scores or final posttest scores between the WBT and the ILT groups.
2. The participant's discipline does not affect the gain or final scores from either the WBT or ILT courses.
3. The participant's geographic location does not affect the gain or final scores of either the WBT or ILT courses.

Methods

The study utilizes secondary data analysis to compare knowledge obtainment between two different modes of instruction within two different courses. This section briefly elaborates the research design, population, sampling, courses, instrumentation, study procedures, and concludes with a discussion of the data analysis. A more detailed elaboration of the methods is found in Chapter Three.

Within this study, there are two courses under examination, AWR 148 “Crisis Management for School-Based Incidents” and MGT 335 “Event Security Planning for Public Safety Professionals.” Both courses, one an awareness level course (AWR) and the other a management level course (MGT), were developed by the Rural Domestic Preparedness Consortium (RDPC) with funding from the U.S. Department of Homeland Security (DHS). DHS defines awareness level courses (AWR) as those designed for responders who require the skills necessary to recognize and report a potential catastrophic incident or who are likely to witness or investigate an event involving the use of hazardous and/or explosive devices. Additionally, management level courses (MGT) are defined by DHS as those designed for managers who build plans and coordinate the response to a mass consequence manmade or natural event (DHS National Training and Education, 2011). Both courses have an ILT component, with the AWR ILT lasting eight hours and the MGT ILT lasting 16 hours, as well as a WBT component.

The study implements a comparison group pretest/posttest design, which is a common quasi-experimental design. The design includes studies where subjects cannot be randomly assigned to either the experimental or the control group. Participants in this study self-selected the modality in which they registered with no direction from the researcher or the training entity. Participants are U.S. residents who have participated in U.S. Department of Homeland Security (DHS) training during CY 2010 and 2011. The participants work in one of the four disciplines of law enforcement, fire service, emergency management and emergency medical services. Additionally, the participants are from geographically diverse areas of the United States and territories.

The primary instrumentation for the study is the DHS registration form that provides demographic information and the pre and posttests that measure knowledge obtainment. The examinations consisted of 15 or 20 multiple choice questions (depending on course) with randomized ordering of questions marking the difference between the pre and post questions; however, the participants were not made aware of this commonality. In the ILT groups, the pretest was administered just prior to each training session with the same instructions given in each course. With regards to the WBT groups, all tests are administered through the Learning Management System (LMS) with the platform randomizing the questions for each participant.

The independent variable for research question one of this study is the mode of delivery (ILT or WBT). The ILT groups received in-person training in locations throughout the United States. The WBT groups conducted all training and administrative activities online through a LMS. The dependent variables for research question one is the gain scores (the amount of increase between the pre and post test scores) as well as the final score of competency in the course, the posttest score. These test items serve as the operational definitions of the learning outcomes or instructional objectives that guided the development of both modes of instruction.

Next, the two training courses under investigation for this study were developed for multiple homeland security related disciplines. The second research question investigates whether any differences in learner outcomes of students in the modalities exist between disciplines. The independent variables for this question are disciplines with the dependent variable being gain scores and final posttest scores.

Further, the last research question examines potential differences in learner outcomes by modality (WBT or ILT) and course level (AWR or MGT) between the ten FEMA regions. For this question, the independent variables will be the FEMA regions, which will be grouped in three categories of east, central, and west. To facilitate disaster preparedness and response, FEMA has organized its field offices into ten geographically dispersed regions. Student data from these regions will be analyzed to determine if there are any differences in the dependent variables, gain scores and final posttest scores.

The data were analyzed using IBM SPSS Statistics, version 19.0. First, the researcher extracted descriptive statistics of the data, including mean and standard deviation of the pre and post test scores. Likewise, descriptive statistics for geographic location, participant discipline and other demographics were examined. To determine if statistically significant differences within the three research questions exist, the researcher conducted a series of independent sample t-tests as well as Analysis of Variance (ANOVA) tests.

Web-Based Training Research Overview

By the year 2030, it is anticipated that one in five Americans will reach the retirement age, which will leave a group of Generation X, Y and Millennials to comprise the majority of this country's workforce (Garrity, 2010). With this younger workforce, a greater emphasis on e-learning training methods that leverage technology and the internet will likely be utilized. A variety of research has shaped the direction and advancements in the area of e-learning. This field continues to evolve, but generally refers to the technologies for tracking and managing training, applications that assist in authoring and

managing content, and a host of collaboration and knowledge management applications (Repetto & Trentin, 2011). The following section, focusing on Web-Based Training (WBT) – a subset of e-learning, will provide a high level overview to further explain the context and overall need for the current research. Specifically, this section will include a brief history of WBT and overview studies which examine the effectiveness of WBT as well as those that examine the effectiveness of WBT as compared to traditional or ILT training. It should be noted that additional detail and context will be provided in Chapter Two of this study.

History of Web-Based Training

The advancement of technologies such as the printing press, radio, and television, has paved the way for other technologically-based training modalities such as web-based training. One example of this progress includes the Open University of the United Kingdom, which in 1969 included broadcasts and recorded materials in early multimedia courses (Matthews, 1999; Sumner, 2000). The period from 1985 to 1995 marked the widespread arrival of the computer and the inauguration of e-learning in the United States with universities beginning to experiment with electronic bulletin boards, electronic chat, and electronic mail. These communication options have transitioned from one way communication (from instructor to student) to interactive discussions between classmates (Dilbeck, 2008).

As technology advanced, distance education and training has become more widespread and accepted within both the public and private sector. With regards to higher education, the National Center for Education Statistics reports that from 2000 to

2008, the percentage of undergraduates enrolled in at least one distance education class expanded from 8 percent to 20 percent, and the percentage enrolled in a distance education degree program increased from 2 percent to 4 percent. Of these enrollments, 81 percent were reported in online courses (Radford, 2011).

With regards to training, the American Society for Training and Development (2010) reported an increasingly large proportion of e-learning comprising online learning (self-paced and instructor-led online learning). In 2009, approximately 28 percent of all formal learning hours made available were online, an increase from 23 percent in 2008. The growth of online learning supported the increase in technology-based delivery methods and now represents more than three-quarters of the technology-based learning available.

Effectiveness of Web-Based Training

Several recurring themes surface when reviewing literature on the effectiveness of WBT. First, with regards to course completions, the literature asserts that completion rates of e-learning courses are not as high as more traditionally administered training (Welsh, Wanberg, Brown & Simmering, 2003). Additionally, the importance of ensuring that individuals feel that the course is directly relevant to their needs and job responsibilities influences participation and completion of the WBT modules is emphasized (Brink, Munro & Osborne, 2003). A 2011 study by Rossett and Marshall found that barriers to effective web-based training continued to be funding, especially in light of the current economic recession. Other familiar concerns that challenged WBT

effectiveness were technology shortcomings and a general preference for the traditional classroom.

Further, with regards to technology or technical skills shortcomings, Welsh et al. (2003) found that lower levels of computer efficacy were related to lower learning outcomes. This was further indicated by evidence from the education field. Specifically, those with a higher computer efficacy felt more in control of their learning and were more willing to take risks (Bonk & Wisner, 2000). Next, some participants reported isolated and lonely learning in this medium due to the lack of a shared physical space with other trainees and the instructor (Horton, 2000). Finally, some research indicates that employers feel that WBT is more effective for harder technical skills, such as IT, than softer interpersonal skills (Beamish *et al.*, 2002). However, Welsh *et al.*, (2003) refers to research that suggests a different possibility that WBT works most effectively for short courses with less technical content.

Effectiveness of Web-Based Training as Compared to Instructor-Led Training

As previously noted, a variety of studies have been conducted in an effort to compare WBT and ILT. While the comparison aspect of this research is similar the subject areas of the courses/training are widely diverse. This section will highlight several of those studies with additional review of the studies is provided in Chapter Two.

First, several studies indicate an equivalent level of learning between online and classroom based instruction. In 2002, Neuhauser compared two sections of the same 15 week academic course, one online and the other classroom-based. The author found no significant differences between learning preferences and styles and grades in either group

leading the author to the conclusion that equivalent learning activity can be equally effective for online and face-to-face learners. Related, with regards to findings, Nichols, Shaffer & Shockey (2003) compared web-based and traditional delivery modalities in Freshman English composition courses. Their research showed that measures of student learning and student satisfaction were comparable for online and in-class instruction. With regards to training (as opposed to formal education), Crews et al. (2007) examined a training course on deception in online and classroom-based instruction. The authors concluded that the training curriculum significantly improved the accuracy of human deception in the online training as effectively as the instructor-led, lecture-based training.

Further, other countries are also comparing the training effectiveness between the two modalities. One example of this international comparison comes from a 2011 study in England, Northern Ireland and Wales. In these countries, thousands of examiners are employed to evaluate tests from various examinations offered to students during the education phases. All examiners undergo training to ensure that they interpret correctly, and apply consistently, the mark scheme for their particular exam. Traditionally this training has been delivered face-to-face, but several benefits of an online training environment led to the authors to a quantitative study. In short, the 89 participants were evaluated on marking accuracy and consistency. The findings suggested that both modes of training had comparable, statistically significant positive effects on examiners' accuracy and consistency. The results indicate that online training may be an effective alternative to face-to-face training for the purposes of standardizing examiners' marking (Chamberlain & Taylor, 2011).

Despite the studies showing advantages to both modalities, several studies indicated significant differences between the WBT and ILT groups. Gaither (2009) examined differences between WBT and ILT in a retail business setting. Her mixed methods approach found no differences in the perception of training effectiveness based on training modality. However, the study results indicated the participants demonstrated a preference for traditional training over e-learning training. Similarly, Teolis (2003) examined horticultural instruction at a community college and determined that while scores were not significantly different between the online and classroom groups, the preference for traditional classroom instruction was prevalent among both groups for horticultural instruction.

Lastly, while most research focused on performance and attitudes, several studies focus on other aspects of the comparison which further advances the pedagogy of instruction in education and training. For example, Stuart (2003) utilized a qualitative approach and focused on the relationship between the use of and beliefs regarding instructional strategies in classroom and online instruction and described in terms of patterns in the behaviors and beliefs of the instructor. Stuart identified tensions in the instructor's behaviors and beliefs, identified the multiple levels of converting a face-to-face course to an online course, and noted several strategies for online instruction based on the comparison.

Definition of Terms

Asynchronous Learning: A learning event where interaction is delayed over time. This delay allows learners to participate according to their schedule and also allows for a geographic separation from the instructor.

E-learning: A term covering a wide variety of technological tools that are either Web-based, Web-distributed or Web capable for the purposes of education or training.

Instructor-Led Training: Usually refers to a traditional classroom setting where training is delivered in a physical location led by an instructor, with or without additional participants in the class. This term is used synonymously with on-site training and classroom training.

Interactivity: There are two types of interactivity, indicative and simulative. Indicative interactivity is typified by the use of button rollovers and site navigation. Simulative interactivity is interactivity that enables students to learn from their own choices in a way that provides some form of feedback.

Internet: An international network developed by the U.S. government and first used to connect education and research networks. The Internet now provides communication and application services to an international base of businesses, consumers, educational institutions, governments, and other organizations.

Learning Management System (LMS): A collection of eLearning tools available through a shared administrative interface.

Mixed-mode/Blended/Resource-Based Learning: These terms interchangeably describe an approach to education that combines face to face and distance approaches to

education in that an instructor or tutor meets with students (either in a face to face mode or through a technological means) and a resource-base of content materials and learning activities are made available to students. In addition, some eLearning approaches might be used.

Synchronous Learning: A real-time, instructor-led event in which all participants participate at the same time and communicate directly with each other. This learning may occur in a classroom setting and/or through technology.

Web-Based Training: A term to describe the delivery of educational / training content through a web browser over the Internet, a private intranet, or an extranet.

CHAPTER II

LITERATURE REVIEW

Advances in information technology, coupled with the changes in society, have created a new paradigm for training. Participants, from the perspective of this new training paradigm, require rich learning environments supported by well-designed resources (Khan & Reigluth, 1993; Pawlyn, 2012). The prevalence of Information Technology (IT) applications for teaching and learning has captured the interest and attention of academic and other public and private organizations. The ability to share information (experiences and competencies) through web based communications allows for the rapid dissemination of knowledge. As noted in Belanger (1996), “The question is no longer whether adult learning is needed, and how important it is. The issue today is how to respond to this increasing and diversified demand, how to manage this explosion” (p. 21). This chapter will overview the literature and begins with an overview of training, focusing on the distinction between Instructor-Led Training (ILT) and Web-Based Training (WBT). In describing these training approaches, advantages and disadvantages will be identified. Following the delineation between WBT and ILT, the characteristics of an adult learner and homeland security practitioners (as they apply to WBT) will be provided. Further, training effectiveness will be explored with an emphasis on both evaluating training using the Kirkpatrick Model and a systems approach. Finally, a review of the existing literature regarding the effectiveness of WBT will be provided as well as a review of studies that compare WBT to ILT.

Training Defined

The ultimate goal of training is the subsequent learning by its intended audience. Learning is defined as the acquisition of knowledge or skills through experience, practice, or study, or by being taught. In this pursuit of knowledge or skills, many different strategies and techniques can be employed that each culminates with differing skills and knowledge. For purposes of this study, training will be defined as “The action of teaching a particular skill or behavior” (Training, 2011, p.8). Historically, training was practiced through guilds with children and young adults being apprenticed to a master craftsman and working under him in order to learn the trade. This was considered the proper method of learning for the lower and middle classes. With training, a primary goal is to create a change in learners that they consistently reproduce without variation. Through intense training, the learner becomes increasingly able to reproduce the learned behavior with fewer errors, greater speed, and under more demanding conditions.

Bartley and Golek (2004) noted that modern training approaches consist of multiple modalities to include, but not limited to: classroom-based training, e-learning (web- and computer-based training), one-on-one study and self-study. Organizations are encouraged to determine the best training approaches for the specific subject matter and the intended audience. In determining training approaches, several classification methods have been developed. A concise method of training classification was developed by Swanson and Dobbs (2006) in their structured and unstructured framework. From a macro perspective, structured training is highly planned and unstructured has no plan. Structured training includes traditional classroom-based training and e-learning, with

unstructured training including methods such as organizational learning and informal learning. In an effort to further define structured training approaches, both instructor-led and web-based approaches to training will be explored.

Instructor-Led Training (ILT)

ILT training has been the predominant form of training in the United States since its formation. Common approaches to ILT include the use of a classroom (both on and off-site), structured On-the-Job Training (OJT), and learning teams. ILT also may be delivered in an interactive workshop format with an opportunity for learners to collectively practice and/or discuss the knowledge or skills introduced. It should be noted that face-to-face instruction can also be accomplished through video teleconferencing between the instructor and the student in a real-time format. While these approaches may utilize various forms of media and technology (video, presentation software, etc.), the primary method of information dissemination is through a face-to-face encounter with the instructor. Instructors can also be referred to as a facilitator, who may be knowledgeable and experienced in the learning material, but can also be used more for their facilitation skills and ability to deliver material to learners.

Potential Advantages of ILT

One primary advantage of ILT is that it allows for real-time feedback and interaction during the information dissemination process. Kapp and McKeague (2002) noted that ILT is a highly effective mechanism for teaching problem-solving skills due to the fact that learners can directly exchange information between their classmates and the instructor. The ability for a collective class to further develop concepts as they are

introduced in a group setting is beneficial to developing a deeper understanding of the course content.

An additional advantage is the instructor's ability to employ the appropriate teaching techniques based on class size, knowledge obtainment level, and subject matter. The learner-centric model allows the instructor to provide additional examples, assign supplemental readings to assist with understanding and re-emphasize certain points based on the needs of the learners in that particular course. Without the face-to-face contact available in ILT, customization based on user needs and existing knowledge is difficult. Despite the advantages provided, ILT also has several disadvantages.

Potential Disadvantages of ILT

While ILT allows for the instructor to meet the needs of learners on an individual basis, this also may result in the lack of instructional consistency. While course learning objectives may clearly identify the course material to be covered, time is a significant factor in delivering content. If the instructor continues to discuss a given topic so that all learners understand it fully, it is likely that other important topics will not be covered during the allocated timeframe. While a few students are assisted in the reinforcement of concepts, the other students (who did not need remediation) suffer as a result. Time also plays a role in the ability to share ideas and experiences with the class in that a student may monopolize the time period resulting in a lack of content dissemination. For this reason, it is imperative for course developers and instructors to carefully schedule the course with built-in discussion points.

Additionally, the size of a classroom may heavily influence the ability for interaction between the students and instructor. Unfortunately, the most utilized instructional technique used in a large classroom environment is lecture. The lecture structure reduces the quality of participation with students focusing more on the instructor's words than participating in a discussion (Jacobsen et. al, 1999).

Last, most ILT deliveries require a centralized location for training. While this may not present a problem for local students, other professionals must take additional time from work for commuting and other logistical expenses (lodging, meals, etc.). ILT also carries costs of at least one instructor (if not multiple) and potentially classroom costs.

Web-Based Training (WBT)

WBT is a component of e-learning which comprises all forms of electronically supported learning and teaching. E-learning has been divided into two parts: computer-mediated learning and electronically assisted learning. Computer-mediated learning encompasses both web and computer-based training (using personal computers). Electronically assisted learning encompasses facilitates aspects of distance learning through video conferencing, audio conferencing, electronic whiteboards, and other similar formats (Rothwell, 2008).

With regards to the computer-mediated learning approach of WBT, it provides learning opportunities through the transformation of Computer-Based Training (CBT) with the infrastructure and capabilities of the World Wide Web and the internet. WBT gives instructors and instructional designers the opportunity to present timely content that

can be modified very quickly in a structure in which the student can obtain self-directed, self-paced instruction (asynchronously). Depending on budget and skill set, developers can transform WBT into a media-rich environment with three dimensional virtual reality, animation, interactions, chat and conferencing, and real-time audio and video. Generally, WBT is delivered through the use of a Learning Management System (LMS). A LMS is a software application for the administration, documentation, tracking, and reporting of training programs, classroom and online events, e-learning programs, and training content (Horton, 2000; Lonn, Teasley & Krumm, 2011).

WBT offers the ability to deliver training in three distinct ways: synchronously, asynchronously or by using a combination of the two. First, *synchronous* deliveries are commonly supported by media such as videoconferencing and chat, is time dependent. The experience of synchronous learners and instructors is seen as more social with scheduled events and instructional periods. On the other hand, *asynchronous* deliveries are commonly facilitated by media such as e-mail and discussion boards, is not time dependent and students can work at their own pace. This flexible instruction allows learners to access course materials when it is convenient for their schedules. Both synchronous and asynchronous formats are used in web-based training.

History of Web-Based Training

In response to the Soviet Union's launch of the first man-made satellite, the Advanced Research Projects Agency (ARPA) was created in 1958. Their first significant advancement was the creation of a network (ARPANET) in 1960 that linked together Department of Defense computers and universities (Lester & Piore, 2004).

Other significant advancements in the technology area were the invention of the microprocessor by Intel in 1971 and the arrival of the first personal computer on the market in 1975. In 1977, technicians joined the Satellite Network (SATNET) to ARPANET. They called the connection between multiple networks inter-networking or the INTERNET for short (Internet History, 2007).

In the mid-1980s, the National Science Foundation (NSF) developed a network of five supercomputer centers which connected universities and research organizations (Moore & Kearsley, 2005). The network was used to interact through email and electronic bulletin boards. Additionally, users were able to transfer data files and access libraries (Charlson, 2006).

The next advancement in the field of technology-based instruction was the development of the World Wide Web, a system of interlinked, hypertext documents accessed via the Internet. The World Wide Web was created in 1989 by Tim Berners-Lee while working at CERN in Geneva, Switzerland. With a web browser, web pages that contain text, images, videos, and other multimedia could be viewed using hyperlinks (Berners-Lee, 1990). It should be noted that in 1995, only 9% of American adults had accessed the Web (Moore & Kearsley, 2005). By December 2011, it was estimated that 78% of American adults were accessing the Internet from their home or workplace (Internet World Statistics, 2012). As this number increased exponentially, various e-learning opportunities began to arise.

Potential Advantages of Web Based Training

As previously noted, training is fundamental to the operation of organizations. However, helping employees enhance their knowledge and skills through traditional instructor led training courses can be challenging (Iris & Vikas, 2011; McCormack & Jones, 1998). Even for a large company, time away from work for training interrupts productivity. Equally important, the need for information can be immediate, while an instructor led course must be scheduled, forcing the employee to wait for the information. Additionally, there is no guarantee that an instructor led course will convey the same information from delivery to delivery. Therefore some literature notes that the actual training objectives are subject to change depending on instructor style or preferences (Liu et. al, 2007). To assist in solving these problems, WBT can be implemented throughout an organization simultaneously. As a result, organizations are increasingly relying on web delivery as a solution to issues of immediacy, convenience, and consistency (Shotsberger, 1996; Wang, Jia, Sugumaran, Ran & Liao, 2011).

The literature on WBT advantages and applications is very comprehensive. Common adjectives to describe quality WBT modules include: learner-centered, engaging, interactive, affordable, efficient, easily accessible, flexible, meaningful, distributed, and facilitated (Chien-Hung, Tzu-Chiang, & Yueh-Min, 2007; McVey, Gusella, Tweed & Ferrari, 2009; Westmoreland, Counsell, Tu, Wu & Litzelman, 2010). Other advantages of WBT in the literature are also very common. First, WBT's anytime/anywhere access is put forward as a primary advantage for this delivery mechanism. Participants continuously have access to a potentially large library of

training and information whether they are working from home, in the office, or from a hotel room. Given the rotating shifts and days off that many homeland security professionals encounter, access and availability takes on greater importance in solving a long-standing problem of releasing responders for training while ensuring sufficient staffing for the shift.

Next, student costs are affordable when compared to traveling to an instructor led course. Once students access the system, it is also noted that student tracking through the LMS is facilitated through technology. WBT enables the data to be automatically tracked on the server and data (such as scores or completion records) can be accessed quickly (Lee, Srinivasan, Trail, Lewis & Lopez, 2011; Sambrook, 2003). Last, as noted earlier, content can be updated very quickly depending on current events or other necessary updates that an instructor may find necessary to make.

Additionally, studies have also found that lack of face-to-face interaction in a traditional classroom setting allows students to express their opinions and ideas without concern of negative treatment or discrimination based on their gender, race, or nationality (Tham & Werner, 2005). Non-western students, particularly Asians who are typically found to be shy in traditional classroom settings, are said to have especially benefitted from the use of discussion forums in online programs. Moreover, virtual learning environments provide opportunities for exchanging global experiences and shared knowledge among diverse groups.

Potential Disadvantages of Web Based Training

Although WBT can potentially provide several advantages as noted above, users/potential adopters must consider several other factors prior to implementing the delivery mechanism. These considerations include, but are not limited to: time, technology infrastructure/knowledge, cost, and accessibility.

With regards to time, WBT oftentimes requires significantly more effort and time on the part of the instructors and designers in developing and adapting curricula to the Web-based medium. These changes also frequently require a shift in teaching and training strategies. Continuing with the consideration of time, participants must spend additional time familiarizing themselves with new technologies before they can engage in learning. Depending on the technology familiarity of the participant, they may find great difficulty in getting past this initial stage. The time commitment can oftentimes be greater on the part of the participant as well, when factoring in the time spent in online discussions, discussion boards, posts, and other activities that they would do much faster in face-to-face discussions. Lastly, when participants are taking asynchronous WBT, the need for immediate response may be frustrating for the participant and instructor depending on the feedback system developed by the course faculty (Minotti & Giguere, 2003).

With the constant advancements in technology, infrastructure or technical issues may not be as prevalent with basic applications. However, new WBT platforms and additions continue to advance as well, which is accompanied by the potential of technical challenges. The availability of responsive technical support for participants is

paramount to ease frustrations felt by WBT users. However, issues such as bandwidth limitations that involve intensive graphics, video and audio may slow down WBT in some locations (Desai, Richards, & Eddy, 2000). Participants / organizations must ensure that their technology is suitable for the WBT modules to limit these challenges.

The potential cost savings of WBT was highlighted in the advantages section with an emphasis on participant cost savings; however, the costs of the training deliverer should be contemplated. Expenses are often difficult to estimate when designing WBT for the first time, and a break-even point for return on investment can be even harder to determine. Costs can be more expensive than in a traditional classroom environment given the need for special equipment, software, instructional designers and the adaptation of course material, especially when designing WBT for the first time (Minotti & Giguere, 2003). Additionally, as previously noted, the technical support personnel required is an additional cost that is extremely necessary.

Further, accessibility issues must be examined when placing training on the web. Individuals with disabilities are at risk of being excluded when content is not made fully accessible (Gold, 1997; Zie, 2011). The ability for a participant to access the training materials is critical due to the fact that training cannot commence until this occurs. Adopters must be aware of accessibility guidelines such as Section 508 which requires agencies to make their electronic and information technology accessible to people with disabilities.

In short, critics assert that web-based programs will not provide the same high-quality instruction and student-oriented interactions that face-to-face formats provide

(Floyd & Casey-Powell, 2004). Critics also maintain that quality can only be achieved through face-to-face interaction and mentoring. Moreover, they deem web-based courses to be impersonal, less engaging, and lacking the same rigor as face-to-face courses (Adams, 2007; Baggaley, 2008).

Training the Adult Learner

In order to understand what constitutes effective training, it is important to recognize the manner in which adults learn. The idea that adults learn differently than children was pioneered by Malcolm Knowles in the late 1960s. Through his work in Europe, Knowles coined the term andragogy, or the art and science of helping adults learn. Within the concept of andragogy, Knowles made six assumptions about the adult learner. Below, each of those assumptions is provided along with a connection to WBT.

First, Knowles (1980) noted that as a person matures, his or her self-concept moves from that of a dependent personality toward one of a self-directing human being. A by-product of this assumption is the learning climate should be one that causes adults to “feel accepted, respected, and supported.” Additionally, the interactions between teachers and students should be one in a “spirit of mutuality as joint inquirers” (Knowles, 1980, p.47). With regards to the self-directing nature of an adult learner, WBT offers “anytime/anywhere” access for training opportunities. Additionally, the adult learner does not need to rely on other individuals in the self-paced environment. The learner can complete the course when convenient for them to do so.

Next, the adult has a vast array of accumulated experiences, which serve as a resource for learning. Training, including technology-based instruction, must include

opportunities for learners to use their knowledge and experience. These activities such as decision-making scenarios or other case studies designs call upon the experiences of the learner and facilitate the application of their existing expertise. Advanced instructional design techniques in WBT allow for the incorporation of realistic decision-making scenarios that can be equipped with video and other multimedia stimuli. This incorporation of interaction allows for application of knowledge and skills on the most course topics.

According to Bernard, Brauer, Abrami & Surkes (2007), media has the ability to alter the learning experience in ways that face-to-face education cannot. To support this point, Bernard et al. reference the works of Hawkes (2001) who advocates that the use of written language in computer-mediated communication results in increased reflection and Winkelmann (1995) who purports that increased reflection via written language leads to the development of better writing skills. Bernard et. al also reference peer modeling and mentoring (Lou, 2004; Lou, Dedic, & Rosenfield, 2003; Lou & MacGregor, 2002) and critical thinking literature asserting that media has the capability to initiate higher quality performance in terms of solving complex problems through mentoring and modeling.

Additionally, the readiness of an adult to learning is closely correlated to the developmental tasks of his or her social role. As Knowles explained, “adults experience a need to learn in order to cope more satisfyingly with real-life tasks or problems” (1980, 44). Therefore, curriculum should be designed to relate to students needs and future goals. Related to this assumption, the “always on” feature of WBT provides adult learners with the opportunity to access problem-specific training whenever necessary.

Given this feature, the adult learner does not have to wait until a training delivery date that may be scheduled in the future. Immediate access equates to immediate information on the specific challenge.

Further, there is a change in time perspective as people mature, from future application of knowledge to immediacy of application (Knowles, 1980). Adults are task, life, or problem-centered in their orientation to learning. They want to know what they are learning will apply to life, a task they need to accomplish, or a problem they need to solve. The ability to demonstrate a real-life application is related to the abilities of the training developers and instructional designers. In both WBT and ILT, multimedia from current events and other situations can be tied into the course content to demonstrate applicability and value. Tham and Werner (2005) advocate that when choosing media for imparting knowledge, designers should consider the nature of the material covered and make decisions based on what learners can receive and absorb through transmission rather than be swayed by “cutting-edge” technology. Course learning objectives and outcomes should drive the design of courses, rather than technology.

Next, the most potent motivations are internal rather than external. Incentives such as self-esteem, job satisfaction, and quality of life are all motivations to the adult learner. Adult-centered instruction should focus on the motivators in order to engage the adult learner. WBT capitalizes on the value of a responder’s time by providing direct, time-efficient training that will return the responder back to their agencies and families. The ability to convey knowledge, in less time and equally or more effective than traditional ILT, appeals to many working professionals. Moreover, course designers

should work to minimize potential fears of adult learners when dealing with technology and assist them with the behavior changes and knowledge needed in order to successfully maneuver through online courses.

Finally, adults need to know why they need to learn something (Knowles & Associates, 1984). More specifically, adults want to know how the material will benefit them directly. These overarching goals and expectations can be used throughout the learning materials to reinforce their importance to the adult learner (Lawler, 1991, p. 36). The importance and benefit of training can be associated with the climate of the responder's agency and community. If the agency and professional community support the obtainment of knowledge, skills, and abilities through WBT and other distance learning technologies, a responder will more readily accept the modality and potentially retain more information based on this support.

In short, the application of adult learning theories/principles is facilitated through the use of technology-based instruction. While the homeland security practitioner community obviously falls within the category of adult learners, the nature of the work that they perform is associated with several unique characteristics that will be presented in the next section.

Training the Homeland Security Practitioner

The tragic events of September 11, 2001 not only led to the development of a federal department, but also changed the nature and complexity of training for homeland security practitioners in the United States. While training was available in most, if not all, of the disciplines in homeland security prior to 9/11, the events forced practitioners to

focus on a multi-disciplinary approach implementing concepts such as incident command and multi-agency coordination systems. While collaboration and control skills were built into training curricula following 9/11, veteran practitioners were called upon to redefine their roles in public safety and security to correspond with new legislation and doctrine. This paradigm shift may have been more difficult for veteran responders since most homeland security practitioners receive the majority of their training early in their careers as preparation for performing required duties.

The history of technology-assisted training for homeland security practitioners is somewhat limited. As a whole, the homeland security community has been sluggish (especially in the early years of technology development) in adopting and fully utilizing online or distance technologies to train personnel. Possible reasons for limited usage include cultural resistance (feelings about the way training should be conducted) and a lack of infrastructure to provide opportunities to the homeland security community (nationwide or in that particular region). Below, several studies that have been completed are presented and categorized by sub-disciplines of fire/emergency medical, emergency management and law enforcement.

Fire Service / Emergency Medical

Due to its culture and working environment, the fire service is unique. As with the other public safety, the profession's exposure to often dangerous working conditions coupled with societal reliance, make its coordinated and timely response detrimental to a community. With regards to training, the fire service implements a variety of modalities to include ILT, WBT, simulations, and evolutions (drills) for hands-on experience. For

deep learning, one of the most critical simulation delivery modes (Sherkart, 2002) is the live-burn training activity. Due to the need for realistic training environments, there are obviously limits to simulation and online activities for the fire service. First, simulations can lead to learned behavior that precludes considerations of building material construction and smoke types. Further, simulations cannot fully represent the conditions of live burn. However, modern firefighters are not solely concerned with the fighting of fires, but also emergency medical calls.

A trend of many fire departments is to respond to emergency medical-related calls. In fact, many firefighter recruits are required to have Emergency Medical Technician (EMT) certification for hiring consideration. Like the fire service, the emergency medical services field employs many modes of training delivery: ILT, simulations, tabletop models, field training, video, and WBT. These delivery methods and curricula were evaluated in a Harvard Medical School study (Ciconne et al., 2002) both for long-term and short-term transfer of skills and knowledge. This study concluded that a new ILT curriculum for EMTs met its objectives by a high percentage rate (84%) of learners with no prior medical experience passing the exam. Other studies (Chi et al., 2001; Lai et al., 2005) examined simulation, tabletop, and field training had mixed results when measuring efficacies. Troubles in creating real-world environments made goal-attainment problematic. Skill maintenance studies comparing ILT and WBT showed no difference between the delivery methods (Chi et al., 2001; Jerin & Rea, 2005).

Emergency Management

The definition of emergency management can be extremely broad and all-encompassing. However, for purposes of this document, it can be defined as the profession that addresses the management of disasters and critical incidents. With its roots in the 1950s with the Cold War and Civil Defense, emergency management performs an essential role in U.S. public safety. With regards to training the nation's emergency managers, a great deal of credit is given to the Emergency Management Institute (EMI) in Emmitsburg, Maryland.

EMI, celebrating 60 years of operation this year, traces its heritage from the former Civil Defense Staff College that was created to develop and conduct emergency training at all levels of government in response to the Cold War. To facilitate meeting this national threat, the federal government opened the training facility and rescue school in Olney, Maryland and later transferred to Battle Creek, Michigan, in 1954. In 1980, the Staff College moved to its current location and was renamed the "Emergency Management Institute" (EMI, 2011).

Since that time, EMI has trained millions of responders and serves as the national focal point for the development and delivery of emergency management training. This training enhances the capabilities of the Federal, state, and local government, volunteer organizations, and the private sector to minimize the impact of disasters on the American public. EMI curricula includes the online Independent Study Program (ISP) courses, which are structured to meet the needs of this diverse audience with an emphasis on how the various elements work together in emergencies to save lives and protect property. To date, there are over 100 ISP courses that are offered free of charge to the American

public. It serves as both an alternate means to deliver valuable training to the professional and volunteer emergency management community, and an opportunity to improve public awareness and promote disaster preparedness nationally (EMI, 2011).

Law Enforcement

The use of technology to train law enforcement can be traced back to the early 1990s. At this time, distance training was begun with the use of the Law Enforcement Television Network (LETN). LETN provided video training course distributed via satellite signal that is beamed to television receivers in law enforcement agencies. This technology has evolved into a more computer-oriented method of delivering training programs. Further, the use of computer-based training (CBT) in law enforcement began about ten years later in the late 1990s. One example of evaluating the effectiveness of CBT was conducted with the Lexington-Fayette Urban County (Kentucky) Division of Police in 2002.

The study evaluated the effectiveness of (CBT) technology compared to traditional lecture-based instruction with a DNA Evidence Collection beginning level module. In evaluating the effectiveness of the DNA Evidence Collection-Beginning Level CBT module, pre- and post-instruction knowledge tests and attitudinal surveys were developed. Study results indicated that both lecture and CBT resulted in increased knowledge about DNA evidence, the amount of learning that occurred did not differ significantly across the two modes of instruction, lack of familiarity with computers did not hamper participants in the CBT from learning the material, and officers were generally positive about CBT, both before and after course completion (Baggett et al., 2003).

As technology has advanced, so has the availability of online training for law enforcement personnel. In addition to various private sector organizations, federal funds have been allocated to the development and dissemination of online training. For example, the Federal Law Enforcement Training Center (FLETC) developed the Virtual Campus to provide law enforcement officers with the ability to access training resources that may not be available to them otherwise. With regards to homeland security training, the DHS has allocated millions of training dollars to the Federal Emergency Management Agency's (FEMA) National Training and Education Division (NTED).

NTED prepares state and local first responders to prevent, protect, respond to, and recover from manmade and natural catastrophic events. NTED draws upon a diverse group of training providers to develop and deliver NTED approved training courses. These training providers include the National Domestic Preparedness Consortium (NDPC), the Rural Domestic Preparedness Consortium (RDPC), the Naval Postgraduate School (NPS) and Center for Domestic Preparedness (CDP), among others. Many of the NTED training providers were established in 1998 under the Department of Justice's Office for Domestic Preparedness. Since that time, it has grown from four to more than 45 training providers that are in various stages of curriculum development and course delivery. To date, NTED has delivered training to over two million first responders. Currently, NTED offers over 50 WBT course offerings, with the majority in the awareness training level (FEMA, 2011). As noted, the training of homeland security responders has become a multi-million dollar venture. On the federal level, these funds are allocated from tax payer dollars each year. For this reason, as well as responder

safety and effectiveness, it is essential to conduct timely, comprehensive evaluations of training to determine its efficacy to the homeland security community.

Evaluating Training Effectiveness

Training effectiveness evaluation models are commonly referred to as either system-based or goal-based. Systems-based training evaluation models are useful in determining the overall context and situation surrounding training, but may not provide sufficient granularity. Unlike goal-based models, systems-based models may not represent the interactions between the design and subsequent evaluation of training. Examples of system-based models include the Context, Input, Process, Product (CIPP) Model (Stufflebeam, 1966) and Input, Process, Output (IPO) Model (Bushnell, 1990).

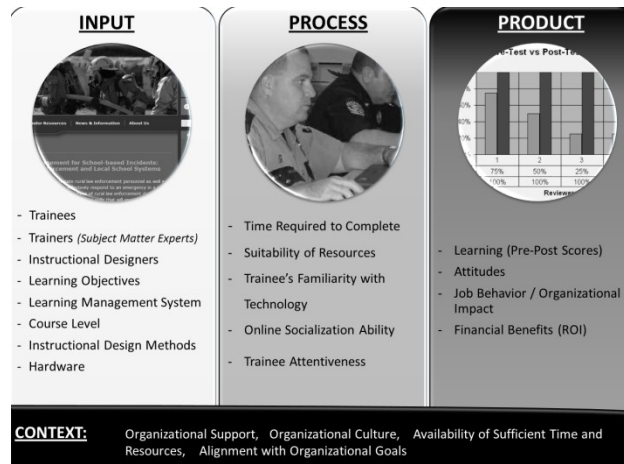
Context, Input, Process, Product (CIPP) Model

First, the CIPP model for evaluation is a comprehensive framework for guiding formative and summative evaluations of programs, projects, institutions, and systems. This model was introduced by Daniel Stufflebeam in 1966 to guide mandated evaluations of U.S. federally funded projects because these emergent projects. Since then, the model has been widely applied and further developed. The model can be used in internal evaluations, self-evaluations and in external evaluations. CIPP is a decision-focused approach to evaluation and information is seen as a tool to help program managers make better informed decisions. The CIPP model is an attempt to make evaluation directly relevant to the needs of decision-makers during the different phases and activities of a program. In order for an evaluation to be useful using CIPP, it must address those

questions which inform key stakeholders of program effectiveness. Additionally it must utilize verbiage that stakeholders will clearly understand. The approach aims to involve the decision-makers in the evaluation planning process as a way of increasing the likelihood of the evaluation findings having relevance and being used. As noted on the CIPP model's application to WBT in Figure 2.1, there are four general components to the model.

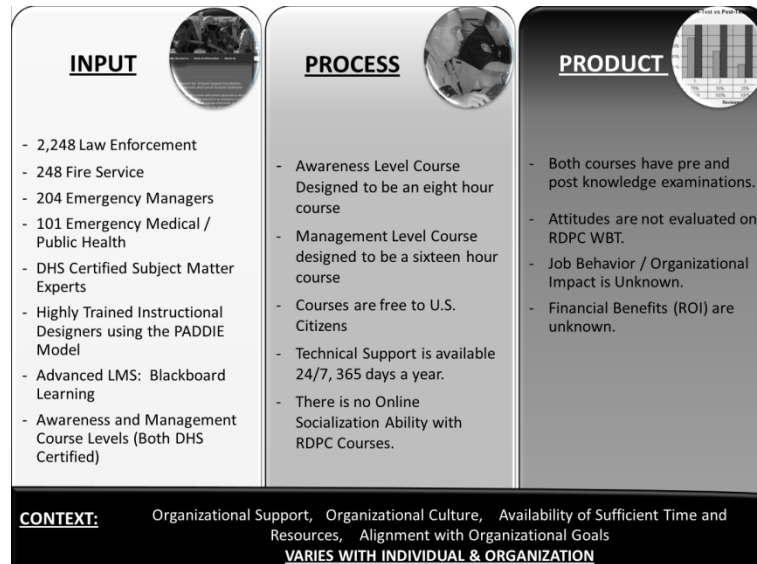
First, the input evaluation measures the appropriateness of the individual and the training design. This is done through an examination of the trainees, subject matter experts, instructional designers, technology, and the actual course under evaluation. Second, the process evaluation questions the behaviors of the trainees and availability of technical support during the training. This evaluation looks at aspects such as time required to complete the course, the trainee's familiarity with technology, and their ability to socialize with other practitioners during the training process. Next, the output evaluation looks at the various effects of having used WBT. This includes achievement of training and personnel objectiveness. Models such as the Kirkpatrick Model (*discussed later in this section*) can be utilized to obtain information for the output evaluation. Last, the context section measures how WBT exists within an organizational context. Various measures include employee motivation, management support and time for WBT during work hours.

Figure 2.1: Application of the CIPP Model to WBT



As seen in Figure 2.1, the CIPP Model can be applied to WBT for the purposes of evaluation. As a specific example, Figure 2.2 below demonstrates the application of the CIPP Model to the specific study discussed in this dissertation.

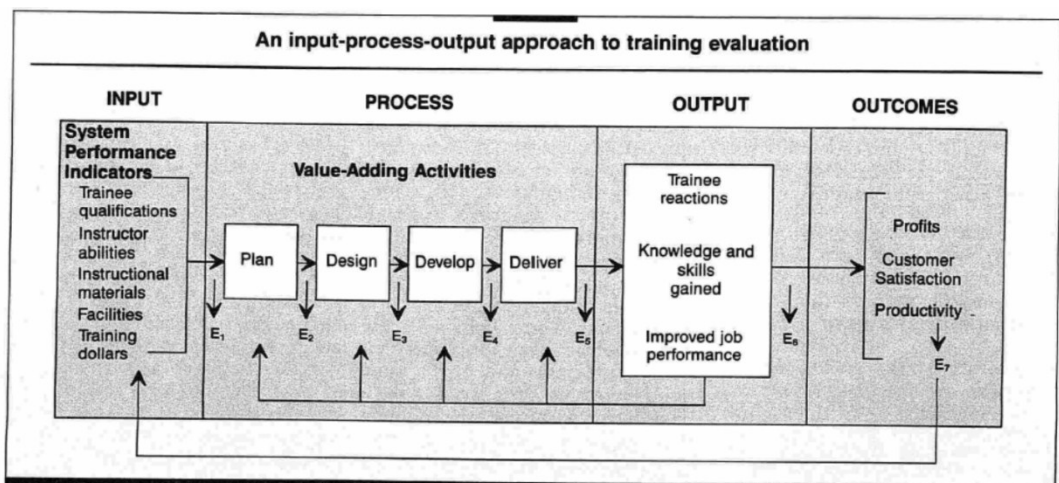
Figure 2.2: Application of the CIPP Model to the Dissertation Study



Input, Process, Output (IPO) Model

Closely related to the CIPP Model, the Input-Process-Output (IPO) Model was geared towards business entities on narrowing training budgets. Most notably, IBM was an early adopter of the IPO model. Executives desired to balance the costs and results of training. IBM found that an IPO approach to training evaluation enables decision makers to select from several options that allow the ultimate selection of the most effective package. As noted in Figure 2.3 below, the most striking difference between the IPO Model and the CIPP Model previously outlined is the delineation between output and outcomes in the IPO Model. The IPO Model developers believe it is helpful to make a distinction between the two in that output deals with the short term benefits or effects of training while outcomes refer to longer term results associated with improvement in the corporation's bottom line. Most notably, it's profitability, competitiveness and event survival as a company.

Figure 2.3: IPO Model Framework



Source: Bushnell, D.S. (March, 1990). "Input, Process, Output: A Model for Evaluating Training". *Training and Development Journal*, 44 (3), 41 – 43.

Kirkpatrick Model

As outlined earlier, an alternative to a systems-based approach is the goal-based approach. The most popular goal-based training evaluation model was developed by Donald Kirkpatrick in 1983. Within the Kirkpatrick model, there are four levels of effectiveness to include: reaction of trainees (level one), learning results (level two), job behavior (level three), and returns for the organization (level four). Levels one through three can be summarized as formative evaluation, which is a method for judging the worth of the course while activities are in progress. This type of evaluation permits the course designers and instructors to monitor how well the instructional goals and objectives are being met and to consequently remedy identified deficiencies. Level four is best characterized as a summative evaluation or a method of judging the worth of the course at the end of the activities with the focus on the outcome.

In this study, level two is utilized, which is commonly referred to as the *learning* level. This level attempts to measure skills and knowledge learned, which is assessed using criterion-referenced tests to include pretests and posttests. In order to ensure accurate measure, the instrumentation for this level must be validated in order to ensure the learning reflects the objectives of the unit of study. Results from this level can also inform course delivery, but more specifically it will also allow for re-alignment of objectives as compared with teaching materials (Kirkpatrick, 1983). While the Kirkpatrick model can be used to assess various modalities of training delivery, it is also a key indicator of effectiveness for web based training.

Effectiveness of Web-Based Training

A fundamental concern of WBT is the participant's ability to learn the required information through the electronic delivery mechanism. Much of the literature on WBT provides thorough analysis of the potential and realized benefits of the technology (Beamish, Armistead, Watkinson & Armfield, 2002; Brink et al., 2002; Macpherson, Elliot, Harris & Homan, 2003; Revere & Kovach, 2011; Sambrook, 2003). Few organizations, especially in the private sector, are willing to publicly admit significant challenges with their WBT programs. The literature that does discuss challenges, quickly counters with the explanation of how those issues were addressed (Gold, 2003). Additionally, with regards to effectiveness of WBT, Attewell (2002) concluded that "Most of the research provides data about the experiences of, often quite small, particular groups of learners. Taken individually, it is difficult to categorize those studies as reliable evidence; taken as a whole, it represents evidence that can provide significant benefits to individuals and society" (p.34). The conclusion that WBT can, but does not automatically confer benefits, has been reached by others who have done systematic reviews of the literature (Sambrook, 2003).

One WBT course evaluation criterion is the number of participants who successfully complete the course. In this regard, the literature asserts that completion rates of e-learning courses are not as good as more traditionally administered training (Welsh *et al.*, 2003). Additionally, the importance of ensuring that individuals feel that the course is directly relevant to their needs and job responsibilities will influence participation and completion of the WBT modules. This assertion was further

underlined by a 2011 study by Wang et. al, whereby a performance-oriented approach is presented. The authors contend that historically, WBT has been perceived as less goal-effective due to a lack of alignment of learning with work performance. Using a performance-oriented approach, an empirical study was conducted by the software testing sector to use and evaluate the system. The results showed a high rate of effectiveness of the approach (2011). Additionally, a case study of engineers in Scotland in 2002 showed low WBT completion rates (Brink et al., 2002). The low rates (29%) were attributed to the fact that it was a course on finance that they thought the company wanted them to take but which was of little relevance to their jobs (2002).

As noted earlier, one of the concerns of WBT is the ability of individuals with low computer proficiency to navigate throughout the system. Welsh et al (2003) found that lower levels of computer efficacy were related to lower learning outcomes. This was further indicated by evidence from the education field, that those with a higher computer efficacy felt more in control of their learning and were more willing to take risks (Bonk & Wisner, 2000). In order to assist those with less computer technical knowledge, materials must be highly organized, engaging, self-describing and easy to use in order to avoid confusion on the part of students, since the instructor is not always present to answer questions right away. Additionally, participants may find it difficult to maintain the level of discipline required to stay on task with WBT since they are not in a structured classroom setting. Further, some participants may feel isolated and lonely learning in this medium due to the lack of a shared physical space with other trainees and the instructor (Horton, 2000). It is important to note that several studies have concluded that age does

not necessarily a significant predictor in success for online courses. In fact, a 2009 study by Ke & Xie notes that course content and support is stronger predictor among “non-traditional” students. Therefore, the question on what type of course information is most suitable for a WBT module should be a serious consideration for potential adopters.

Some research seems to indicate that employers feel that WBT is more effective for harder technical skills, such as IT, than softer interpersonal skills (Beamish et al., 2002). However, Welsh *et al.*, (2003) refers to research that suggests WBT works most effectively for short courses with less technical content. The contention that shorter courses working better is supported by examples of lower course completion rates for E - Learning. Laine (2003), for example, showed how IT professionals dropped out of longer WBT courses but persisted to the end with shorter versions.

Effectiveness of Web-Based Training as Compared to Instructor-Led Training

As explored in the previous section, several authors have investigated the effectiveness of web-based training as an instructional modality. Similarly, researchers have also compared WBT to ILT. These authors have stressed that evaluating WBT is more difficult than ILT due to factors such as organizational setting, information technology infrastructure, types and amount of media utilized in the WBT, technical issues, and learners’ experience level with technology (Curtain, 2002; Jung & Rha, 2000; Olson & Wisher, 2002; Zallas, 2005). Several studies comparing WBT and ILT in the areas of emergency response, academia, private sector, and government will be reviewed.

As noted in this manuscript, very little research has been conducted comparing WBT and ILT in the field of homeland security and emergency response. However,

WBT is actively utilized within many disciplines comprising this professional community. One study in the area of emergency medicine examines the use of a WBT for extended focused assessment for trauma (Platz et. al, 2009). In this research, the authors enrolled first-year emergency medicine and surgery residents in WBT and ILT sections. In short, the authors concluded that WBT was as effective as the ILT representing a worthwhile training modality for the specified curriculum. Related, a 2011 study by Geiman took place in the correctional industry. Geiman noted that WBT constitutes a viable, cost-effective solution in the face of budget cuts for correctional personnel. Further, the study noted that web-based instruction trainees had higher learning outcomes than those who had face-to-face training, and trainees who had a combination of both methods did best of all (2011).

Institutions of higher education have actively explored the potential of online learning for the past decade. A commonly cited reference in higher education online learning is “The No Significant Difference Phenomenon” (Russell, 2001). In that meta-analysis, the author reviewed over 300 studies that detected no significant difference in student outcomes between distance learning and traditional education. There have been several rebuttals to this research which critique Russell’s sampling techniques and quality (Bernard et al. 2004). Other researchers have since attempted replication of the Russell study and while some support the findings (Yiping, 2006), others find significance in the advantages of using distance learning (Means, et al., 2009). The divergence of results suggests the need for additional research in the area.

Not only has higher education utilized WBT in student learning, but it has also been employed in faculty and staff training. For example, in their study on the educational training programs of two colleges' administration application systems, Chien-Hung et. al (2007) compared learning effectiveness between ILT and WBT. The researchers collected data from two colleges that received training on their administration application systems. In their study, the authors concluded that learners receiving WBT achieved better learning performance than their counterparts receiving ILT. Additionally, they noted that learners receiving WBT reported higher levels of satisfaction than their counterparts with the traditional approach.

Next, Crews et al. (2007) investigated the ability to provide quality instruction on recognizing the cues of human deception. The researchers utilized ILT and WBT with a system called the Agent99 Trainer. The common curriculum was utilized for both modalities in an attempt to determine if the curriculum could improve the accuracy of human deception detection and the effectiveness of the electronic modality. The authors conclude that the curriculum showed effectiveness in both modalities, with the WBT (Agent99 Trainer system) providing training as effective as the ILT (Crews et al., 2007).

As noted earlier, the private industry has been an active proponent of online training. Gaither (2009) utilized a mixed-methods study to analyze a sales and service retail organization to determine whether participants perceive e-learning training as an effective method for training in comparison to traditional training. The author concludes that participants demonstrated a preference for traditional training over e-learning training. However, the participants noted that the convenience of e-learning training with

on-demand availability and user controlled training pace were desirable methods. With this information, the author notes that while online training should be pursued, the acceptance of the training method should be carefully reviewed and selection of training curricula for WBT should be limited to those that translate well into the electronic format.

In conclusion, a variety of studies have been conducted on the effectiveness of WBT as presented in the review of the literature. These studies include both qualitative and quantitative efforts, with most of the quantitative studies applying a quasi-experimental approach. The lack of research in the field of homeland security (especially focused on those serving in small and rural communities) suggests the need for additional research.

CHAPTER III

METHODS

Background of Study

As noted in Chapter One, a lack of information exists on the effectiveness of e-learning (specifically WBT) for the rural homeland security community. While existing studies explore the effects of WBT on other disciplines, the relatively new formation of the homeland security discipline has provided an opportunity for new research. The deficiency leaves a void for this community in determining whether WBT is a valid training modality as compared to the more traditional instructor led method. Not only does the shortage of research exist for the cumulative homeland security community, but those individuals serving in small and rural communities have even less information available to make informed decisions on training modalities.

The purpose of this quantitative study is to determine whether WBT (a component of e-learning) represents a viable training method for rural homeland security communities. This study was designed to identify whether differences in training modality affect knowledge obtainment across diverse disciplines and geographic locations. In a time when financial resources are scarce in many jurisdictions, the ability to make an informed procurement decision regarding the most effective training modality will assist jurisdictions with maximizing their training budgets.

Research Questions and Hypotheses

This study is specifically designed to determine if significant differences in learner outcomes exist between two sections of the same course, one taught

asynchronously online (WBT) and one taught using the traditional modality of Instructor-Led Training (ILT).

The research questions for this study are as follows:

1. Are there differences in learner outcomes between the Web-Based Training group and the Instructor-Led Training Group?
2. Are there differences in learner outcomes of students taught by Web-Based Training or Instructor-Led Training between disciplines?
3. Are there differences in learner outcomes of students taught by Web-Based Training or Instructor-Led Training between Federal Emergency Management Agency (FEMA) regions?

From these research questions emerged several null hypotheses:

1. There are no significant differences in gains from the pre and posttest scores or final posttest scores between the WBT and the ILT groups.
2. The participant's discipline does not affect the gain or final scores from either the WBT or ILT courses.
3. The participant's geographic location does not affect the gain or final scores of either the WBT or ILT courses.

Research Design

The study utilizes secondary data analysis to compare knowledge obtainment between two modalities of instruction with two different training courses. As asserted by Nachmias et al. (2000), secondary data analysis has several methodological advantages. First, secondary data provides opportunities for future replication. Next, the availability

of data collected at different points in time enables the researcher to employ longitudinal research designs. Additionally, secondary analysis may improve the validity of measurement by expanding the scope of the independent variable employed when operationalizing major concepts. In short, by utilizing secondary data, the researcher can increase the sample size and its representativeness, factors that contribute to more encompassing generalizations (Nachmias et al., 2000, p.278).

The secondary data collected for this study was pre and post test data (with associated registration data) from two U.S. Department of Homeland Security courses, AWR 148 “Crisis Management for School-Based Incidents” and MGT 335 “Event Security Planning for Public Safety Professionals.” Both courses, one an awareness level course (AWR) and the other a management level course (MGT), have an ILT and a self-paced WBT component. The AWR ILT lasts approximately eight hours and the MGT ILT lasts approximately 16 hours.

The AWR 148 course is designed train rural law enforcement personnel as well as school administrators and staff to effectively respond to an emergency involving a school building or an entire school system. The training provides representatives of rural law enforcement departments with a foundation of knowledge and skills that will enable them to progressively establish a school-based emergency response plan and crisis management team through information sharing and training (RDPC, 2010).

Next, the MGT 335 course is designed to provide planning and management-level skills to officers from state and local homeland security agencies. Participants are provided with the essential skills and knowledge to understand the importance of and the

need for planning and managing security for special events, and to identify guiding principles for special-events security (RDPC, 2010).

The study implemented a comparison group pretest/posttest design, which is a common quasi-experimental design. The quasi-experimental design allows for the utilization of a purposive sample where the researcher uses naturally formed groups (Creswell, 2009), such as course and modality in this study. This design allows the involvement of more than one sample, often over an extended period of time (Nachmias et. al, 2000).

Context of the Study / Site Selection

The Rural Domestic Preparedness Consortium (RDPC) is a national training provider funded by the U.S. Department of Homeland Security. The majority of training provided by the RDPC is non-resident mobile training. RDPC instructors travel to rural and remote locations throughout the United States to deliver training to underserved communities who may not have the resources to travel to centralized locations for training opportunities. According to the Rural Assistance Center (www.raconline.org), the U.S. Census Bureau estimates that as much as 97.4% of American land is rural, while the U.S. Department of Agriculture Economic Research Service defines 74.5% of the land in America as rural (USDA, 2008). Despite the competing definitions, most Federal agencies use a population threshold at under 50,000 to define a “rural” area. The RDPC therefore defines the rural communities it serves as any location with a population of less than 50,000 and with a population density of less than 1,000 persons per square mile (RDPC, 2010).

Sample / Participants

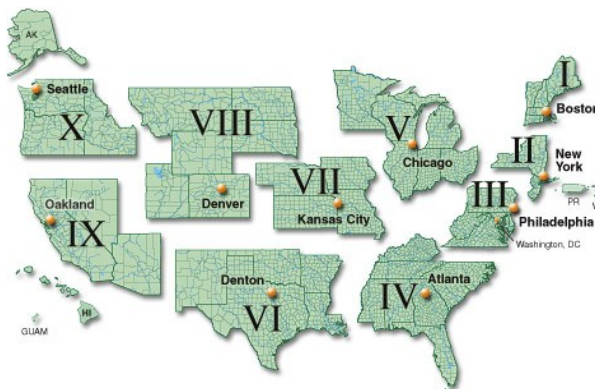
Participants in this study self-selected the course and associated modality in which they registered with no direction from the researcher or the training entity. There were a total of 2,801 participants as displayed in Table 3.1 below. Participants were U.S. residents who have participated in U.S. Department of Homeland Security (DHS) training during CY 2010 or the first two quarters of CY 2011. Table 3.1 also displays the fact that the participants worked in a variety of disciplines to include, but not limited to: law enforcement, fire service, emergency management and emergency medical services.

*Table 3.1
Sample Size (n=2801)*

Discipline:	Sample Size:
Law Enforcement	2248
Fire Service	248
Emergency Management	101
Emergency Medical Services	204

Additionally, the participants were from geographically diverse areas of the United States and territories. Participants in this study represent all ten of the Federal Emergency Management Agency (FEMA) regions. As seen in Figure 3.1, FEMA has compartmentalized the United States to better serve the needs of the nation.

Figure 3.1: FEMA Regions



Source: United States Department of Homeland Security. (2012). *FEMA Regions*. Available On-Line: <http://www.fema.gov/about/contact/regions.shtm>

For purposes of this study, the FEMA regions have been divided into the three categories of east, central, and west. Regions one through four comprise the east sector, regions five through seven comprise the central sector and regions eight through ten comprise the west sector.

Variables and Measures

The independent variable for research question one of this study is the mode of delivery (ILT or WBT). The ILT groups received in-person training in locations throughout the United States. The WBT groups conducted all training and administrative activities online through a Learning Management System (LMS). The dependent variables for research question one are the gain scores (the amount of increase between the pre and post test scores) as well as the final score of competency in the course, the posttest score. Both dependent variables are operationalized as percent correct. These

test items serve as the operational definitions of the learning outcomes or instructional objectives that guided the development of both modes of instruction.

Next, the two training courses under investigation for this study were developed for multiple homeland security related disciplines. The second research question investigates whether any differences in learner outcomes of students in the modalities exist between disciplines. The independent variables for this question are disciplines with the dependent variable being gain scores and final posttest scores. These disciplines include law enforcement, fire service, emergency medical service, and emergency management.

Further, the last research question will examine potential differences in learner outcomes by modality (WBT or ILT) and course level (AWR or MGT) between the ten FEMA regions. For this question, the independent variables will be the FEMA regions, which will be grouped in three categories of east, central, and west. To facilitate disaster preparedness and response, FEMA has organized its field offices into ten geographically dispersed regions. Student data from these regions will be analyzed to determine if there are any differences in the dependent variables, gain scores and final posttest scores.

Data Collection

The primary instrumentation for the study is the DHS registration form which provides demographic information as well as the pre and posttests that measure knowledge obtainment (*See Appendix A*). The examinations consist of 15 or 20 multiple choice questions (depending on course) with randomized ordering of questions marking the difference between the pre and post questions; however, the participants were not

made aware of this commonality. In the ILT groups, the pretest was administered just prior to each training session with the same instructions given in each course. With regards to the WBT groups, all tests are administered through the Learning Management System (LMS) with the platform randomizing the questions for each participant.

The AWR 148 pretest (*see Appendix B*) and posttest (*see Appendix C*) both consist of 15 multiple-choice questions that generally take a participant 15-20 minutes to complete. Similarly, MGT 335 pretest (*see Appendix D*) and posttest (*see Appendix E*) both consist of 20 multiple-choice questions that again, generally take a participant 15-20 minutes to complete.

Data Analysis

The data was analyzed using the IBM SPSS Statistics program, version 19.0. First, the researcher extracted descriptive statistics of the data, including mean and standard deviation of the pre and posttest scores. Likewise, descriptive statistics for geographic location and participant discipline were examined. Additionally, in an effort to determine if statistically significant differences within the three research questions exist, the researcher conducted a series of independent sample t-tests as well as Analysis of Variance (ANOVA) tests.

Independent Sample t-tests

The independent sample t-test is a statistical technique that is used to analyze the mean difference between two independent groups. The technique will be used to draw conclusions about the means of two populations, and used to tell whether or not they are similar. The test assumes that the dependent variable is normally distributed, the samples

are independent of each other and the dependent variables are measured on an interval or ratio level scale (Agresti & Finlay, 2008). Significance for the independent sample t-tests was determined at the $\alpha=.01$ level.

Analysis of Variance (ANOVA)

An Analysis of Variance (ANOVA) is useful in assessing the significance differences between two or more group means. A one-way ANOVA is used when the independent variable has three or more groups. When using the ANOVA, the same assumptions apply as were stated with the independent sample t-test.

The ANOVA assisted the researcher in determining if the presence of one or more significant differences exists between the group means being compared. If significant differences were identified, the researcher determined between which of the groups significant differences exists. The researcher utilized the Bonferroni Method for comparison testing to complete the analysis (Agresti & Finlay, 2008). Significance was determined at the $\alpha=.05$ level.

Limitations of the Study

One limitation of this study is there may be other variables such as responder qualifications and past experiences of the responders with the specific course subject matter that are not included in the analyses yet affect the dependent variables. This concern is somewhat mitigated by assessing the gain score to determine progress as a result of the course and not solely basing effectiveness on final scores.

Next, a limitation may be the lack of examination of attitudes of the WBT participants regarding their previous use of WBT and their associated comfort level. It

may be hypothesized that responders with previous familiarity with the WBT modality would score higher due to their overall ease of use with the LMS.

Additionally, there is no way of judging whether the process of pretesting actually influenced the results because there is no baseline measurement to determine existing training or education on the course topics. While the groups were not informed that the pre and posttests contained the same questions (only randomized), it can be hypothesized that responders focused on the pretest questions during the actual training which consequently helped them during the posttest exam.

Last, while the sample used in this study is believed to be characteristic of homeland security responders in rural and small agencies, it must be noted that there may be characteristics beyond the scope of this study that may not make it appropriate to generalize the results to all rural and small agencies.

CHAPTER IV

RESULTS

Introduction

The effectiveness of homeland security training for rural communities, comparing web-based training (WBT) and instructor-led training (ILT) were the primary interests of this study. This chapter presents the results that were produced by utilizing quantitative research methods. The scores of the pre- and posttests of two homeland security training courses were examined to measure the effectiveness of two instructional modalities in teaching the specific subject matter. The statistical data were analyzed using the IBM SPSS Statistics program, version 19.0. Testing for statistical significance was conducted using an alpha level of 5 percent (.05).

First, a brief description of the sample will be provided in order to understand the diversity of the responders who took the two training courses. Next, the chapter will display tables and results from specific analyses that address the research questions. In short, there are three research questions that guided the study:

1. Are there differences in learner outcomes between the Web-Based Training group and the Instructor-Led Training Group?
2. Are there differences in learner outcomes of students taught by Web-Based Training or Instructor-Led Training between disciplines?
3. Are there differences in learner outcomes of students taught by Web-Based Training or Instructor-Led Training between Federal Emergency Management Agency (FEMA) regions?

Demographic Information

From January 2010 to June 2011, 2,801 responders from small and rural communities participated in a web-based or instructor-led section of the Rural Domestic Preparedness Consortium’s AWR 148 “Crisis Management for School-Based Incidents” or MGT 335 “Event Security Planning for Public Safety Professionals”. As displayed below in Table 4.1, of the responders taking the AWR 148 courses (n=1709), 93% (n=1597) completed the ILT course while 7% (n=112) completed the WBT version. Additionally, of the responders taking the MGT 335 courses (n=1092), 83% (n=906) completed the ILT course while 17% (n=186) completed the WBT version.

*Table 4.1
Participant Course Information (n=2801)*

Course	ILT	Percent	WBT	Percent	Totals
AWR 148	1597	93%	112	7%	1709
MGT 335	906	83%	186	17%	1092

Further, the responders in this study represented 44 of the 50 United States. From a regional perspective, as displayed in Table 4.2 on the following page, 68% (n=1898) of the responders were from the eastern region of the United States. This region is comprised of Federal Emergency Management Agency (FEMA) regions one through five. The central region, consisting of FEMA regions six through eight, was home to 725 responders (26%). Finally, the western region, consisting of FEMA regions nine and ten, sent 178 responders (6%) to the training courses.

*Table 4.2
Participant Region Information (n=2801)*

	Eastern Region	Central Region	Western Region
AWR 148 ILT	973	520	104
AWR 148 WBT	76	23	13
MGT 335 ILT	716	152	38
MGT 335 WBT	133	30	23

Last, the Rural Domestic Preparedness Consortium is responsible for the training of all responder disciplines from small and rural communities. As displayed in Table 4.3 below, this specific research included participants from four disciplines: law enforcement, fire service, emergency management and emergency medical. First, law enforcement responders (n=2248) represented the overwhelming majority (80%) of the sample, while fire service responders (n=248) comprised 9%. Next, emergency management personnel (n=204) comprised 7% of the sample, while the discipline with the fewest participants (emergency medical, n=101) comprised 4% of the sample.

*Table 4.3
Participant Discipline (n=2801)*

Discipline	Frequency	Percent
Law Enforcement	2248	80%
Fire Service	248	9%
Emergency Management	204	7%
Emergency Medical	101	4%

Differences in Learner Outcomes Between WBT and ILT

In order to determine if differences exist in learner outcomes between the two modalities in this study, a series of independent sample t-tests were used to compare mean scores. As previously noted, the independent variable in this question is the mode of delivery (ILT or WBT), while the dependent variables are the gain scores (the amount of increase between the pre and post test scores) as well as the final score of competency in the course, the posttest score. Both dependent variables are operationalized as percent correct. Below, both modalities (ILT and WBT) within each course (AWR 148 and MGT 335) are compared regarding gain scores and final scores.

AWR 148 Gain Scores

As previously noted, this study utilizes a pretest/posttest comparison design to determine learning effectiveness. Before participating in training, students take a pretest examination. For the AWR 148 “Crisis Management for School Based Incidents” course, students in the ILT course averaged 65.34% on their pretest, while those students enrolled in the WBT course averaged 66.30%. In order to compare the percentage of scores gained between pre and posttests for the ILT and WBT sections of AWR 148, an independent samples t-test was conducted. As displayed in Table 4.4 below, there was a significant difference in the gain score for AWR 148 ILT ($M = .28$, $SD = .16$) and AWR 148 WBT ($M = .19$, $SD = .18$), $t(122.96) = 5.433$, $p = .000$.

Table 4.4: Independent Sample t-Test: AWR 148 and Gain Scores

t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
5.433	122.963	.000	.094	.017

These results suggest that modality has an effect on the improvement made (gain score) between the pre and posttest on the AWR 148 course. Specifically, the results suggest that students in the ILT section of AWR 148 gain more points between the pretest and posttest than their counterparts who take the WBT section.

AWR 148 Post Test Scores

Next, to determine if differences existed between the posttest scores of the ILT and WBT sections of AWR 148, an independent samples t-test was conducted. As displayed below in Table 4.5, there was a significant difference in the posttest scores for AWR 148 ILT (M=93.67, SD=7.49) and AWR 148 WBT (M=85.18, SD=8.40), $t(1707) = 11.50, p=.000$.

Table 4.5: Independent Sample t-Test: AWR 148 and Posttest Scores

t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
10.401	123.684	.000	8.482	.816

These results suggest that modality has an effect on posttest scores on the AWR 148 course. Specifically, the results suggest that students in the ILT course score significantly higher on course posttests as compared to their WBT counterparts.

MGT 335 Gain Scores

For the MGT 335 “Event Security Planning for Public Safety Professionals” course, students in the ILT sections averaged 40.39% on their pretest, while those students enrolled in the WBT course averaged 46.45%. In order to compare the percentage of scores gained between pre and posttests for the ILT and WBT sections of MGT 335, an independent samples t-test was conducted. As displayed in Table 4.6 below, there was a significant difference in the gain score for MGT 335 ILT ($M = .54$, $SD = .131$) and MGT 335 WBT ($M = .35$, $SD = .169$), $t(232.455) = 14.888$, $p = .000$.

Table 4.6: Independent Sample t-Test: MGT 335 and Gain Scores

t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
14.888	232.455	.000	.196	.013

These results suggest that modality has an effect on the improvement made (gain score) between the pre- and posttest on the MGT 335 course. Specifically, the results suggest that students in the ILT section of MGT 335 gain more points between the pretest and posttest than their counterparts who are enrolled in the WBT section.

MGT 335 Post Test Scores

Next, to determine if differences existed between the post test scores of the ILT and WBT sections of MGT 335, an independent samples t-test was conducted. As displayed below in Table 4.7, there was a significant difference in the posttest scores for

MGT 335 ILT (M=94.89, SD=6.32) and MGT 335 WBT (M=81.34, SD=8.74), $t(226.36) = 20.10, p=.000$.

Table 4.7: Independent Sample t-Test: MGT 335 and Posttest Scores

t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
20.098	226.361	.000	13.546	.674

These results suggest that modality has an effect on posttest scores on the MGT 335 course. Specifically, the results suggest that students in the ILT course score significantly higher on course posttests as compared to their WBT counterparts.

Differences in Learner Outcomes of WBT and ILT Between Disciplines

In order to determine if differences in learner outcomes of students taught by Web-Based Training or Instructor-Led Training existed between disciplines a series of one-way, between subjects Analysis of Variance (ANOVA) tests were conducted. The following section will outline those results by course and modality. The disciplines analyzed as part of this research included law enforcement, fire service, emergency management, and emergency medical services. First, a review of AWR 148 ILT will be conducted.

AWR 148 ILT

During the study period, 1597 responders were trained in AWR 148 using the ILT modality. Before conducting analysis of the differences between posttest and gain scores, a brief overview of the participant's posttest scores (displayed in Table 4.8) is

warranted. As displayed in the table, the fire service averaged the lowest pretest scores (m=61.22) with emergency management averaging the highest (m=68.12).

Table 4.8: Pretest Scores: AWR 148 ILT – By Discipline

Participant Discipline	Mean	N	Std. Deviation
Law Enforcement	65.70	1260	14.389
Fire Service	61.22	161	15.512
Emergency Management	68.12	101	15.142
Emergency Medical	64.44	75	16.026
Total	65.34	1597	14.699

Next, an ANOVA was conducted to compare the posttest scores of each discipline on the ILT version of AWR 148. With these scores (as displayed in Table 4.9 below), there was not a significant difference in posttest scores for AWR 148 ILT at the $p < .05$ level for the four disciplines [$F(3,1593) = 1.647, p = .177$].

Table 4.9: ANOVA: Disciplines and AWR 148 ILT Posttest Scores

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	276.523	3	92.174	1.647	.177
Within Groups	89174.255	1593	55.979		
Total	89450.778	1596			

Next, with the gain scores for AWR 148 ILT (as displayed in Table 4.10 below), there was a significant difference at the $p < .05$ level for the four disciplines [$F(3,1593) = 7.035, p = .000$].

Table 4.10: ANOVA: Disciplines and AWR 148 ILT Gain Scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.503	3	.168	7.035	.000
Within Groups	37.961	1593	.024		
Total	38.464	1596			

Post hoc comparisons using the Bonferroni Method indicated that the mean score for the fire service ($m=.33, sd=.162$) was significantly higher than law enforcement ($m=.28, sd=.153$) and emergency management ($m=.24, sd=.149$). However, the emergency medical discipline ($m=.29, sd=.169$) did not differ significantly from the other disciplines on gain scores for the AWR 148 ILT courses. These results are displayed in Table 4.11 below.

Table 4.11: Bonferroni Method: Disciplines and AWR 148 ILT Gain Scores

(I) Participant Discipline	(J) Participant Discipline	Mean Difference (I-J)	Std. Error	Sig.
Law Enforcement	Fire Service	-.046	.013	.002
	Emergency Management	.041	.016	.062
	Emergency Medical	-.009	.018	1.000
Fire Service	Law Enforcement	.046	.013	.002

Table 4.11 (continued)

	Emergency Management	.087*	.020	.000
	Emergency Medical	.037	.022	.531
Emergency Management	Law Enforcement	-.041	.016	.062
	Fire Service	-.087*	.020	.000
	Emergency Medical	-.050	.022	.204
Emergency Medical	Law Enforcement	.009	.018	1.000
	Fire Service	-.037	.022	.531
	Emergency Management	.050	.024	.204

*The mean difference is significant at the 0.05 level.

Specifically, the above results suggest that the fire service discipline gained more points between the pre and posttest as compared to law enforcement and emergency management.

AWR 148 WBT

Next, the WBT sections of AWR 148 will be analyzed, starting with a look at the pretest scores for the 112 participants. As seen in Table 4.12, emergency management averaged the lowest score on the AWR 148 WBT pretest ($m=64.00$), while the fire service averaged the highest ($m=67.30$).

Table 4.12: Pretest Scores: AWR 148 WBT – By Discipline

Participant Discipline	Mean	N	Std. Deviation
Law Enforcement	66.66	80	14.680
Fire Service	67.30	10	11.889
Emergency Management	64.00	15	23.893
Emergency Medical	65.71	7	16.163
Total	66.30	112	15.870

Following analysis of pretest scores, the post test scores of each of the disciplines were compared using a one-way ANOVA as displayed in Table 4.13 below. For the WBT, there was not a significant difference in posttest scores for AWR 148 at the $p < .05$ level for the four disciplines [$F(3,108) = .209, p = .890$].

Table 4.13: ANOVA: Disciplines and AWR 148 WBT Posttest Scores

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	45.238	3	15.079	.209	.890
Within Groups	7787.115	108	72.103		
Total	7832.353	111			

Further, with the gain scores for AWR 148 ILT (as displayed in Table 4.14), there were also no significant differences at the $p < .05$ level for the four disciplines [$F(3,108) = .204, p = .893$].

Table 4.14: ANOVA: Disciplines and AWR 148 WBT Gain Scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.020	3	.007	.204	.893
Within Groups	3.546	108	.033		
Total	3.566	111			

Following the analysis of the AWR 148 course, a similar series of statistical tests were applied to the MGT 335 course.

MGT 335 ILT

During the study period, 906 responders were trained in MGT 335 using the ILT modality. Before conducting analysis of the differences between posttest and gain scores, a brief overview of the participant's posttest scores (displayed in Table 4.15) is warranted. As displayed in the table, law enforcement averaged the lowest pretest scores (m=39.66) with emergency management averaging the highest (m=46.29).

Table 4.15: Pretest Scores: MGT 335 ILT – By Discipline

Participant Discipline	Mean	N	Std. Deviation
Law Enforcement	39.66	760	12.368
Fire Service	42.38	63	12.110
Emergency Management	46.29	70	11.908
Emergency Medical	41.92	13	10.516
Total	40.39	906	12.413

Next, an ANOVA was conducted to compare the posttest scores of each discipline on the ILT version of MGT 335. With these scores (as displayed in Table 4.16 below), there was a significant difference in posttest scores for MGT 335 ILT at the $p < .05$ level for the four disciplines [$F(3,902) = 3.196, p = .023$].

Table 4.16: ANOVA: Disciplines and MGT 335 ILT Posttest Scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	380.108	3	126.703	3.196	.023
Within Groups	35758.855	902	39.644		
Total	36138.962	905			

However, post hoc comparisons using the Bonferroni Method indicated no significant differences between the four disciplines as displayed in Table 4.17 below.

Table 4.17: Bonferroni Method: Disciplines and MGT 335 ILT Posttest Scores

(I) Participant Discipline	(J) Participant Discipline	Mean Difference (I-J)	Std. Error	Sig.
Law Enforcement	Fire Service	1.997	.825	.095
	Emergency Management	.164	.786	1.000
	Emergency Medical	3.554	1.761	.263
Fire Service	Law Enforcement	-1.997	.825	.095
	Emergency Management	-1.833	1.093	.564
	Emergency Medical	1.557	1.918	1.000
Emergency Management	Law Enforcement	-.164	.786	1.000
	Fire Service	1.833	1.093	.564

Table 4.17 (continued)

	Emergency Medical	3.390	1.902	.450
Emergency Medical	Law Enforcement	-3.554	1.761	.263
	Fire Service	-1.557	1.918	1.000
	Emergency Management	-3.390	1.902	.450

Next, with the gain scores for MGT 335 ILT (as displayed in Table 4.18 below), there was a significant difference at the $p < .05$ level for the four disciplines [$F(3,902) = 8.514, p = .000$].

Table 4.18: ANOVA: Disciplines and MGT 335 ILT Gain Scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.428	3	.143	8.514	.000
Within Groups	15.107	902	.017		
Total	15.535	905			

Post hoc comparisons using the Bonferroni Method indicated that the mean score for law enforcement ($m=.55, sd=.131$) was significantly higher than emergency management ($m=.49, sd=.113$). Additionally, it was indicated that the mean score for law enforcement is also significantly higher than the fire service ($m=.51, sd=.130$). However, emergency medical ($m=.50, sd=.103$) did not differ significantly from the other disciplines on gain scores on MGT 335 ILT. These results are displayed in Table 4.19.

Table 4.19: Bonferroni Method: Disciplines and MGT 335 ILT Gain Scores

(I) Participant Discipline	(J) Participant Discipline	Mean Difference (I-J)	Std. Error	Sig.
Law Enforcement	Fire Service	.047*	.017	.033
	Emergency Management	.068*	.016	.000
	Emergency Medical	.058	.036	.650
Fire Service	Law Enforcement	-.047*	.017	.033
	Emergency Management	.021	.022	1.000
	Emergency Medical	.011	.039	1.000
Emergency Management	Law Enforcement	-.068*	.016	.000
	Fire Service	-.021	.022	1.000
	Emergency Medical	-.010	.039	1.000
Emergency Medical	Law Enforcement	-.058	.036	.650
	Fire Service	-.011	.039	1.000
	Emergency Management	.010	.039	1.000

*The mean difference is significant at the 0.05 level.

Specifically, the above results suggest that law enforcement gained more points between the pre and posttests as compared to the fire service and emergency management.

MGT 335 WBT

During the study period, 186 responders were trained in MGT 335 using the WBT modality. Before conducting analysis of the differences between posttest and gain scores, a brief overview of the participant's posttest scores (displayed in Table 4.20) is

warranted. As displayed in the table, law enforcement averaged the lowest pretest scores (m=45.20) with emergency management averaging the highest (m=56.11).

Table 4.20: Pretest Scores: MGT 335 WBT – By Discipline

Participant Discipline	Mean	N	Std. Deviation
Law Enforcement	45.20	148	14.959
Fire Service	47.50	14	13.693
Emergency Management	56.11	18	19.369
Emergency Medical	45.83	6	7.360
Total	46.45	186	15.406

Next, an ANOVA was conducted to compare the posttest scores of each discipline on the WBT version of MGT 335. With these scores (as displayed in Table 4.21 below), there was not a significant difference in posttest scores for MGT 335 WBT at the $p < .05$ level for the four disciplines [$F(3,182) = .483, p = .695$].

Table 4.21: ANOVA: Disciplines and MGT 335 WBT Posttest Scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	111.469	3	37.156	.483	.695
Within Groups	14002.510	182	76.937		
Total	14113.978	185			

Further, with the gain scores for MGT 335 WBT (as displayed in Table 4.22 below), there were also no significant differences at the $p < .05$ level for the four disciplines [$F(3,182) = .2476, p = .063$].

Table 4.22: ANOVA: Disciplines and MGT 335 WBT Gain Scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.208	3	.069	2.476	.063
Within Groups	5.106	182	.028		
Total	5.315	185			

Differences in Learner Outcomes of WBT and ILT Between FEMA Regions

The last research question in this study attempts to determine if differences in learner outcomes of students taught by Web-Based Training or Instructor-Led Training existed between geographical regions of the United States. As discussed in chapter three of this manuscript, the United States Department of Homeland Security's (DHS) Federal Emergency Management Agency's (FEMA) ten regions were utilized for this questions. Specifically, the ten regions were grouped into three larger regions of east, central and west. To determine if differences exist between these regions, a series of one-way, between subjects Analysis of Variance (ANOVA) tests were conducted. The following section will outline those results by course and modality. First, a review of AWR 148 ILT will be conducted.

AWR 148 ILT

During the study period, 1597 responders were trained in AWR 148 using the ILT modality. Before conducting analysis of the differences between posttest and gain scores, a brief overview of the participant's posttest scores by region (displayed in Table 4.23) is warranted. As displayed in the table, the central region averaged the lowest pretest scores ($m=64.36$) with the west region averaging the highest ($m=71.22$).

Table 4.23: Pretest Scores: AWR 148 ILT – By Region

Region	Mean	N	Std. Deviation
East	65.24	973	14.427
Central	64.36	520	14.847
West	71.22	104	15.262
Total	65.34	1597	14.699

Next, an ANOVA was conducted to compare the posttest scores of each region on the ILT version of AWR 148. With the scores displayed in Table 4.24, there was a significant difference in posttest scores for AWR 148 ILT at the $p < .05$ level for the three regions [$F(2,1594) = 21.951, p=.000$].

Table 4.24: ANOVA: Regions and AWR 148 ILT Posttest Scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2397.615	2	1198.808	21.951	.000
Within Groups	87053.162	1594	54.613		
Total	89450.778	1596			

Post hoc comparisons using the Bonferroni Method indicated that the mean score for the central region (m=95.06, sd=6.455) was significantly higher than the east region (m=92.69, sd=7.918). Additionally, the west region score (m=95.78, sd=6.598) was also significantly higher than the east region. These results are displayed in Table 4.25 below.

Table 4.25: Bonferroni Method: Regions and AWR 148 ILT Posttest Scores

(I) Region	(J) Region	Mean Difference (I-J)	Std. Error	Sig.
East	Central	-.046	.013	.002
	West	.041	.016	.062
Central	East	.046	.013	.002
	West	.087*	.020	.000
West	East	-.041	.016	.062
	Central	-.087*	.020	.000

*The mean difference is significant at the 0.05 level.

Specifically, the above results suggest that the central and west region scored higher on post tests for AWR 148 ILT as compared to the east region.

Further, with the gain scores for AWR 148 ILT (as displayed in Table 4.26 below), there was a significant difference at the $p < .05$ level for the three regions [$F(2,1594) = 10.809, p = .000$].

Table 4.26: ANOVA: Regions and AWR 148 ILT Gain Scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.515	2	.257	10.809	.000
Within Groups	37.950	1594	.024		
Total	38.464	1596			

Post hoc comparisons using the Bonferroni Method indicated that the mean score for the central region ($m=.31, sd=.158$) was significantly higher than both the east region ($m=.27, sd=.151$) and the west region ($m=.25, sd=.163$). These results are displayed in Table 4.27 below.

Table 4.27: Bonferroni Method: Regions and AWR 148 ILT Gain Scores

(I) Region	(J) Region	Mean Difference (I-J)	Std. Error	Sig.
East	Central	-.032*	.008	.000
	West	.029	.016	.207
Central	East	.032*	.008	.000
	West	.061*	.017	.001
West	East	-.029	.016	.207
	Central	-.061*	.017	.001

*The mean difference is significant at the 0.05 level.

Specifically, the above results suggest that the central region gained more points between the pre and posttest as compared to both the east and west regions.

AWR 148 WBT

Next, the WBT sections of AWR 148 will be analyzed, starting with a look at the pretest scores for the 112 participants. As seen below in Table 4.28, the central region averaged the lowest score on the AWR 148 WBT pretest (m=64.13), while the west region averaged the highest (m=69.23).

Table 4.28: Pretest Scores: AWR 148 WBT – By Region

Region	Mean	N	Std. Deviation
East	66.46	76	16.276
Central	64.13	23	13.559
West	69.23	13	17.847
Total	66.30	112	15.870

Following analysis of pretest scores, the posttest scores of each of the disciplines were compared using a one-way ANOVA as displayed in Table 4.29. For the WBT, there was not a significant difference in posttest scores for AWR 148 at the $p < .05$ level for the three regions [$F(2,109) = .2271, p = .108$].

Table 4.29: ANOVA: Regions and AWR 148 WBT Posttest Scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	313.371	2	156.686	2.271	.108
Within Groups	7518.982	109	68.981		
Total	7832.353	111			

Further, with the gain scores for AWR 148 WBT (as displayed in Table 4.30 below), there were also no significant differences at the $p < .05$ level for the three regions [F (2,109) = .319, $p = .728$].

Table 4.30: ANOVA: Regions and AWR 148 WBT Gain Scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.021	2	.010	.319	.728
Within Groups	3.545	109	.033		
Total	3.566	111			

Following the analysis of the AWR 148 course, a similar series of statistical tests were applied to the MGT 335 course.

MGT 335 ILT

During the study period, 906 responders were trained in MGT 335 using the ILT modality. Before conducting analysis of the differences between posttest and gain scores, a brief overview of the participant's pretest scores by region (displayed in Table 4.31) is warranted. As displayed in the table, the central region averaged the lowest pretest scores ($m = 38.16$) with the west region averaging the highest ($m = 42.11$).

Table 4.31: Pretest Scores: MGT 335 ILT – By Region

Region	Mean	N	Std. Deviation
East	40.78	716	12.372
Central	38.16	152	12.162
West	42.11	38	13.438
Total	40.39	906	12.413

Next, an ANOVA was conducted to compare the posttest scores of each region on the ILT version of MGT 335. With these scores (as displayed in Table 4.32 below), there was not a significant difference in posttest scores for MGT 335 ILT at the $p < .05$ level for the three regions [$F(2,903) = .411, p = .663$].

Table 4.32: ANOVA: Regions and MGT 335 ILT Posttest Scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	32.862	2	16.431	.411	.663
Within Groups	36106.100	903	39.985		
Total	36138.962	905			

Further, with the gain scores for MGT 335 ILT (as displayed in Table 4.32 below), there was not a significant difference at the $p < .05$ level for the three regions [$F(2,903) = 2.563, p = .078$].

Table 4.33: ANOVA: Regions and MGT 335 ILT Gain Scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.088	2	.044	2.563	.078
Within Groups	15.447	903	.017		
Total	15.535	905			

MGT 335 WBT

During the study period, 186 responders were trained in MGT 335 using the WBT modality. Before conducting analysis of the differences between posttest and gain scores, a brief overview of the participant's pretest scores by region (displayed in Table 4.34) is warranted. As displayed in the table, the west region averaged the lowest pretest scores ($m=42.39$) with the central region averaging the highest ($m=48.50$).

Table 4.34: Pretest Scores: MGT 335 WBT – By Region

Region	Mean	N	Std. Deviation
East	46.69	133	16.142
Central	48.50	30	14.689
West	42.39	23	11.167
Total	46.45	186	15.406

Next, an ANOVA was conducted to compare the posttest scores of each region on the WBT version of MGT 335. With these scores (as displayed in Table 4.35), there was not a significant difference in posttest scores for MGT 335 WBT at the $p < .05$ level for the three regions [$F(2,183) = 2.006, p=.137$].

Table 4.35: ANOVA: Regions and MGT 335 WBT Posttest Scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	302.842	2	151.421	2.006	.137
Within Groups	13811.136	183	75.471		
Total	14113.978	185			

Further, with the gain scores for MGT 335 WBT (as displayed in Table 4.36 below), there were also no significant differences at the $p < .05$ level for the three regions [F (2,183) = .186, $p = .831$].

Table 4.36: ANOVA: Regions and MGT 335 WBT Gain Scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.011	2	.005	.186	.831
Within Groups	5.304	183	.029		
Total	5.315	185			

In summary, the chapter presented the results of several statistical tests conducted to answer the three research questions of this study. In addition to general frequencies for several items, four independent sample t-tests and 16 ANOVAs were conducted to further the research on the questions. Where applicable, five post-hoc comparisons were conducted to further investigate significant differences. Chapter Five will further focus on the differences that were revealed in an effort to provide additional insights into the study questions.

CHAPTER V

DISCUSSION

The final chapter of this manuscript begins with an overview of the purpose of the study and research questions followed by a review of the context. In order to summarize the purpose, it is imperative to restate the importance of training to the development of an individual's job knowledge and skills (Erickson et. al, 2012; Itner & Larcker, 2003; Kress et al., 1981; Lim & Morris, 2006; Rothwell, 2008). Hence, the dissemination of quality training is essential to an organization's effective operations. This conclusion is specifically important to those serving in the homeland security community who work on a daily basis to protect and preserve life, property and the environment. However, limited operating budgets and shortages of personnel to backfill positions of those who are sent to training may limit a small and rural agency's ability to provide adequate training opportunities to their responders. With this in mind, modalities such as Web-Based Training (WBT) could be a viable training modality alternative for the homeland security community, especially those serving in small and rural areas. Despite the perceived advantages of utilizing WBT for homeland security professionals, little research has been conducted comparing the results of traditional, lecture based training (LBT) to WBT for this profession. Therefore, the purpose of this quantitative study was to determine whether WBT represents a viable training option for homeland security responders serving in rural communities.

The study was designed to identify whether differences in training modality affect knowledge obtainment across diverse disciplines and geographic locations. Specifically, are there significant differences in learning outcomes between two sections of the same course, one taught asynchronously online (WBT) and one taught using the traditional modality of Instructor-Led Training (ILT). In an effort to add to the current body of knowledge, three research questions were developed:

- 1) Are there differences in learner outcomes between the Web-Based Training group and the Instructor-Led Training Group?
- 2) Are there differences in learner outcomes of students taught by Web-Based Training or Instructor-Led Training between disciplines?
- 3) Are there differences in learner outcomes of students taught by Web-Based Training or Instructor-Led Training between Federal Emergency Management Agency (FEMA) regions?

Overview of the Context and Sample

The training for this study was developed and delivered by the Rural Domestic Preparedness Consortium (RDPC), a national training provider of the U.S. Department of Homeland Security (DHS). Participants in the study self-selected the course and associated modality in which they registered with no direction from the researcher or the training entity. There were a total of 2,801 participants (U.S. citizens) who participated in the training during CY 2010 and the first two quarters of CY 2011. Additionally, the participants worked in one of four disciplines: law enforcement, fire service, emergency management or emergency medical services. Last, the participants resided in

geographically diverse areas of the United States, representing all ten Federal Emergency Management Agency (FEMA) regions and 44 of the 50 United States.

Overview of Research Methods

The study utilized quantitative research methods and secondary data analysis of existing training data to compare knowledge obtainment between two modalities of instruction within two different training courses. Further, the study implemented a comparison group pretest/posttest design, a common quasi-experimental design. The primary instrumentation for the study was DHS registration forms for demographic information and course pre and posttests that measured knowledge. After data was entered and cleaned, it was analyzed using the IBM SPSS Statistics program, version 19.0. Descriptive statistics were extracted from the data as well as a series of independent sample t-tests and Analysis of Variance (ANOVA) tests to determine the existence of statistically significant differences.

Interpretation of Major Findings

The findings of this study are organized into three sections based on the three original research questions. The first section entitled “Differences Within Courses” discusses differences in learner outcomes, both gain scores (the amount of increase between the pre and posttest scores) as well as the final score of competency (posttest score), for both the ILT and WBT groups within each course (AWR 148 and MGT 335). The next section entitled “Differences Between Disciplines” describes any differences in learner outcomes that existed between the four disciplines in this study within each course and modality. The third and final section entitled “Differences Between Regions”

discusses any differences in learner outcomes by modality (ILT or WBT) and course (AWR or MGT) between the ten FEMA regions (which have been grouped into three categories of east, central and west).

Differences Within Courses

In determining the differences between the two modalities in this study, it is important to revisit the advantages and disadvantages of ILT and WBT as noted in Chapter Two. Although the modalities are different in technique and delivery, both have proven effectiveness in disseminating knowledge and/or skills (Beamish et al., 2002; Brink et al., 2002; Crews et al., 2007; Gaither, 2009; Macpherson et al., 2003; Revere & Kovach, 2011; Sambrook, 2003; Wang et. al, 2011; Yiping, 2006). The first research question in this study investigated whether there were differences in learner outcomes between the ILT and WBT group within the same courses. In answering this question, the gain scores (difference between the pretest and posttest scores) and final posttest scores were analyzed. First, the AWR 148 “Crisis Management for School Based Incidents” course will be explored.

In order to compute the gain score and understand the participant’s knowledge of the subject matter prior to taking the course, an analysis of the pretest scores for the ILT and WBT in AWR 148 were analyzed. It was determined that the two groups were very similar in their existing knowledge of crisis management for school based incidents. In fact, only one percentage point differentiated the ILT group (65.34%) and the WBT group (66.30%). However, when analyzing the percentage points gained by each group in AWR 148, the ILT group gained 28 percentage points between the pre and posttests

while the WBT gained 19. This significant difference of nine percentage points indicated a greater amount of knowledge obtainment in the course by the ILT group. Further, when analyzing the posttest scores of the AWR 148 groups, a significant difference was also discovered. The ILT group averaged a 93.67% on the posttest while their WBT counterparts averaged an 85.18%. It should be noted that 70% is a passing score on DHS examinations; therefore, both groups surpassed the minimum passing score on the posttests. Next, a similar analysis was conducted on participants who took the MGT 335 “Event Security Planning for Public Safety Professionals” course.

Participants in the MGT 335 course scored lower and experienced greater variance in scores on the pretests than what was presented with the AWR 148 course. The ILT group averaged 40.39% on the MGT 335 pretest, approximately six points lower than their WBT counterparts (46.45%). However, gain scores for the MGT 335 were large for both groups, with the ILT group gaining an average of 54 percentage points and the WBT group gaining an average of 35 points. This difference of 19 points between the groups showed that the ILT group obtained significantly higher gain scores than those taking MGT 335 via WBT.

Next, when comparing the posttest (or final competency) scores of the two groups there was also a significant difference. Those in the traditional ILT group averaged a score of 94.89% on the posttest while the WBT group averaged 81.34%. Again, while both scores are passing according to DHS standards, the variance in the average scores showed that the ILT obtained significantly higher scores on the posttests.

In short, the data in this study revealed that participants who took the courses through the ILT modality not only made greater gains between the pre and posttests, but they also achieved higher scores on the final posttest. These findings may be attributable to the fact that historically, the emergency response community has received most, if not all, of their training through the ILT modality. While not addressed in this study, it is likely that these responders have a higher comfort level with this form of training and excel when it is utilized. Additionally, it may be possible that instructors in the ILT course may emphasize information that is on the posttest examination. If this does occur, it is likely inadvertent on the part of the instructor, but it may give a slight advantage to those who take the ILT section.

It should also be noted that while it appears ILT was a more effective training mechanism in these two courses, responders taking the WBT also increased their knowledge of the subject matter by making gains between the two tests and satisfactorily passing the posttest. Potential methods to decrease the possible gap between ILT and WBT will be presented in the implications sections presented later in this chapter.

Differences Between Disciplines

The next research question examined potential differences that existed between the four disciplines of law enforcement, fire service, emergency management, and emergency medical services. As outlined in Chapter Two of this study, while these disciplines all work within the homeland security community of professionals, their work styles and training methods may vary. However, tragic events in the last decade (both natural and man-made) have re-emphasized the need for these responder disciplines to

both work and train together. Thus, it is essential to understand if differences exist in the most effective modality to train each discipline. In an effort to add information to this complex question, the study examined learner outcomes of the different disciplines in both the ILT and WBT modalities in the AWR 148 and MGT 335 courses.

First, the AWR 148 ILT course was analyzed with a review of the disciplines' pretest scores. The four disciplines all averaged scores in the 61 – 68% range with fire service scoring the lowest (61.22%) and emergency management scoring the highest (68.12%). When comparing these pretest scores to the posttest scores with a one-way ANOVA, it was determined that there was a significant difference between the four disciplines. Further analysis indicated that the lowest scoring discipline on the pretest (fire service) gained the greatest number of points between that and the posttest (33%). This gain was significantly higher than both law enforcement (28%) and emergency management (29%). When the posttest scores for AWR 148 ILT were examined, it was determined that all the disciplines obtained similar scores (averaging between 90 and 94%) which indicated no significant differences.

Next, the AWR 148 WBT scores were analyzed to determine if the participants achieved a significant difference as compared to the scores obtained in the ILT course. As was the case with the ILT pretest scores, the WBT pretest scores were very similar with only one percentage point separating each of the four disciplines. This data indicates that the level of knowledge on school crisis management for the four disciplines was very similar. When comparing these scores to the posttest scores, it was also determined that there were no significant differences between the four disciplines. As

evidenced in question one, the gain scores for the WBT course were lower than the ILT and consequently, the final posttest scores were also lower with an average of 85%.

Following the analysis of the AWR 148 course, the MGT 335 data was evaluated to determine if similar findings were present. First, the pretest data of the 906 responders who took the MGT 335 “Event Security Planning” course via ILT was analyzed. The average scores for these pretests ranged from 39.66% for law enforcement up to 46.29% for emergency management participants. These scores were then compared with the posttest scores to obtain the gain scores. Using a one-way ANOVA, it was determined that there were significant differences between the four disciplines. Specifically, as displayed in the post-hoc comparison, law enforcement gained an average of 55 points on the posttest for MGT 335 ILT which was significantly greater than both emergency management’s gain of 49 points and the fire service’s gain of 51 points. Similarly, the one-way ANOVA also indicated that there were significant differences between the disciplines on the MGT 335 ILT posttest scores. However, when the post-hoc comparison was ran using the Bonferroni Method, there were no items that were significantly different. Literature on research methods refer to this as the "significant omnibus test and no significant differences" conclusion. It may occur when sample sizes are disparate when running post-hoc tests (Babbie, 2009). Therefore, there are no significant differences to report on the posttest scores of the MGT 335 ILT group.

Last, the performance of the 186 participants in the MGT 335 WBT course will be discussed. As before, the pretest scores of these individuals were assessed by discipline. Interestingly, the lowest average score on the pretest was by law enforcement

(45.20%) and the highest was obtained by emergency management (56.11%). The order of scores for the four disciplines was the same as the ILT group which could solidify the disciplines' level of knowledge of event security planning prior to taking the MGT 335 course. However, unlike the ILT group, there were no significant differences between the disciplines on either gain or posttest scores. While all but one participant in the group satisfactorily completed the course (over 70%), the average score for the WBT was 81%.

In short, similar to the first research question, the ILT group produced statistically significant results while the WBT group failed to do so. Both groups experienced substantial gain scores from the pre to the posttest and all but one participant passed the final competency examination (posttest). Given the seemingly small margins of gain (albeit statistically significant), the data suggests that the participants taking the two RDPC courses increased their knowledge from the time they entered the classroom or sat down at the computer until the time they left. Additionally, these participants satisfactorily passed the competency examination and completed the DHS course indicating their proficiency in those facets of either crisis management in schools or event security planning. The data does not indicate that a specific group had a more difficult time in either of the modalities. This finding suggests that both modalities should be continued in order to maximize training opportunities for those in small and rural communities.

Differences Between Regions

The United States of America is a federal constitutional republic comprising fifty states with a land area of 3,794,100 miles and an estimated 2012 population of

313,774,030 (United States Census, 2012). The U.S. Department of Homeland Security is the third largest federal agency (behind the Department of Defense and Veterans Affairs) and serves millions of responders throughout the United States. As reported earlier in this study, these responders reside in busy metropolitan areas, but also in our nation's small and rural communities. Given the large expanse of the United States, the last question of this study was exploratory in nature with hopes of spurring future research on the topic. The question examines if a participant's geographic region has any influence on their performance on either the ILT or WBT courses. The rationale behind the question was to give policy makers additional information when determining how to spend training funds for their particular region. As previously indicated, the ten FEMA regions were divided into the three sectors of east, central and west for this study.

First, the pretest scores of the 1,597 participants who took the AWR 148 ILT course were examined. The scores were high by region, with the averages ranging from 65.24% for the East sector to 71.22% for the West sector. It should be noted that the West sector actually averaged a passing score on the pretest examination! When examining the gain and posttest scores for the AWR 148 ILT group, both indicated significant differences between the regions. With regards to gain scores, the post hoc comparisons indicated that the central region (31 points) gained significantly more points than the east (27) and west (25). Similarly, the central region (95.06%) and the west region (95.78%) scored statistically significantly higher on the posttest examination than the east region (92.69%). However, as indicated by the scores, each region averaged very high scores on the final competency examination.

Unlike the AWR 148 ILT, the WBT group did not show significant differences in either gain scores or posttest scores. The pretest score of the WBT group were similar to the ILT group, ranging from 64% with the central region to 69% with the west region. While each of groups passed the posttest scores and gained scores between the two tests, the regions did not statistically differ between each other.

Next, the scores of the 906 participants who took the MGT 335 ILT course were assessed. The participants in each of the three regions scored similarly in a range from 38% from the central region to 42% from the west region. Additionally, scores of the 186 participants who took the WBT were also assessed. This group scored slightly higher on the pretest with a range of 42% from the west region to 49% from the central region. As was the case with the AWR 148 course, a series of one-way ANOVAs were ran to determine if significant differences existed between the three regions on the courses. Despite gains and adequate proficiency scores on the posttest, there were no significant differences between the three region's scores on the MGT 335 courses, both ILT and WBT.

In short, the only course and modality that showed any significant difference between regions in this study was the AWR 148 ILT. Although statistically significant, all regions produced sizeable gains in the course and also averaged exceptional final scores on the posttest. Therefore, it can be concluded from the data on this study that a participant's region is not a determining factor as to their performance on the AWR 148 or MGT 335. However, additional research on this question is warranted on various subject areas. This will be discussed further in the future research area of this chapter.

Implications for Practice

As supported by the literature presented in this dissertation, training is an essential component of an effective organization and the most effective manner in which it is delivered can vary depending on various factors. In this study, the ILT modality appears to have provided higher results on course examinations as compared to the WBT modality. Additionally, the results indicate that some disciplines differed significantly on scores within the courses. However, the results also indicated that both modalities helped the participants gain more knowledge through the courses, enough to successfully complete the posttest examinations.

The results of this quantitative study of the effectiveness of ILT and WBT for homeland security practitioners from small and rural areas point to recommendations for practice to improve training for this group of responders.

Recommendations

1. Value the role of e-learning for the homeland security community. With advancements and greater accessibility to information technology, opportunities are abundant for responders to obtain quality training on their computers. Given results as seen in this and other studies, administrators should embrace these opportunities for their personnel and ensure that they are seen as comparable opportunities on certain subject matter areas. As Seaman (2009) concluded, leadership's support and commitment to e-learning are critical to the success of those initiatives.

2. Continue providing ILT opportunities whenever possible for homeland security responders. It appears that homeland security practitioners are “creatures of habit” and continue to appreciate the traditional, lecture-based training session. These sessions may provide invaluable networking opportunities for the participants, in addition to the information that is disseminated. While budgets and other resources will allow, ILT should be a primary mechanism for homeland security training.
3. Consider a hybrid or blended approach to training delivery. This study has shown that ILT and WBT can both be effective training delivery modalities. However, in the two courses analyzed, the ILT modality was shown to be more effective at improving knowledge of the subject matter. In an effort to decrease travel and backfill costs, especially on courses that last longer than one day, it is recommended that developers utilize a hybrid or blended approach incorporating both WBT and ILT. Participants could utilize the WBT component before they arrived for ILT portion to obtain the necessary background and factual knowledge regarding the specific course topic. Then, the ILT could be used to reinforce course information, provide an outlet for hands-on training, and discuss the course concepts and main themes in a group environment.
4. Support the collection and referral of training opportunities by agency personnel. Oftentimes, personnel may sit back and wait for an agency head to send them to training. However, with the growing increase in e-learning opportunities, staff should continuously look for opportunities and be encouraged to complete the

courses on their own or defer to agency leadership regarding the perceived applicability and usefulness of the training for the individual responder's current duty. By encouraging an "all-hands" approach to training identification, the agency will increase its knowledge, skills and abilities on various topics that may otherwise have gone unknown.

5. Encourage cross-disciplinary training opportunities for homeland security practitioners. Prior to events such as the attacks of September 11, 2001 and Hurricane Katrina, the importance of collaboration for various disciplines may have been ignored by some agencies. These events led the homeland security community to a greater understanding of the importance of training, exercising, and working together with diverse disciplines in an emergency setting.
6. Suggest training topics that are not available via e-learning to federal and state training providers. While a variety of mechanisms are used to determine courses suitable for conversion into WBT, the most effective mechanism is through suggestions from responders in the field. Every year, dozens of courses are converted by training providers who are funded by the federal government to deliver the final product free of charge to responders.

Implications for Policy

Professionals in the homeland security community rely on the guidance of policies and guidelines for many aspects of their jobs. While implications for practice may be followed by forward-thinking agencies, the reality is that most agencies rely on policy changes before action will be taken. This study was conducted in an effort to add

to the body of knowledge which will give administrators the information they need to affect change, whether by policy, practice or both.

The first implication for policy recommendation would be the inclusion of advanced training modalities (such as WBT) in the allowable courses for professional development credit for homeland security practitioners. While each discipline is different, each requires a set minimum number of hours each year to maintain certification as a professional in that discipline. Some of these disciplines do not recognize e-learning as acceptable training for the core hour requirement. These courses are seen as supplemental and can be taken at the participant's/agency's discretion. As studies such as this one have shown, WBT enables the acquisition of knowledge. While further research is required to determine if this is the case in other subject matters, policy changes should be considered.

Next, agencies should work to allow supplemental time each week for each staff member so that they may take online training. While many agencies advocate supplemental training for their staff, some do nothing to facilitate the professional development. Thus, staff is left to take training on their off-time or not at all. By allowing even an hour each week, staff would benefit by learning new information that would ultimately benefit not only the agency, but also the community they serve.

Last, by giving staff work time to complete online training, the staff should also contribute to the agency's training initiative. This can be accomplished by providing feedback to not only the agency but also the training developer/provider. It has been said that feedback is a gift that should be welcomed. Participants completing training should

let the rest of their agency know the perceived strengths and weaknesses of the training so that a decision can be made whether to continue recommending it to other responders. Likewise, the training developer/provider should be given this same information that they may work to improve the training as time and resources allow.

Implications for Future Research

The findings of this quantitative comparative study offer particular insight into the training modalities for homeland security responders from four specific disciplines who serve in rural communities. Since there is limited research on this topic, the opportunity for further exploration of this topic has strong merit. The following recommendations are offered for future research:

- 1) Replicate this comparative study using other modalities, courses, and discipline groups. This study examined two specific courses out of hundreds of courses that are currently available online. More comparative research should be conducted using other modalities such as hybrid and blended courses, virtual reality platforms such as Second Life™ and courses designed for mobile platforms such as Apple's iPad™. Additionally, secondary responder groups such as public utilities, hospital emergency personnel and transportation workers should be included in the studies. This study could be replicated with other modalities, other courses and other discipline groups to inform stakeholders regarding the effectiveness of training modalities for the homeland security response community.

- 2) Collect attitudes of responders as part of training effectiveness studies. The attitudes of those involved with the training are very important in establishing whether the participant would return for another course via that modality. While test scores are important in establishing performance, data regarding the perceptions and opinions of participants regarding the experience can be equally as informing when improving the course development and delivery.
- 3) Analyze cost data to determine final Return on Investment (ROI). While participant performance and satisfaction are paramount, the reality of cost unfortunately remains critical in our society. As part of a holistic comparative study, an interesting component would be the analysis of cost data to determine the true cost of both course development and delivery for each modality. While these specific courses are offered free to responders through federal funds, developers and other administrators should also be cognizant of training ROI.
- 4) Conduct level three and four evaluations to better inform training outcomes. In order to truly answer the question of “how effective is the training,” longitudinal evaluations should be conducted to determine how the participants use the training over time. As discussed in Chapter Two, levels three and four of the Kirkpatrick Model should be implemented to determine effectiveness/utility months or even years after the training has been conducted. This data will help better inform the training developers and providers in making the course more usable for participants.

5) Utilize same participants for both ILT and WBT course for the study and collect additional data about each participant. In order to effectively compare courses, it is suggested that the same participants take both modalities of the same course. This would allow for a true comparison of the modalities; however, it may not be appealing to participants to take the same course twice. Next, additional data about each participant to include years of experience, training taken in the last five to ten years and job responsibilities would be interesting covariates in determining factors which would influence training performance.

Summary and Reflections

This study examined whether WBT represents a viable training method for homeland security responders serving in rural communities. The central question that drove this research was: does training modality affect knowledge obtainment across diverse disciplines and geographic locations? It examined two different training courses, each offered with both ILT and WBT, affecting responders from four disciplines (law enforcement, fire service, emergency management, and emergency medical) serving in 44 of the 50 United States. Results from this study led to the conclusion that while ILT had a greater impact on gain scores and final scores as compared to WBT, its influence on disciplines and geographic location was varied or non-existent. Further, it can be concluded that within the two courses examined, both ILT and WBT were largely effective and could be used as viable training mechanisms.

It was interesting to see such commonalities between the ILT and WBT groups in this study. First, in most cases, their pretest scores were very similar in both groups. This common level of knowledge of the subject matter across the country, prior to taking the training, was surprising. Next, even though ILT had a significantly greater impact on participant learning than WBT, it was evident that both modalities were viable training methods. Given the amount of funding that has been invested in the development of online training, this was a beneficial finding. Additionally, it appears that discipline and geographic location, at least with the two courses analyzed, were not strong predictors of participant performance. While some disciplines fared statistically better on either gain or final scores, the overall competency level of each group was high.

In conclusion, adult learning theories have taught that different people respond to different types of training. The important consideration is the continued availability of quality training to our nation's homeland security responders. While the researcher understands the plethora of other factors that may influence training performance, as a result of this study, it can be noted that both ILT and WBT are viable training options in the AWR 148 and MGT 335 courses. Homeland security agencies, especially those facing budget and human resource deficits should continue exploring federal and state resources to determine existing opportunities. These opportunities should be capitalized upon to ensure personnel are given the most effective training resources that are available.

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APPENDIX A:
FEMA Registration Form



FEMA

U.S. Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA), National Preparedness Directorate (NPD), National Integration Center (NIC), Training and Exercise Integration Secretariat/Training Operations (TE/TO)

REGISTRATION FORM

Fields displayed in **bold*** are required and must be completed. Please print characters in CAPITAL LETTERS only using BLACK ink.

Part 1: Course Information

Training Provider Abbrev*

Course Name*

Course Catalog Number* - - Start Date* / / End Date* / /

Start Time* End Time* Contact Hours*

City*

State* ZIP Code*

Training Method*
Bubble in ONE item that represents the method by which training is being delivered.
 Resident Mobile Indirect

Instructor Point of Contact

Last Name*

First Name*

Part 2: Student Information

Last Name*

First Name* Middle Initial

Agency

Job Title

Work Address

Work Address 2

City*

State* ZIP Code* Work Phone Number* () - -

Email Address

Level of Government*
Bubble in ONE item that best describes your level of government.
 Local State Federal (DHS) Federal (Non-DHS) Not Applicable

Student Discipline*
Bubble in ONE item that best describes your discipline.

<input type="radio"/> Agricultural Safety (Pre and Post Harvest) (AGS)	<input type="radio"/> Governmental Administrative (GA)	<input type="radio"/> Public Health (PH)
<input type="radio"/> Animal Emergency Services (AES)	<input type="radio"/> Hazardous Materials (HM)	<input type="radio"/> Public Safety Communications (PSC)
<input type="radio"/> Citizen/Community Volunteer (CV)	<input type="radio"/> Healthcare (HC)	<input type="radio"/> Public Works (PW)
<input type="radio"/> Emergency Management (EM)	<input type="radio"/> Information Technology (IT)	<input type="radio"/> Search & Rescue (SR)
<input type="radio"/> Emergency Medical Services (EMS)	<input type="radio"/> Law Enforcement (LE)	<input type="radio"/> Transportation Security (Air, Water, Ground, Port) (TS)
<input type="radio"/> Fire Service (FS)	<input type="radio"/> Private Sector/Corporate Security and Safety Professionals (PSP)	<input type="radio"/> Other (OTH)

Confidentiality of Information: Your responses and all personal information will remain confidential. Any reporting of data will be done anonymously in an aggregated fashion, without names or identifiers. Public Reporting Burden: Paperwork Reduction Act Notice. Under the Paperwork Reduction Act, a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. Forms are created and instructions are provided so that they are accurate and can be easily understood while imposing the least possible burden on you to provide the requested information. The estimated average time to complete and file this application is 15 minutes per form. If you have any comments regarding the accuracy of this estimate or suggestions for making this form simpler, please send to U.S. DHS / FEMA Room 2106b, North Tower, Tech World Bldg., 500 C Street, SW, Washington, D.C. 20472.

APPENDIX B:

AWR 148 Pretest Instrument



AWR 148: Crisis Management for School-Based Incidents - Partnering Rural
Law Enforcement and Local School Systems

Pre-Test

1. The term "Buddy Teacher" in school emergency management refers to an educator who
 - a) Has been awarded a Board Certification by the state in which they teach
 - b) Attends ride along training with law enforcement
 - c) Manages students of another teacher who is working a crisis event
 - d) None of the above

2. Domestic violence spill over most directly refers to
 - a) Football rivalry causing campus unrest
 - b) Spousal abuse occurring on campus
 - c) Militia activity occurring within the campus setting
 - d) None of the above

3. Identify the four types of threats as presented in this course
 - a) Direct, Indirect, Veiled, Conditional
 - b) Dependent, Independent, Veiled, Compound
 - c) Differentiated, Indifferent, Vocal, Composite
 - d) None of the above

4. The term "copy-cat" event refers to an incident that is perpetrated by
 - a) Someone who perpetrates the incident for a group such as A.L.F.
 - b) Someone who is directed by schizophrenic and delusional neurosis
 - c) Someone who replicates the incident following a previous like crisis
 - d) None of the above

5. Behavioral profiling via TAM as discussed in this course refers to
 - a) Modifying a threatening individuals behavior via expulsion
 - b) Investigative and operational activities to mitigate threats
 - c) Identifying threats based upon physical characteristics and gender
 - d) None of the above



6. Targeted violence refers to
 - a) When someone targets an act of violence at the school to cause property loss and campus unrest
 - b) Incidents where the perpetrator and victim are identified prior to the incident
 - c) Random acts against a group of like minded individuals
 - d) None of the above

7. For a Lockdown Level 3, where is the threat located in relationship to the school building and what should the classroom environment be like upon law enforcements arrival to the scene?
 - a) Threat exterior to building and regular classroom activity
 - b) Threat interior to building and regular classroom activity
 - c) Threat interior to building and administrative staff are in halls to update law enforcement
 - d) Threat interior to building and all staff and students are out of line of sight

8. The shelter-in-place response by schools is initiated due to
 - a) Active shooter event on campus or in close proximity
 - b) Marshall law order to control population during an epidemic
 - c) A potential danger from a chemical release into atmosphere
 - d) None of the above

9. Shelter-in-place at a school is best achieved using
 - a) Duct tape only around windows
 - b) Placing moist cloth around doors and windows to serve as a filter medium to reduce contaminate flow into occupied space
 - c) Wrapping duct tape around your nose and mouth to prohibit the inhalation of contaminates
 - d) None of the above

10. Dual Gate Parent Reunification refers to a procedure to
 - a) Ensure students are reunited with their lawful guardians
 - b) Make certain mother and father are reunited post-incident
 - c) Allows for rapid return of parents to students through multiple portals
 - d) None of the above

11. Law Enforcement's critical role in Dual Gate Parent Reunification is to
 - a) Direct traffic
 - b) Offer CISM guidance
 - c) Maintain order
 - d) None of the above



12. For a Lockdown Level 1, where is the threat located in relationship to the school building and what should the classroom environment be like upon law enforcements arrival to the scene?
- a) Threat exterior to building and regular classroom activity
 - b) Threat interior to building and regular classroom activity
 - c) Threat interior to building and administrative staff are in halls to update law enforcement
 - d) Threat interior to building and all staff and students are out of line of sight
13. The primary purpose of school-based incident mental health defusing and debriefing sessions for responders and victims is to
- a) Promote safety and security while exploring the trauma experience
 - b) Identify specific psychosis of victims and their peers
 - c) Return victims to normalcy within 72 hour period
 - d) None of the above
14. The Targeted violence process suggests that individuals move through four phases before responding with violence, the progression suggested is
- a) Preparation, Ideation, Planning, Implementation
 - b) Ideation, Preparation, Planning, Implementation
 - c) Ideation, Planning, Preparation, Implementation
 - d) None of the above
15. Joint press conferences refer to
- a) Collaborative roles of law enforcement and schools in post-crisis communications to provide appropriate and accurate information
 - b) Media releases from the school focusing on marijuana usage
 - c) Establishing a time to meet with the media that restricts their ability to report the story during peak news coverage
 - d) None of the above

APPENDIX C:
AWR 148 Posttest Instrument



AWR 148: Crisis Management for School-Based Incidents - Partnering Rural Law Enforcement and Local School Systems

Post-Test

1. The term "copy-cat" event refers to an incident that is perpetrated by
 - a) Someone who perpetrates the incident for a group such as A.L.F.
 - b) Someone who is directed by schizophrenic and delusional neurosis
 - c) Someone who replicates the incident following a previous like crisis
 - d) None of the above
2. Dual Gate Parent Reunification refers to a procedure to
 - a) Ensure students are reunited with their lawful guardians
 - b) Make certain mother and father are reunited post-incident
 - c) Allows for rapid return of parents to students through multiple portals
 - d) None of the above
3. Domestic violence spill over most directly refers to
 - a) Football rivalry causing campus unrest
 - b) Spousal abuse occurring on campus
 - c) Militia activity occurring within the campus setting
 - d) None of the above
4. Behavioral profiling via TAM as discussed in this course refers to
 - a) Modifying a threatening individuals behavior via expulsion
 - b) Investigative and operational activities to mitigate threats
 - c) Identifying threats based upon physical characteristics and gender
 - d) None of the above
5. Targeted violence refers to
 - a) When someone targets an act of violence at the school to cause property loss and campus unrest
 - b) Incidents where the perpetrator and victim are identified prior to the incident
 - c) Random acts against a group of like minded individuals
 - d) None of the above
6. The shelter-in-place response by schools is initiated due to
 - a) Active shooter event on campus or in close proximity
 - b) Marshall law order to control population during an epidemic
 - c) A potential danger from a chemical release into atmosphere
 - d) None of the above



7. Identify the four types of threats as presented in this course
 - a) Direct, Indirect, Veiled, Conditional
 - b) Dependent, Independent, Veiled, Compound
 - c) Differentiated, Indifferent, Vocal, Composite
 - d) None of the above

8. Shelter-in-place at a school is best achieved using
 - a) Duct tape only around windows
 - b) Placing moist cloth around doors and windows to serve as a filter medium to reduce contaminate flow into occupied space
 - c) Wrapping duct tape around your nose and mouth to prohibit the inhalation of contaminates
 - d) None of the above

9. The term "Buddy Teacher" in school emergency management refers to an educator who
 - a) Has been awarded a Board Certification by the state in which they teach
 - b) Attends ride along training with law enforcement
 - c) Manages students of another teacher who is working a crisis event
 - d) None of the above

10. For a Lockdown Level 3, where is the threat located in relationship to the school building and what should the classroom environment be like upon law enforcements arrival to the scene?
 - a) Threat exterior to building and regular classroom activity
 - b) Threat interior to building and regular classroom activity
 - c) Threat interior to building and administrative staff are in halls to update law enforcement
 - d) Threat interior to building and all staff and students are out of line of sight

11. Law Enforcement's critical role in Dual Gate Parent Reunification is to
 - a) Direct traffic
 - b) Offer CISM guidance
 - c) Maintain order
 - d) None of the above

12. The primary purpose of school-based incident mental health defusing and debriefing sessions for responders and victims is to
 - a) Promote safety and security while exploring the trauma experience
 - b) Identify specific psychosis of victims and their peers
 - c) Return victims to normalcy within 72 hour period
 - d) None of the above



13. The Targeted violence process suggests that individuals move through four phases before responding with violence, the progression suggested is
- a) Preparation, Ideation, Planning, Implementation
 - b) Ideation, Preparation, Planning, Implementation
 - c) Ideation, Planning, Preparation, Implementation
 - d) None of the above
14. Joint press conferences refer to
- a) Collaborative roles of law enforcement and schools in post-crisis communications to provide appropriate and accurate information
 - b) Media releases from the school focusing on marijuana usage
 - c) Establishing a time to meet with the media that restricts their ability to report the story during peak news coverage
 - d) None of the above
15. For a Lockdown Level 1, where is the threat located in relationship to the school building and what should the classroom environment be like upon law enforcements arrival to the scene?
- a) Threat exterior to building and regular classroom activity
 - b) Threat interior to building and regular classroom activity
 - c) Threat interior to building and administrative staff are in halls to update law enforcement
 - d) Threat interior to building and all staff and students are out of line of sight

APPENDIX D:

MGT 335 Pretest Instrument

NAME: _____

DATE: _____

Event Security Planning for Public Safety Professionals Pretest

1. What is NOT considered a characteristic of a planned event?
 - a) Unique, not routine in nature
 - b) Usually held at outdoor venues
 - c) Stresses local resources
 - d) Usually attracts large crowds

4. The security plan **should not** detract from the planned event's purpose; however the security plan **should** provide a means to _____, _____ or _____ any type of credible threat surrounding the event.
 - a) Prevent, Delay, Protect
 - b) Deter, Delay, Desist
 - c) Prevent, Deter, Mitigate
 - d) Prevent, Mitigate, Absolve

5. The three types of intelligence referred to in the Department of Homeland Defense's Target capabilities List (TCL) dated Aug 2006 are _____, _____ and _____.
 - a) Tactical, Operational, Global
 - b) Operational, Strategic, Global
 - c) Unit, Operational, Strategic
 - d) Tactical, Operational, Strategic

6. What are the 5 phases of the Intelligence Cycle?
 - a) Planning/Direction, Collection, Analysis/Production, Dissemination, Evaluation
 - b) Determination, Collection, Refinement, Dissemination, Feedback
 - c) Assessment, Analysis, Reliability, Production, Dissemination
 - d) Source Identification, Collection, Production, Dissemination, Evaluation

7. What are considered to be the 4 types of Intelligence Resources?
 - a) Media, Informants, External, Task Forces
 - b) Private Security, Government, Media, Informants
 - c) Open Source, Internal, Covert, External
 - d) Overt, Covert, Internal, External

8. Risk assessment is a _____ that looks at the overall danger associated with an event.
- a) Evolving Theory
 - b) Investigative Process
 - c) Mathematical Algorithm
 - d) Analytical Process
9. What are the three areas normally addressed during the risk assessment?
- a) Assets, Threats, Hazards
 - b) Risks, Assets, Impacts
 - c) Threats, Vulnerabilities, Impacts
 - d) Assets, Vulnerabilities, Hazards,
10. What is NOT considered a type of protestor tactic which requires Law Enforcement crowd control measures?
- a) Auditory Distraction
 - b) Civil Disobedience
 - c) Direct Action
 - d) Violent Criminal Action
11. Access management involves the use of 4 security concepts which are Access Control, Surveillance/Detection, Systems Integration and _____
- a) Redundancy
 - b) Information Sharing
 - c) Layered Security
 - d) Situational Awareness
12. The three core factors that can impact traffic and transportation operations during a planned event are:
- a) Crowd Size, Venue Capacity, Law Enforcement Resources
 - b) Event Operation, Travel Demand, Road/Site Capacity
 - c) Law Enforcement Resources, Road Construction, Travel Demand
 - d) Crowd Size, Ingress/Egress, Law Enforcement Resources
13. The 3 areas that communications interoperability directly affects and impacts are:
- a) ICS, Emergency Management, Resource Management
 - b) Situational Awareness, ICS, Chain of Command
 - c) Command and Control, Task Organization, ICS
 - d) Situational Awareness, Resource Management, Command and Control

14. The 3 building blocks of an effective Command and Control system are:
- a) Functions, Training, Reliability
 - b) Organization, Experience, Protection
 - c) Structure, Personnel, Equipment
 - d) Doctrine, Personnel, Equipment
15. The 3 types of support agreements normally used by law enforcement to augment resource capabilities for any event are a Memorandum of Agreement (MOA), Mutual Aid Agreement (MAA), and _____.
- a) Memorandum of Compensation (MOC)
 - b) Memorandum for Record (MFR)
 - c) Memorandum of Understanding (MOU)
 - d) Memorandum of Reciprocal Aid (MORA)
16. A method used to develop many of the Homeland Security concepts for ensuring our nation is prepared to defend against national threats and can be applied to determining manpower and resource requirements for planned events is known as _____ Planning.
- a) Resource Identification
 - b) Capability Based
 - c) Target Capabilities
 - d) Emergency Management
17. ICS principles are implemented through a wide variety of management features which contribute to the strength and efficiency of the overall system. How many management features are commonly associated with ICS?
- a) 12
 - b) 10
 - c) 14
 - d) 16
18. The Command Staff of the ICS organizational structure include the Public Information Officer, the Safety Officer and the _____ Officer.
- a) Liaison
 - b) Communications
 - c) Administration
 - d) Logistics

19. Tone and style are two keys things for law enforcement officers to understand about handling the media. The 3 P's are a quick reminder of what the public expects to hear from you as spokesman after an incident. What are the 3 P's?
- a) Praise, Patience, Performance
 - b) Pity, Patience, Pride
 - c) Passion, Pride, Praise
 - d) Pity, Praise, Pledge
20. During an incident the media will generally have operating patterns or characteristics which become very evident; which of the following does NOT characterize media dynamics during an incident.
- a) The media will arrive in large numbers and well resourced
 - b) The media wants to make story timely and dramatic
 - c) The media will try to keep close hold information they ascertain from other sources
 - d) The media wants to be professional and accurate

APPENDIX E:
MGT 335 Posttest Instrument

NAME: _____

DATE: _____

Event Security Planning for Public Safety Professionals Post – Test

1. Access management involves the use of 4 security concepts which are Access Control, Surveillance/Detection, Systems Integration and _____
 - a) Redundancy
 - b) Information Sharing
 - c) Layered Security
 - d) Situational Awareness

2. The primary role of the security planner in briefing the security plan is to:
 - a) Instill confidence and credibility
 - b) Provide security solutions
 - c) Serve as security subject matter expert
 - d) Coordinate with all security agencies

3. ICS principles are implemented through a wide variety of management features which contribute to the strength and efficiency of the overall system. How many management features are commonly associated with ICS?
 - a) 12
 - b) 10
 - c) 14
 - d) 16

4. The 3 areas that communications interoperability directly affects and impacts are:
 - a) ICS, Emergency Management, Resource Management
 - b) Situational Awareness, ICS, Chain of Command
 - c) Command and Control, Task Organization, ICS
 - d) Situational Awareness, Resource Management, Command and Control

5. Tone and style are two keys things for law enforcement officers to understand about handling the media. The 3 P's are a quick reminder of what the public expects to hear from you as spokesman after an incident. What are the 3 P's?
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 - b) Pity, Patience, Pride
 - c) Passion, Pride, Praise
 - d) Pity, Praise, Pledge

6. The security plan **should not** detract from the planned event's purpose; however the security plan **should** provide a means to _____, _____ or _____ any type of credible threat surrounding the event.
- a) Prevent, Delay, Protect
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 - d) Prevent, Mitigate, Absolve
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 - b) Capability Based
 - c) Target Capabilities
 - d) Emergency Management
9. What are the 5 phases of the Intelligence Cycle?
- a) Planning/Direction, Collection, Analysis/Production, Dissemination, Evaluation
 - b) Determination, Collection, Refinement, Dissemination, Feedback
 - c) Assessment, Analysis, Reliability, Production, Dissemination
 - d) Source Identification, Collection, Production, Dissemination, Evaluation
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- a) Auditory Distraction
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 - d) Crowd Size, Ingress/Egress, Law Enforcement Resources

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- a) Unique, not routine in nature
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18. The 3 types of support agreements normally used by law enforcement to augment resource capabilities for any event are a Memorandum of Agreement (MOA), Mutual Aid Agreement (MAA), and _____.
- a) Memorandum of Compensation (MOC)
 - b) Memorandum for Record (MFR)
 - c) Memorandum of Understanding (MOU)
 - d) Memorandum of Reciprocal Aid (MORA)
19. The Command Staff of the ICS organizational structure include the Public Information Officer, the Safety Officer and the _____ Officer.
- a) Liaison
 - b) Communications
 - c) Administration
 - d) Logistics
20. The main reasons to ensure that our event security plans are formalized and developed into written documents is because they add to our ability to Hold Accountability, Assign Responsibility, Use as an Operations Handbook, Use as Historical Records and _____.
- a) Conduct Rehearsals
 - b) Develop Task Organization
 - c) Conduct Coordination
 - d) All of the Above

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Justice and Safety Center
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Berea, KY 40403
(859) 228-0448

EDUCATION

2009 – Present

Currently Enrolled:

Eastern Kentucky University: Richmond, Kentucky

Doctor of Education Degree

Educational Leadership and Policy Studies

Doctoral Candidate – All But Dissertation (ABD) Status

1999 – 2001

Eastern Kentucky University: Richmond, Kentucky

Master of Science Degree

Criminal Justice with a concentration in Police Administration

Thesis: “Simulation Training for Law Enforcement”

1995 – 1999

Murray State University: Murray, Kentucky

Bachelor of Science Degree

Criminal Justice Major / Sociology Minor

WORK EXPERIENCE

August 2011 -
Present

Eastern Kentucky University College of Justice and Safety

Department of Safety, Security, and Emergency Management

Assistant Professor – Homeland Security (Tenure-Track)

Primary Duties:

- Teach online and on-campus undergraduate courses in the Department of Safety, Security and Emergency Management
- Develop online courses in the Department of Safety, Security and Emergency Management
- Serve on the College of Justice and Safety Strategic Planning Committee

December 2008 – Eastern Kentucky University Justice and Safety Center
August 2011 **Director – Homeland Security Programs**

Primary Duties:

- Oversight of the daily activities of two U.S. Department of Homeland Security/Federal Emergency Management Agency (DHS/FEMA) programs:
 - Rural Domestic Preparedness Consortium (RDPC)
 - Integrated Public Alert and Warning System Conformance Assessment Program (IPAWS/CAP)
- Supervision of five Associate Directors with program management responsibilities (*The Justice and Safety Center employs 22 full-time employees.*)
- Provision of overall quality control and assurance on all program aspects
- Facilitation of meetings with various topics as well as the delivery of briefings to project sponsors and stakeholders
- Oversight of budget and contracts management as well as human resource related items

January 2001 - Eastern Kentucky University
May 2011 Department of Safety, Security, and Emergency Management
Department of Criminal Justice and Police Studies
Adjunct Faculty

Primary Duties:

- Instruction of one to two courses per semester as deemed necessary by the academic department
 - Instruction of six different undergraduate courses at EKU, two of which have been taught during multiple semesters (*See Teaching Experiences in Vita*)
- Design and implementation of course curriculum for two courses
- Extensive utilization of the Blackboard Learning Management System for the online components of the courses
- Served as a course facilitator for HLS 810 on two separate occasions and conducted video recording sessions for two modules within the course

October 2003 – Eastern Kentucky University Justice and Safety Center
November 2008 **Deputy Director – Technology and Information Services**

Primary Duties:

- Directed the Technology and Information Services unit within the JSC
- Lead content selection and acquisition for the DHS Science and Technology Directorate's TechClearinghouse
- Assisted with the management of the DHS/FEMA National Incident Management System Support Center and the evaluation and prototype development of advanced public safety and security technologies.

September 2001– Eastern Kentucky University Justice and Safety Center
September 2003 **Assistant Director for Law Enforcement Technology**

Primary Duties:

- Managed the technical aspects of a project's lifecycle for JSC's federally funded projects
- Provided daily coordination and tracking of technology projects for the U.S. Department of Justice (USDOJ)
- Disseminated information to assorted audiences through public speaking at various events and the production of reports/related materials

June 2000– Eastern Kentucky University Justice and Safety Center
September 2001 **Law Enforcement Research and Technology Specialist**

Primary Duties:

- Provided technical support of the USDOJ Rural Law Enforcement Technology Center.
- Served as project lead for law enforcement technology related projects

August 1995 – Murray State University Police Department
May 1999 **Racer Patrol Division Supervisor**

Primary Duties:

- Supervised fifteen (15) college security officers
- Conducted parking enforcement, special event security, radio communications, traffic safety, and the general safeguarding of life and property of the Murray State University community

TEACHING EXPERIENCE

Eastern Kentucky University Safety, Security, and Emergency Management:

Fall 2011, Spring 2012	HLS 101: Introduction to Homeland Security
Spring & Fall 2011, Spring 2012	APS 210: Physical Security
Spring 2007, 2008, 2009	APS 210: Vulnerability and Risk Assessments
Fall 2003, Spring 2005, 2006	APS 210: Security Systems Integration
Fall 2008, 2010, 2011, Spring 2012	HLS 441: Homeland Security Technology

Fall 2006	APS 435: Homeland Security Technology
Spring 2009, 2010, 2011	HLS 810: Critical Infrastructure Protection <i>Online Graduate Course Facilitator</i>
<i>Eastern Kentucky University Criminal Justice and Police Studies:</i>	
Fall 2004, 2005	PLS 408: Police Technology
Spring 2003, Summer 2005	PLS 220: Criminal Investigations
Summer 2002	CRJ 406: Advanced Topics in Criminal Justice
Spring 2002	PLS 103: Foundations of Policing
Spring 2001	PAD 330: Police Use of Technology

Other:

Spring 2007	<i>“Security Management and Marketing Program”</i> : Mongolian Security Executives
Spring 2003, 2004, 2005	<i>“Law Enforcement Technology”</i> Kentucky Department of Criminal Justice Training (DOCJT) Criminal Justice Executive Development

PUBLICATIONS

- Baggett, R.K.** & Collins, P.A. (2012). *Vulnerability Assessments*. In Dunlap, S. (Ed.) School Safety.
- Collins, P.A. & **Baggett, R.K.** (2011). *Aging of America’s Critical Infrastructure*. In Shally-Jensen, M. (Ed.) Encyclopedia of Contemporary American Social Issues. ABC – CLIO, Inc., Santa Barbara, CA.
- Collins, P.A. & **Baggett, R.K.** (2011). *Technological Surveillance*. In Shally-Jensen, M. (Ed.) Encyclopedia of Contemporary American Social Issues. ABC – CLIO, Inc., Santa Barbara, CA.
- Collins, P.A. & **Baggett, R.K.** (2010). *Private security intelligence and homeland security*. In Logan, K. (Ed.) Homeland Security and Intelligence. Praeger Security International. Westport, CT.

- Collins, P.A. & **Baggett, R.K.** (2009). Critical Infrastructure Protection. Praeger Security International. Westport, CT.
- Baggett, R.K.**, Collins, P.A., & Scarborough, K.E. (2007). *Technological Surveillance*. In Gregg Barak (Ed.) Battleground Criminal Justice. Greenwood Press. Westport, Connecticut.
- Scarborough, K.E., Collins, P.A., & **Baggett, R.K.** (2007). *Surveillance Technology and the Law*. In C. Hemmens (Ed.), Current Legal Issues in Criminal Justice. Roxbury Publishing Company. Los Angeles, CA.
- Baggett, R.K.** & Cordner, AM. (2005). Evaluation of a mobile firearm simulation system. In L. Moriarty (Ed.), *Criminal Justice Technology in the 21st Century (2nd Ed)*. Charles C. Thomas Publisher, Ltd. Springfield, IL.
- Baggett, R.K.**, Collins, P.A., & Cordner, AM. (2005). Evaluation of computer based training for DNA evidence collection. In L. Moriarty (Ed.), *Criminal Justice Technology in the 21st Century (2nd Ed)*. Charles C. Thomas Publisher, Ltd. Springfield, IL.
- Baggett, R.K.** (2005). Federal Air Marshall Program. In Encyclopedia of Law Enforcement (Vol.2 – Federal, pp.653-654). Sage Publications. Thousand Oaks, CA.

PROFESSIONAL PRESENTATIONS

- “Critical Infrastructure Protection: Lessons Learned from U.S. Tragedies” (November 2011). The Dragon and the Bear: Strategic Choices of China and Russia”. 11th Aleksanteri Conference. Helsinki, Finland.
- “Zotero Instruction Workshop” (September 2011). Noel Academic Studio – Eastern Kentucky University. (Collaboration with University Librarian Cindy Judd).
- “9/11 Ten Years Later” (September 2011). Invited presentation to Garrard County High School – Lancaster, KY.
- “Introduction to Homeland Security” (July 2011). Invited presentation to Congressman Roger’s “Roger’s Explorers” Program. Eastern Kentucky University.
- “Data Management Demystified: Using Zotero in Professional Learning” (May 2011). Kentucky Converging Trends Conference – Northern Kentucky University – Erlanger, KY.

- “Rural Training in the United States” (April 2010). Missouri State Emergency Management Conference – Branson, MO.
- “Rural Domestic Preparedness Consortium” (February 2009). U.S. Department of Homeland Security, Region 6 Regional Interagency Steering Committee (RISC) Meeting - Ft. Worth, TX.
- “National Incident Management System: Forecast for 2008.” (November 2007) U.S. Department of Homeland Security & U.S. Department of Justice Critical Incident Conference: San Francisco, CA.
- "Surveillance Technologies for Correctional Applications" (September 2004). Correctional Security Conference: Cincinnati, OH.
- “IACP Crime Prevention Survey Results.” (October 2003). 49th Annual International Association of Chiefs of Police (IACP) Conference: Philadelphia, PA.
- “Small and Rural Law Enforcement: Technology Assessments and Applications. (September 2003). Annual Meeting of the Southern Criminal Justice Association (SCJA), Nashville, TN.
- “Surveillance Technologies for Law Enforcement.” (March 2003). Annual Meeting of the Academy of Criminal Justice Sciences, Boston, MA.
- “Evaluation of Computer Based Training” (with Dr. Kay Scarborough) (March 2003). Annual Meeting of the Academy of Criminal Justice Sciences, Boston, MA.
- “School Critical Incident Planning.” (with Dr. Pam Collins) (January 2002). National Institute of Justice School Safety Symposium, Arlington, VA.
- “Evaluation of a Mobile Firearms Simulation System: PRISim™.” (March 2001). Annual Meeting of the Academy of Criminal Justice Sciences, Washington, DC.
- “Simulation and Training Initiatives for Small and Rural Law Enforcement Agencies.” (October 2000). NIJ Rural Law Enforcement Technology Fair and Symposium, Somerset, KY.
- “From Lo-Jack™ to Hijack: Emerging Applications of GPS and GIS for Searches and Security.” (May 2000). FRENZY – Forensics Sciences and Crime Scene Technology Conference and Exposition, Washington, D.C.
- “The New Forensic Correspondence Courses: Continuing Education through Interactive Multimedia.” (May 2000) FRENZY – Forensics Sciences and Crime Scene Technology Conference and Exposition, Washington, D.C.

- 2001 – 2007: **Rural Law Enforcement Technology Center**
 Funded by: U.S. Department of Justice
 National Institute of Justice
 Award #: 2001-MU-MU-K009
- 2000 – 2004: **National Assessment of Technology and Training**
 Funded by: U.S. Department of Justice
 National Institute of Justice
 Award #: 1999-LT-VX-K022
- 1999 – 2006: **Kentucky Advanced Technology and Training**
 Funded by: U.S. Department of Justice
 National Institute of Justice
 Award #: 1999-LT-VX-K006

PROFESSIONAL AFFILIATIONS

- 2010 – Present Homeland Security and Defense Education Consortium
 Association
- 2005 – Present National White Collar Crime Research Consortium
- 2000 – 2010 International Association of Chiefs of Police – Associate Member
- 1999 – 2007 Academy of Criminal Justice Sciences (ACJS)
- 2001 – 2006 American Society for Industrial Security (ASIS)
- 2002 – 2003 Vice-Chair, ASIS Crime and Loss Prevention Council

SPECIALIZED TRAINING

United States Department of Homeland Security:

- March 2011 IS-00265: Basic Instructional Skills (*FEMA*)
- July 2010 IS-00703: NIMS Resource Management (*FEMA*)
- July 2010 ICS-100: Introduction to the Incident Command System
 (*FEMA*)

June 2010	IS-00860: Introduction to the National Infrastructure Protection Plan (<i>FEMA</i>)
June 2010	IS-00100: Introduction to the Incident Command System for Higher Education (<i>FEMA</i>)
May 2010	Technology for Homeland Security: Inspection and Detection Technologies (<i>Center for Homeland Defense and Security</i>)
November 2005	IS-700: National Incident Management System (<i>FEMA</i>)

Other:

October 2011	CARVER Vulnerability Assessment Course (18 hour block, Las Vegas, NV)
October 2008	Human Subjects in Social and Behavioral Research - (<i>Collaborative Institutional Training Initiative</i>)
September 2008	Preventing Employee Discrimination and Sexual Harassment in the Workplace - (<i>New Media Learning, LLC</i>)
Summer 2002	Project Management (40 hour block, Chicago, IL) – (<i>IJIS Institute</i>)
Winter 2001	Closed Circuit Television (40 hour block, Seattle, WA) – (<i>ASIS International</i>)
Spring 1999	Ethnograph™ version 5.0 Training (8 hour block)

References, Transcripts, Course Materials, and Letters of Recommendation Available Upon Request