Learning actions of fire fighters using best practices
by Brian Martin Crandell

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Education in Education
Montana State University

Abstract:
Fire fighters, nationally and in Montana, face significant hazards in their work.

To work effectively and avoid injury and death, fire fighters must effectively train in many subject areas. Fire fighters, as adult learners, learn by various learning actions from various sources. This study examined the learning actions and learning sources used by selected fire fighters recognized as using best practices in preparing a safe and competent workforce.

This qualitative research used researcher-developed interview questions, a rating of sources questionnaire, and observation of artifacts to investigate the learning actions and learning sources used by selected fire fighters who were recognized as using best practices in preparing a safe and competent workforce. The participants were selected by a group of Montana fire fighters who served as field staff members or advisory council members from the Montana Fire Services Training School. Each of the 15 members of the selection group identified fire fighters they recognized as using best practices in preparing a safe and competent workforce.

Nineteen participant fire fighters were recognized as using best practices in preparing a safe and competent workforce. The participants were from 17 fire service organizations and included fire service members with the ranks of fire fighter, fire officer and fire chief. The participants provided demographic information about themselves, their communities, and their organizations. The participants rated learning sources in terms of the relevance and frequency of use. They answered seven open-ended interview questions regarding learning sources and actions and provided access to artifacts including technology, facilities, procedures and records. The top learning sources and actions included observation of the deployment of fire fighters during training/drills and incidents/responses, networking with other fire fighters, and the educational products and services provided by the Montana Fire Services Training School including the resource center, electronic newsletter, courses and consultancy services. The artifacts supported the interview and survey data gathered from the participants.

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Brian Martin Crandell

This dissertation has been read by each member of the dissertation committee and has been found to be satisfactory regarding content, English usage, format, citations, bibliographic style, and consistency, and is ready for submission to the College of Graduate Studies.

Dr. Gloria Gregg _____ (Signature) 4-19-04 Date

Approved for the Department of Education

Dr. Robert Carson _____ (Signature) 4-19-04 Date

Approved for the College of Graduate Studies

Dr. Bruce McLeod _____ (Signature) 4-22-04 Date

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ABSTRACT

Fire fighters, nationally and in Montana, face significant hazards in their work. To work effectively and avoid injury and death, fire fighters must effectively train in many subject areas. Fire fighters, as adult learners, learn by various learning actions from various sources. This study examined the learning actions and learning sources used by selected fire fighters recognized as using best practices in preparing a safe and competent workforce.

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CHAPTER 1

INTRODUCTION

Background of the Study

Fire is a significant problem in America. Each year fires kill 4,000 people and tens of thousands are injured. The number of fire deaths in America is 20 times the number of deaths from all other natural disasters combined. In a typical year, 100 fire fighters are among those killed by fire and 87,000 fire fighters are among those injured (USFA, 2002). Many fire fighter fatalities and injuries are preventable.

Fire fighter training programs can help reduce the incidence of fire fighter deaths and the severity of fire fighter injuries. Training prepares fire fighters to perform their work in a standard and safe manner. Training also helps fire fighters recognize potential hazards and take preventative action prior to an accident occurring, thus reducing injuries and death.

Fire fighter training occurs in several ways in Montana. Fire fighters receive training from the fire department in which s/he is a member. Fire fighters also receive training from sources outside their fire department. Fire fighter training programs are available for fire fighters in Montana from the Montana Fire Services Training School (MFSTS), a part of the Montana State University Extension Service. The MFSTS provides fire fighter training by direct training delivery to fire fighters and by supporting fire fighter training programs within fire departments.

Part of the work of MFSTS is to design and implement training programs that help improve fire fighter safety by helping fire departments prepare a safe, competent workforce. Often an indication of the need for a training program is an incident that results in the injury or death of a fire fighter. Many incidents involving injury or death of fire fighters receive extensive review.

Incident reviews, or critiques, address causal factors related to fire fighter injury or death. They also identify lessons learned or reinforced and suggest action plans for reducing the likelihood of similar occurrences. The lessons and action plans are an important foundation in fire fighter training programs used in the preparation of a safe and competent workforce. These training programs are delivered by MFSTS staff and are provided to fire department trainers for their use in delivery of these programs within their department.

In support of fire departments developing a safe, competent workforce, MFSTS training programs address the full range of fire service topics using many delivery mechanisms and approaches. MFSTS fire fighter training programs are available every day of the week, at all hours of the day and night. These programs are offered at many locations throughout Montana. Training programs are also developed for specific needs of individual fire fighters or groups of fire fighters. The training delivery methods and approaches used by the MFSTS staff are grounded in contemporary adult education methodology.

The MFSTS staff is committed to developing programs that meet the needs of its adult education customers. An important part of developing and delivering fire service adult education programs in Montana is understanding what program characteristics are

most effective for the fire fighter. In order to be a fire fighter one must be an adult, thus it makes sense to review adult learning theory.

One adult education theory suggests that effective educational program development and delivery are closely tied to understanding the adult learner. Understanding what learning sources learners use and what learning actions the learner takes can facilitate the effective implementation of an educational program.

By understanding how adults learn and what sources they find relevant and use, adult educators can design and implement appropriate programs. Adult education programs must be founded on the needs of the learner. They must be designed in a way that addresses the learning actions taken by learners.

Montana fire fighters face demanding work in a state with dynamic community needs. The service demands they must face today are a combination of old, well-established hazards and new emerging hazards. For fire fighters to be successful, they must survive the work they perform. To prepare to operate in a safe and competent manner, fire fighters have and will actively participate in many training programs. Those training programs will be most effective when the fire service adult educators design the program to address the needs of the fire fighter learner.

In order for fire fighters to access effective training and practice, that training and practice must be available. Developing relevant, valid, proactive training and practice products is achievable through established curriculum development processes. Creating opportunities and gateways for the learners to access these products is a challenge that can be effectively met by understanding what methods learners use to first encounter such information.

Fire Fighter Training in Montana

The Montana Fire Services Training School estimates that approximately 10,000 fire fighters operating through 350 local fire departments serve Montana. Montana fire departments range in size of membership from 104 fire fighters (Billings) to four fire fighters (Clarkston).

Fire fighters participate in numerous training opportunities. Members of a fire department may provide some training opportunities to other members. Fire service trainers from outside the fire fighter's department provide other training. In Montana, fire service training is provided on a statewide basis by the Fire Services Training School (MFSTS). The mission of the MFSTS is to build capability in local governments for protecting the safety of citizens, their property, the tax base and infrastructure from harm caused by unwanted fires, accidents, injuries, hazardous materials incidents and other emergencies (MFSTS, 2003). MFSTS operates with its purpose detailed in Montana Codes Annotated (MCA) Section 20-31-103. The purpose has five components, which are:

1. provide fire service personnel with professional training;
2. identify new methods of fire prevention and suppression and disseminate information about them;
3. provide a resource center for use by local fire services;
4. provide testing and certification for personnel and apparatus; and
5. coordinate fire services training in the state (MFSTS, 2003).

Fire service trainers working for MFSTS deliver training to fire fighters in their communities. The trainers provide information that is localized to meet the needs of the fire fighters and their communities. The community-based nature of this form of educational program delivery is consistent with the mission of the MFSTS hosting

agency, Montana State University Extension Service. The mission of the Montana State University Extension Service is "... an educational resource dedicated to improving the quality of people's lives by providing research based knowledge to strengthen the social, economic, and environmental well-being of families, communities and agricultural enterprises" (MSU Extension, 2003, para 1).

There is a mandate by statute and mission for the Montana Fire Services Training School to provide training for the professional development of fire fighters in Montana. Effectively meeting that charge was based, in part, on understanding what learning methods fire fighters find most useful.

The Work of Fire Fighters

Fire fighters in Montana face many challenges. They face familiar hazards such as fires in homes and businesses and new challenges such as responding to clandestine methamphetamine manufacturing labs, criminal and terrorist incidents, and fires in the forests that threaten to destroy homes. Meeting those operational challenges requires that fire fighters engage in continual learning.

As first responders to emergencies, fire fighters face life threatening, unforgiving, and dynamic hazards and challenges. Fire fighters are successful in providing first response to emergency situations to the extent they know their business, are serious about delivering their services, and arrive at the emergency inclined to aggressively deliver their services. Fire departments must quickly assemble a set of highly skilled workers who will work inside a plan. The work they do is fundamental to handle emergencies effecting people, property, or the environment. That interruption frequently involves

physically placing their bodies between their customer and what is trying to kill or harm that individual. The intervention services must be delivered by the manual labor of fire fighters. The work of a fire fighter takes place in working conditions that include compressed time frames, severe consequences for their customers and themselves, poor or nonexistent information about exactly what the parameters of the emergency are, and an environment where everyone is stressed. Compounding these challenging working conditions are the constantly evolving hazards fire fighters face.

In order for fire fighters to safely deliver first response emergency services, they must understand the hazards facing their communities and the strategies and tactics they can use to address those hazards. With changes in our world's technologies and social relationships come changes in the hazards faced by fire fighters. Responding effectively requires that fire fighters remain current in all aspects of their work. Staying abreast of all the hazards facing fire fighters is a constant fixture of their work throughout their tenure. Fire fighters must learn to survive.

Learning is part of the work of a fire fighter. The learning undertaken by a fire fighter is continual, diverse, and application driven. Fire fighters share many of the characteristics of classic adult learners. They must find the most up to date knowledge about the challenges currently faced. They must also develop skills and abilities that allow them to safely and aggressively deliver service. Every response provides an opportunity for learning as well. While experience is an invaluable teacher, there is great risk in using that source alone. Emergencies frequently give the test right before the lesson. That sequence of tests and learning can have fatal outcomes for responders and their customers. Fire fighters must combine experience with reflection and proactive

learning in order to survive and provide quality service. Fire fighter training and practice is the core of the proactive development of their skills and abilities.

Demand for emergency services approximates the population of an area. Generally, the greater the demand for service, the higher the need for diverse experiences of the responders delivering the services. Emerging hazards create especially dangerous conditions because responding fire fighters may find themselves in a situation they do not understand. In these situations, emergency responders are faced with the challenge of relatively infrequent (and in some cases, first time) responses and the resulting lack of experience. With limited response experience, first-hand learning opportunities based on actual experience are minimal.

Best Practices in Fire Services

Many fire fighter fatalities are preventable by the implementation of practices that are standard to the fire service. In the United States Fire Administration Fire Fighter Retrospective Study it is stated that, "some circumstances that lead to the death of fire fighters are simply beyond human control. Generally, however, most fire fighter fatalities are the result of a chain of events, which, if detected early, has the potential to be broken and prevent many, or even most, fatalities" (USFA, 2002, p. 3).

Fire service best practices are applicable across many fire departments. In the United States Fire Administration study, A Fire Service Needs Assessment, the general applicability of fire service best practices is stated

> In any community, fire burns the same way in the open or in enclosed spaces. Fire harms people and property in the same ways. And the resources and best practices required safely addressing the fire problem–or any other major

emergency–tending to be the same everywhere (USFA FA-240, 2002, p. 5).

The interest in reducing the negative effects of operating in the hazardous environments where fire fighters work is international in scope. Robeson (1999) asserts a similar perspective on the nature of circumstances where fire fighters are injured or killed. He states, "Almost no accidents happen when people take a calculated risk. They almost always occur when they are overtaken by a risk that was not calculated, or perhaps even foreseen" (p. 1).

Fire fighters can operate more safely if they know what to do and manage the execution of that knowledge. Robeson (1999) further supports the manageability of fire fighting by stating

> Safety is mostly the result of good management systems. If it's sensibly and creatively managed, then not only its safety, but its quality and productivity flow naturally. If its management systems are flawed, muddled, or driven by dysfunctional agendas, then poor outcomes, including accidents, can almost be inevitable (p. 2).

Fire fighters can learn to operate safely and prevent poor outcomes including accidents. Some of the strategies useful in causing high quality operations to happen include improving the knowledge, ability and skill base of fire fighters. Describing the process of preventing accidents, Robeson (1999) states "the key to it all is opening up the flow of relevant, meaningful information to and from fire fighters" (p. 4).

In planning for the future reduction of accidents resulting in fire fighter injury and death, Robeson (1999) suggests several strategies that include:

> I believe it is possible to radically reduce the frequency and severity of fire fighter accidents. I believe the future of reducing fire fighter accidents lies in doing the following things: Develop lots of members to be 'safety savvy' at the brigade level. This can be done through workshops covering how accidents really occur, the beliefs, errors and interactions that lead to them, and how they can be

> investigated and prevented. Feedback that sorts information to all fire fighters in a way that is readily available and easily understood (p. 5).

The strategies Robeson (1999) suggests are available today to fire fighters in Montana. But are they configured in useful ways? Are they available in a venue, at a time and place, or in a medium that is accessible to fire fighters? What are the most effective methods by which fire service trainers can address the needs of fire fighters in Montana who are recognized as using best practices? These questions have not been answered.

Best practices are found in many places. In 1999, the Office of the Legislative Auditor in the State of Minnesota published a report describing the best practices of the fire service. The report identifies five goals for the effective and efficient management of fire services.

The goals outlined in the report include:

1. To prevent the outbreak of fires and achieve fire safety awareness throughout the community.
2. To ensure the enforcement of fire and life safety codes for the prevention and control of structure fires.
3. To investigate the cause, origin, and circumstances of fires in the jurisdiction.
4. To maintain a response capability that is safe and effective.
5. To protect citizens' life safety and property against the dangers of fire and other emergencies that may occur in the response area (1999, p. 32).

The report goes on to identify seven actions that were recommended to meet the five goals listed above. These are:

1. Assess risk and develop long-range plans.
2. Evaluate fire department performance and use resources cost effectively.
3. Promote public awareness of fire safety.
4. Ensure fire code enforcement.
5. Develop effective communications systems.
6. Prepare a competent work force and support safe operations.
7. Plan for on-scene operations (1999, p. 32).

Two more aspects of the report focus on preparation of a safe and competent workforce and conducting safe incident operations. These actions were selected due to the critical relationship between routine performance of these actions and the prevention of fire fighter fatalities (USFA FA-220, 2002). These actions are best practices for the fire service in Minnesota and in Montana.

The purpose of the Montana Fire Services Training School includes "provide fire service personnel with professional training; identify new methods of fire prevention and suppression and disseminate information about them" (MCA, 20-31-103. (1) and (2) Purpose of school). It is the role of the MFSTS to identify the best practices of the fire service and bring that information to fire fighters in Montana.

Problem Statement

Many fire fighter fatalities and injuries are preventable. By implementing prevention programs (including training), fire fighters who have learned the lessons offered by the death or injury of other fire fighters may avoid similar occurrences. While it is essential that fire fighters participate in continuous learning activities, little is known about what learning actions fire fighters in Montana take to learn about effective methods and innovations. The learning sources used by fire fighters recognized as using best practices are not identified nor, necessarily, are they well understood.

Identifying and understanding what learning actions are taken by fire fighters and what learning sources those fire fighters use to address effective methods or innovations is important in the development of the content and delivery mechanisms for fire service training in Montana. Furthermore, with training content and organization closely

matching the learning actions used by the fire fighter, future fire fighter training opportunities will be more effective in helping fire fighters perform their work.

Research conducted in the area of firefighter learning actions is very limited. Database searches in ERIC, Dissertation Abstracts, Federal Emergency Management Agency (FEMA), ASTD, and Google using key words and phrases such as fire fighter learning methods, first responder learning methods, and fire fighter learning techniques have revealed no related research. In order for Montana fire service adult educators to aid the firefighter in his/her pursuit of knowledge and skills, answers to what constitute best practices must be determined.

Purpose of the Study

The purpose of this study was to identify and describe the learning actions and learning sources used by a selected group of fire fighters in Montana who are recognized as using best practices in preparing a safe and competent workforce.

Research Questions

The research questions to be answered in this study were:

1. Where do fire fighters, who are recognized as using best practices in preparing a safe and competent workforce, first receive information regarding effective methods or innovations?
2. What sources are used most by fire fighters, who are recognized as using best practices in preparing a safe and competent workforce, to obtain information about effective methods and innovations?

3. What information source is most relevant to the needs of fire fighters who are recognized as using best practices in preparing a safe and competent workforce?
4. What learning actions are taken by fire fighters who are recognized as using best practices in preparing a safe and competent workforce?

Study Significance

The study was significant in that it provided new insight into the professional development learning practices of fire fighters recognized as using best practices in preparing a safe and competent workforce. The descriptions of what learning actions were effective for fire fighters help adult educators providing fire service training build effective education outreach mechanisms that match the learning actions of their clientele.

This study provided an opportunity to discover, describe, and understand the connection between proven learning actions used by fire fighters and adult education outreach services provided for those fire fighters. The information provides a foundation for the planning and evaluation of effective adult education service delivery to fire fighters in Montana.

The study contributed to the body of knowledge in the fields of adult education in general and offered an in-depth description of how a group of adults learns. Because there has been little research regarding learning actions used by fire fighters, fire service adult educators benefit from this study because they became aware of the means by which to effectively deliver education programs to fire fighters. There is much research regarding learning among adults, but little that focuses on fire fighters.

Fire fighters benefit from the results of this study because of increased awareness of actions and sources for learning effective methods, innovations, skills and knowledge. Many of the effective methods, innovations, skills and knowledge are readily identified in the study of the fire fighters. The lessons learned by fire fighters following a fire fighter fatality or injury are particularly valuable as they often identify causal factors in the death or injury. The application of effective methods, innovations, skills, and knowledge adapted from the lessons learned from fire fighter fatalities and injuries adds to the safety of fire fighters and the customers they serve. Gathering lessons learned from fire fighter fatalities and injuries allows fire service adult educators to offer current relevant information to other fire fighters.

Fire fighters' lives depend on their ability to know, and correctly respond to, the hazards they face. They are at great risk when their ability to address a hazard, particularly an emerging hazard, follows being exposed to the hazard. The greatest risk fire fighters face is when their work provides them with a test of their ability right before they learn the lesson needed to face the hazard. When experience is limited, proactive, real world training and practice are essential to the provision of safe, high quality services. Fire fighters, and especially those operating in rural and frontier areas, need relevant, valid, proactive training and practice. They need that training and practice as soon as possible.

Finally, because fire fighters gained new information about how to learn about the established and emerging hazards facing their customers, the citizens in our neighborhoods and communities benefit. Improved fire fighter performance results in improved customer service.

Definition of Terms

For the purpose of this study, the following terms were defined.

Adult: A mature person who has taken responsibility for his or her own decisions and actions.

Adult learner: Any adult who engages in some type of activity, formal or informal, in the acquisition of knowledge or skill in an examination of personal attitudes or in the mastery of behavior (Hiemstra, 1976).

Artifact: A characteristic product of human activity (Webster's Ninth New Collegiate Dictionary, 1985, p. 105).

Best practices: Activity within a field that is considered by various persons knowledgeable in that field as being the most effective way to respond to a given situation.

Fire Fighter: A person engaged in providing services through a fire service organization.

Fire Service adult educator: A person who engages in providing training opportunities to fire fighters.

Learning actions: The learner activity between the time a learner becomes motivated to learn and implementation of what the learner learned. It is the activity focused toward learning objectives.

Self-directed learning: In its broadest sense, self-directed learning describes a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating goals, identifying human and material

resources for learning, choosing and implementing appropriate learning strategies and evaluating learning outcomes (Knowles, 1975).

Assumptions, Delimitations and Limitations

There are several assumptions regarding the design of this study. Included are:

1. Adults, including fire fighters, are engaged in lifelong learning.
2. A fire fighter must stay abreast of the field through a process of learning.
3. There are many methods of learning. Some are traditional, classroom-based; others are more self-directed.
4. Qualitative research can be descriptive. Data collected in the form of words, artifacts, and pictures are as valuable as statistical research.
5. Qualitative researchers are concerned with the processes of the research as well as the outcomes and products.
6. Fire fighters recognized as using best practices in preparing a safe and competent workforce and conducting safe incident operations are involved in learning as much or more than those fire fighters not using best practices.
7. Fire fighters who take learning actions to implement and employ best practices are assumed to be sufficiently motivated to learn.

Methodology

The researcher used a qualitative methodology for this study, as it was the most effective way to discover and describe by what methods fire fighters, recognized as using best practices in preparing a safe and competent workforce and conducting safe incident

operations, learn. The setting for the study was in the natural context of the participating fire fighters. The framework of the study emerged during the study. All of these characteristics of the study support the selection of a qualitative research methodology (Guba, 1978). Guba and Lincoln (1989, p. 159) cite the work of Mary Lee Smith describing qualitative research "as the long term and first hand study of a case by the investigator for the purpose of understanding and describing human action in the context of that case." Field methods were used to collect data, including direct observation of action in its natural context, clinical interviews to elicit the multiple meanings of participants in that case and the collection of documents. A qualitative approach leads to reports primarily in the form of words, pictures, and displays rather than formal models or statistical findings.

The researcher used a select group of Montana fire fighters recognized as using best practices in preparing a safe and competent workforce and conducting safe incident operations. The Director and staff of Fire Services Training for Montana and the members of the Advisory Council for MSU ES Fire Services Training School selected the study group members. The initial group started with 19. The data collection methods included interviews addressing the research questions, recordings (audio and video), site visits, the study of artifacts and records, and a Rating of Sources Instrument. Demographic information was collected on all study participants. Data analysis included the recognition and description of the actions by which fire fighters–those recognized as using best practices in preparing a safe and competent workforce and conducting safe incident operations–go about learning new skills and knowledge. Data was presented via tables. A frequency count was used to determine the relevance of frequency use for

learning sources and actions.

Summary

Adults face a lifelong, ever changing world and a resulting need for lifelong learning. Fire fighters are adult learners who face a high consequence learning process. If fire fighters are successful in their learning, they perform safely and effectively. If they fail to learn, they face enormous risks including injury or death. Fire fighters must learn to survive.

Many of the hazards effecting communities and their fire fighters are known. Some are new hazards, such as the terrorist attacks on and after September 11, 2001. Fire fighters must learn about these hazards in order to provide safe effective emergency services to their communities.

In order to effectively reach fire fighters with new skills and knowledge, fire service educators must understand how fire fighters go about gaining new skills and knowledge. To understand the learning strategies used by fire fighters, this research sought to discover and describe how fire fighters who are recognized for using best practices in preparing a safe and competent workforce and conduct safe incident operations go about gaining new skills and knowledge.

Selected fire fighters who are recognized as using best practices are the most active learners and were, therefore, the subjects of this research. The research methodology included field interviews with the selected population of fire fighters. The interviews were video- and audio-taped to gather data. The researcher made field observations of the activities, records, and programs of the fire fighters and their

organizations and communities. The researcher studied and recorded (still and video) artifacts that demonstrate the use of best practices. Data was analyzed in the effort to discover patterns of learning actions. Study participants completed a survey that gathered demographic information and allowed for the identification of the frequency of use for learning actions and sources.

CHAPTER 2

REVIEW OF THE LITERATURE

The purpose of this study was to identify and describe the learning actions and learning sources used by a selected group of fire fighters in Montana who are recognized as using best practices in preparing a safe and competent workforce. The literature review includes fire problems in the United States and Montana, identification of the background of community and volunteer fire fighters, fire fighter hazards, fire fighter fatalities, fire fighter best practices, fire training in Montana, and adults as learners.

Fire Problems in the United States and Montana

The scope of the fire problem in the United States and in Montana is well documented. The 12th edition of Fire in the United States, 1989-1998 describes the fire problem in a variety of metrics.

> Fire departments in the United States respond to an average of 2 million fire calls each year. This fire problem, on a per capita basis, is one of the worst in the industrialized world. Thousands of Americans die each year, tens of thousands of people are injured, and property losses reach billions of dollars. There are huge indirect costs of fire as well - temporary lodging, lost business, medical expenses, psychological damage, pets killed, and others. To put this in context, the annual loss from floods, hurricanes, tornadoes, and earthquakes, and other natural disasters combined in the United States average just a fraction of the casualties from fire (USFA, 2002, p. 1).

Fire fighters perform dangerous work. "Nationally, between 1990 and 2000, 1,085 fire fighters lost their lives while on duty" (USFA, 2002, p. 13). While some fire

fighter deaths are the results of circumstances beyond human control, many of the fire fighter deaths are preventable. As stated in the Fire Fighter Fatality Retrospective Study, 1990-2000,

> ...through research, training, improved operations, development of new technologies, the appropriate use of staffing, and other factors, it should be possible to significantly reduce the number of fire fighters killed each year. Moreover, fire fighter fatalities are generally the result of a chain of events, which, if detected early, may be broken to prevent many or even most fatalities (USFA, p. 41).

According to the report, Fire in the United States, 12th edition, the general fire problem in the United States is particularly significant in Montana. Montana has a fire death rate per population that is the sixth highest in the nation. "The national fire death rate per million population for the period 1989-1998 was 14.9. The state fire death rate per million in Montana was 25" (USFA, 2002, p. 35).

According to the Federal Emergency Management System, the United States Fire Administration has set a goal of reducing the fire fighter deaths by 25% by 2005. New methods of fire prevention and suppression are sometimes the result of lessons learned from current, sometimes unsuccessful fire fighting methods. A key to reducing fire fighter deaths is sharing successes and failures of current and new fire fighting practices. In Montana, one organization addressing the need to reduce fire fighter deaths is the Montana Fire Services Training School, which is part of Montana State University's Extension Service. The purpose of the Montana Fire Services Training School (MFSTS) includes disseminating information regarding professional training and new methods of fire prevention and suppression to fire fighters.

The hazards faced by fire fighters in the delivery of the services they provide are as diverse as the duties they perform. Fighting fires in structures exposes fire fighters to the risk of entrapment from the collapse of a building. Responding to traffic collisions on roadways exposes fire fighters to the risk of being hit by other motorists while they attempt to render aid to those entrapped in the initial collision. Fire fighters responding to incidents involving the release of a hazardous product are at risk of ingestion of the products being released. In every aspect of the stressful service they provide, fire fighters are at risk of stress-related medical problems including heart attacks.

Fire fighters must know a lot about many complex and emerging hazards. They need to learn new knowledge and skills in a proactive manner before they encounter the hazard during an emergency. Fire fighters today are involved in the process of lifelong learning. Circumstances such as the terrorist attacks of September 11, 2001 and the aftermath highlight the diverse and emerging challenges that face fire fighters. Present and future fire fighters will face repeated adaptations to change, which require lifelong efforts to stay informed about the challenges facing communities and their fire departments. Fire fighters do overcome barriers and obstacles to participate in learning and opt for increasing present knowledge, gaining new skills, and promoting change in their professional capabilities which result in increased capabilities for fire departments to respond to emergency situations.

As community needs change and demand increases, people providing essential public safety services must change and adapt to remain current in their ability to deliver meaningful services. Remaining current in the ability to deliver services requires continual learning on the part of the service providers. "Change is now so great and so

far reaching that no amount of education during youth can prepare adults to meet the demands that will be made on them" (Cross, 1984, p. 2).

As important as the content of a learning process is, aligning it with the learning actions preferred by the adult learner is a critical component of the successful learning process. Fire fighters are adult learners whose work includes learning throughout their service. Fire fighters learn in practical terms by successfully navigating through unknown situations using previously acquired skills and abilities. This work-related experience is key to their ability to adapt to changing work demands.

In an environment offering limited experience, training and practice take on a significant role in helping fire fighters learn to deliver services. That learning may include case studies, lessons learned, forecasting, application of best practices in simulated real world situations, and a solid grounding in the fundamental skills of service delivery. These many and varied learning opportunities occur in many situations. As Brookfield (1986) has indicated, learning for adults is accomplished through a wide variety of formats and methods.

Background of Fire Service Organizations and Fire Fighters

According to A Fire Service Needs Assessment of the U.S. Fire Service (USFA 2002), there are 26,354 fire departments in the United States. There are an estimated 1,088,950 fire fighters serving in these departments. The Montana Fire Services Training School estimates that there are approximately 10,000 fire fighters in Montana. Of those, approximately 9,600 are volunteer fire fighters. The rest are paid professional fire

fighters who serve their communities. In total, there are approximately 380 fire organizations in Montana that provide fire protection services.

Fire service organizations providing fire protection services in Montana are organized in several ways. Cities and towns have fire departments that are part of the local governmental structure. Areas outside cities and towns may have organized fire protection structured in several ways. Rural fire districts and fire service areas are political subdivisions that provide fire protection services to residents within an identified area. Some areas of the state have fire protection provided by non-profit fire companies operating by donations or the collection of subscription fees. These non-profit fire companies provide a public safety service to a population. Lastly, there are several private fire service organizations in Montana that provide fire protection services to specific properties or populations. These private fire service organizations vary from well known to unknown and as such provide levels of service that are similarly varied. The Exxon Oil Refinery in Billings, Montana has its own private fire fighting capability. It is specific to their petrochemical hazards and their facility. Some Montana ranches have fire suppression capability specific to the hazards they face on the ranch, more specifically range fires.

Nationally it is estimated that 233,000 fire fighters, most volunteers serving in communities with less than 2,500 residents, are involved in structural fire fighting but lack formal training in those duties. Furthermore, the needs assessment reports that an estimated 40% of fire department personnel involved in hazardous materials response lack formal training in those duties. Most of them serve in the small communities.

Additionally, 41% of the fire departments involved in wildland fire fighting lack formal training in those duties (USFA, 2002).

There are no statutory training requirements for fire fighters in Montana. However, there are several regulatory requirements for training at the state and federal levels that encompass fire fighters in Montana. These requirements are applicable only when a fire department provides the service to which the training requirement applies. There is an additional training-related interest effecting fire fighters who serve their communities as volunteers. The training interest is a requirement of the volunteer fire fighters' retirement program administered by the State of Montana Public Employee Retirement Division. That requirement is for 30 hours of training each year. The requirement applies only if the fire fighter wishes to earn one year of credit toward the 20 years required to earn a modest pension.

Fire Fighter Fatalities

According to the Firefighter Fatality Retrospective Study 1990-2000, 1,085 fire fighters died in the line of duty during this period (USFA, 2002). The types of incidents in which there were fatalities are shown in Figure 1. The three most common types of incidents resulting in fire fighter fatalities, structure fires, wildland fire, and motor vehicle crashes comprise approximately 75% of all incident types where a fire fighter fatality occurred. Structure fires, wildland fires, and motor vehicle crashes are all incidents that are common to fire protection service delivery in Montana.

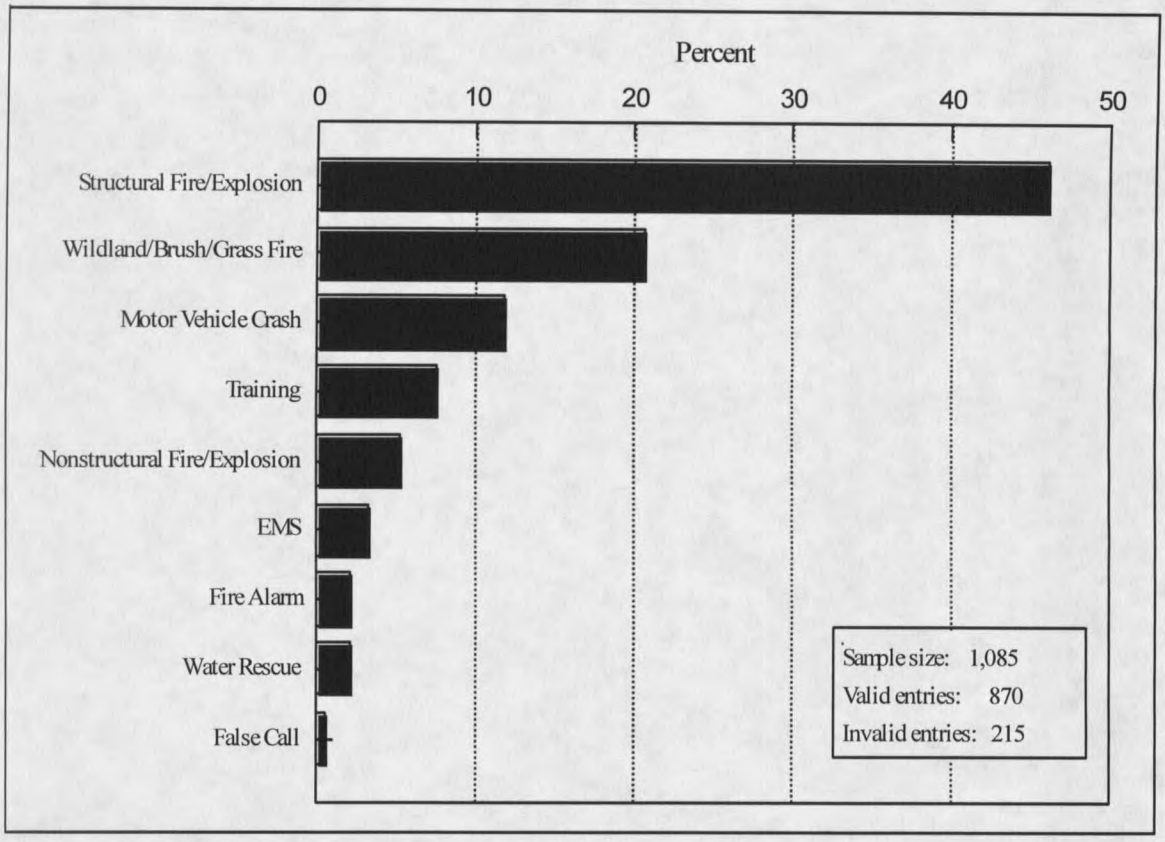

Figure 1. Types of Incidents Resulting in Fatalities (1990-2000) (USFA, 2002, p. 14)

The data in Figure 2 shows the type of duty in which there were fire fighter fatalities. The three leading duties at the time of injury were extinguishing fire/neutralizing the incident, responding to the scene, and suppression support. The three leading types of duty being performed when a fire fighter fatality occurred comprise 60% of all incidents where a fire fighter fatality occurred. The duties of extinguishing fires, responding or traveling en route to an incident, and suppression support are all duties common to fire fighters operating in Montana.