IDENTIFICATION AND COMPARISON OF INSTRUCTIONAL STRATEGIES
FOR THE GOLDEN FIRE DEPARTMENT RECRUIT ACADEMY

EXECUTIVE DEVELOPMENT

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An applied research project submitted to the National Fire Academy
as part of the Executive Fire Officer Program
August 2003
Abstract

This research project identified and compared instructional strategies to build a knowledge base for recommending future instructional strategies for the Golden Fire Department (GFD) Recruit Academy. The problem was that in the six year history of the academy, instructional strategies used in the GFD Recruit Academy had not been identified and compared with instructional strategies identified by educators, and by other fire departments. The purpose of this applied research project was to identify and compare instructional strategies utilized by the GFD Recruit Academy, educators, and other fire departments.

Through the descriptive method the following questions were researched:
1. What are the instructional strategies the GFD Recruit Academy currently utilizes?
2. What are the instructional strategies educators currently utilize?
3. What are the instructional strategies other fire departments currently utilize?
4. How do these instructional strategies compare with one another?

The procedures included interviews and descriptions of the current GFD Recruit Academy instructional strategies, review of relevant research based educational instructional strategies, and a review and survey of other fire departments to ascertain what instructional strategies they were utilizing. A descriptive comparison was made of outside instructional strategies with instructional strategies implemented within the GFD Recruit Academy.

The results derived from the GFD Recruit Academy description, as well as the results revealed from the majority of fire departments surveyed were similar. The most utilized instructional strategy for recruit training was a highly structured direct instruction model, using a specified published curriculum. In contrast, educators
identified a research based standards model as the most utilized instructional strategy for teaching and learning.

The recommendations based on this study and its findings were that the GFD Recruit Academy 1) continue to build a knowledge base and 2) assess the effectiveness of the instructional strategies utilized for entry level firefighter training using evaluative research methods.
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Introduction

The Golden Fire Department (GFD) currently trains entry-level firefighters in an annual recruit academy. The GFD Recruit Academy, since its establishment in 1998, has used instructional strategies taught from a specified and structured curriculum. The curriculum was selected to provide consistent training, and to enable recruits to pass the Colorado State Firefighter I Examination. This examination is based upon the National Fire Protection Association, *NFPA 1001, Standard for Fire Fighter Professional Qualifications*.

When considering the growth and increasing scope of services rendered by the Golden Fire Department, it is timely to review the instructional strategies currently used to train recruits. In the six year history of the GFD Recruit Academy, the instructional strategies have not changed or been evaluated. There is not currently a knowledge base, relating to the instructional methods utilized in the GFD Recruit Academy, which may be used for future decision making.

In contrast, extensive changes have occurred in the field of education during the same time period. The advances in instructional methodology are attributed to an increased knowledge base related to learning. Brandt (1999, p.238) notes: “Today’s educators are fortunate to be living at a time when we are finally beginning to really understand the learning process, including its neural substrate”. Schools and universities transitioned from objective based education to standards based education in the 1990’s. This conscious effort on the part of educators has improved student performance. For the Baltimore City Public School System, as an example, “The components of the entire whole school reform package…have enabled the schools in the Central Administration
Area to significantly increase student achievement” (Dicembre, 2002, p.4). Standards Based Education has impacted teaching and learning.

Now that nearly all states have adopted curriculum standards, teachers are expected to teach in such a way that students achieve the standards. Standards-based education is defined as teaching directed toward student mastery of defined standards. Experts say this means that teachers must have a clear idea of what each standard means, including how it can and will be assessed, and that teachers should monitor individual student achievement of each important standard (Association for Supervision and Curriculum Design, 2002a, ¶ 27).

In recent years, leading fire recruit training programs across the country have reorganized training programs to better prepare recruits. The Illinois Fire Service Institute exemplifies this progressive approach to recruit training. Brauer, (2003, p.83) stated: “The Institute’s organizational philosophy is ‘teaching firefighters to do their work’. In keeping with this concept, we first identified the skills and attitudes a new firefighter needs, then arraigned the objectives required for certification within this framework”.

To review the instructional strategies currently used by the GFD Recruit Academy, to benefit from educational research, and to review firefighter recruit training programs by other departments will require a comprehensive knowledge base. To make informed decisions for the future of the GFD Recruit Academy, the leaders must review theory, research, and practices of those who are well versed in the realities of education and recruit training. This review, and any possible changes for the GFD Recruit Academy will take time. Referring to the pace at which change occurs Goodman notes:
“…remember that progress is rarely in a straight line and that knowledge takes a long time to be accommodated, absorbed, and put to work” (Goodman 1997, p.596).

The problem is that in the six year history of the academy, instructional strategies used in the GFD Recruit Academy have not been identified and compared with instructional strategies identified by educators, and by other fire departments. The purpose of this applied research project is to identify and compare instructional strategies utilized by the GFD Recruit Academy, educators, and other fire departments.

A descriptive method will be used in this project to research the following questions:

1. What are the instructional strategies the GFD Recruit Academy currently utilizes?
2. What are the instructional strategies educators currently utilize?
3. What are the instructional strategies other fire departments currently utilize?
4. How do these instructional strategies compare with one another?

The research in this project is qualitative, and includes some quantitative data through the use of a questionnaire. Some researchers have embraced qualitative research because of the understandings created.

Qualitative research uses methods adapted from anthropology and other social sciences, including systematic observation and interviews. Until recently, most educational research was quantitative. Some researchers are now using qualitative methods because they think statistical processes will not produce the understandings they seek ....Quantitative research is conducted in a traditional
scientific manner using procedures to compare the effects of one treatment with another (Association for Supervision and Curriculum Design, 2002b, ¶1).

Background and Significance

The Golden Fire Department is located 15 miles west of Denver and serves the city of Golden, and parts of unincorporated Jefferson County Colorado. The department, which has a combination of volunteer and paid staffing, provides fire, emergency medical, and technical rescue services. This municipal department utilizes American Medical Response for ambulance services and does not, at this time, provide advanced life support or patient transport. GFD does not accompany the ambulance on every response. However, the department does respond to motor vehicle accidents, major traumatic injuries, and serious medical emergencies. The U.S. Census Bureau, Census 2000, reports a total population of 17,159 residents. Approximately 2.5 million people visit the Golden area each year. Golden is home to the Colorado School of Mines, Coors Brewing, CoorsTek Ceramic Company, and a myriad of spin-off industries. In addition to serving the city, GFD protects nine miles of Clear Creek Canyon as well as a popular rock-climbing venue at the top of North Table Mountain adjacent to the city. Fire and rescue services for the Coors Brewing Complex, which includes over twelve million square feet of floor space, are provided by GFD under a contractual arrangement with the Coors Brewing Company.

In the past, the instructional strategies utilized for training recruit firefighters were considered appropriate for the size of the city and the scope of services rendered by GFD. However, the training of recruits was inconsistent. It became apparent to the chief of department that the GFD needed a more organized and coordinated approach to recruit
training. Thus, in 1998 a formal organized recruit academy was established (M.S. Wallace, personal correspondence, May 30, 2003). The academy served the needs of the recruit training at that time. Instruction, through the implementation of an organized curriculum, related to the standard for Professional Fire Fighter Qualifications developed by the National Fire Protection Association (NFPA). The creation of the recruit academy was intended to meet the requirements of NFPA 1001: Standard for Professional Firefighter Qualifications (J.E. Bales, personal communication, July 16, 2003).

Presently, preparing a GFD recruit firefighter for duty requires more than consistent recruit training using a published curriculum. This is because the scope of services rendered by the Golden Fire Department has increased since 1998. There are more life threatening injuries occurring as a growing number use Clear Creek for recreational purposes and use North Table Mountain for rock climbing. Emergency response to these emergencies requires technical expertise. In addition, motor vehicle traffic traveling through the area has increased because of the growth of the nearby gambling casinos and improvements to the area highway system. Prior to 2001, the department did not typically respond to medical calls, auto accidents, or traumatic injuries. In addition, the increased number of homes and businesses in the area has added to the number and type of emergency responses. These additional medical responses and technical rescues necessitate training recruits with more diverse skills than are currently taught using the published curriculum. Previously, fire suppression was the number one function of the GFD. This researcher is concerned that the curriculum selected in 1998 may not be comprehensive enough to meet the current needs of GFD recruit. The current curriculum has not changed or been evaluated for the past six years.
The increased number of emergency responses and the diversity of these responses have increased the duties of recruit firefighters. Consequently, in 2003, this researcher decided to review the instructional strategies currently used in the academy, and compare them with instructional strategies deemed effective by educators and by other fire departments. The primary objective was to build on the knowledge base for future decisions related to recruit training. Identifying instructional strategies that have the potential to improve learning will add to the knowledge base for a future evaluation of the GFD Recruit Academy. Decisions based on a more comprehensive knowledge base have a high probability of improving recruit training. Recruit training would transition from implementation of only a specified published curriculum to include improved instructional methods, and expand the scope of training. An improved recruit academy could significantly improve the effectiveness of the Golden Fire Department.

This applied research project (ARP) relates to the Service Quality/Marketing unit presented during the Executive Development course taught at the National Fire Academy (NFA) in 2003. The terminal objective of this unit addressed ways to: “develop strategies to improve organizational quality and service standards” (National Fire Academy, 1998, p. SM 10-2). The increased knowledge base produced by this research will be the context from which improved organizational quality and service standard decisions can be derived.

This applied research project is linked directly to the United States Fire Administrations operational objective: “To respond appropriately in a timely manner to emergent issues” (United States Fire Administration, 2003, ¶1). The emergence of evidence based instructional strategies is revolutionizing education in the twenty first
century “to maximize the possibility of enhancing student achievement” (Marzano, Pickering, & Pollock, 2001, p.3). Fire service leaders gathered in 1966, at the first Wingspread Conference, to chart a path for success. They looked to an academic model stating: “A systematic and deliberate educational program leading to a broad knowledge base which is acceptable to the academic community is the surest approach to professionalism” (Clark, 1993. p.50). It is of equal importance today to consider the emergent issue of evidence based instructional strategies and progressive approaches to recruit training used by other fire departments.

This researcher will begin the timely response to the emergent issue of instructional methods that are evidence based and have a high probability of improving the quality of recruit training for the GFD Recruit Academy. The review of educational literature and recruit training programs used by other fire departments will identify potential strategies to improve GFD Recruit Academy instruction. These reviews will create a knowledge base for recommending future instructional strategies appropriate for the training of entry-level firefighters. Further, the results obtained have the potential to improve recruit instruction and consequently the future effectiveness of the Golden Fire Department.

Literature Review

Research Question One: What are the instructional strategies the GFD Recruit Academy utilizes?

The International Fire Service Training Association (IFSTA) Essentials of Firefighting: Firefighter I Curriculum is the curriculum currently used for training firefighters in the GFD Recruit Academy. IFSTA produces the textbooks and materials
that are published by Fire Protection Publications. The curriculum used in the GFD recruit Academy is based on the *Essentials of Firefighting, Fourth Edition*. The IFSTA Curriculum was purchased by GFD in 1998, and used in the initial recruit academy. The same curriculum has been utilized for the past six years. “Although the term curriculum has many possible meanings, it usually refers to a written plan outlining what students will be taught (a course of study). Curriculum documents often also include detailed directions or suggestions for teaching the content” (Association for Supervision and Curriculum Design, 2002c, ¶38).

The annual GFD Recruit Academy is a 14 week program. Instructors present four-hour classroom sessions two times per week. In addition, an eight hour drill session is conducted every other Saturday to address practical skills. Each class is based on a specific chapter from the IFSTA *Essentials of Firefighting, Fourth Edition*. Instructors today are supplied with the IFSTA lesson plans as well as Powerpoint presentations purchased from IFSTA in 1999. Each class is implemented using the publisher’s recommended direct instruction model. Many GFD instructors have embellished on the details of the original Powerpoint presentations, have incorporated instructor-produced materials into their classroom presentations, and have supplemented skill sessions with additional drills.

The *Instructors Guide: Essentials of Firefighting* (1998) is produced by IFSTA, and describes the curriculum as a competency based program in which two types of competency are addressed. They are cognitive and psychomotor competencies. The curriculum developer, Walker, explained: “students must demonstrate competency or mastery of an objective before they can go on to the next level, lesson, or objective” (S.S.
Walker, personal communication, May 13, 2003). The curriculum instructor’s guide explains mastery of the cognitive objectives is demonstrated by performance on written examinations. Skill mastery is demonstrated by performance as recorded on job sheets provided for each of the psychomotor objectives. The job sheets are checklists of criteria specific to the task to be completed (IFSTA, 1998, pp. IGIG-11-IGIG1-16). Walker explained: “The instructor holds the product or the result (answers, scenario, analyses, knots, etc.) up to the listed criteria. As the student meets all of the critical criteria, the instructor uses the rating scale to translate that into a competency rating” (S.S. Walker, personal communication, May 13, 2003).

The student assessment instruments included along with the IFSTA Curriculum are criterion referenced, based on the competency of the learner. For an explanation of criterion referenced competencies, this researcher referred to an educational source. In the book entitled, *10 Traits of Highly Effective Schools*, McEwan (1990, p.118) explained that educators use criterion-referenced evaluations to measure student performance against a standard. This is in contrast to norm-referenced evaluations where performance is measured against the performance of others.

A fire service instructor and author, Carter (2003a, p.20), describes the cognitive domain as:

A general concept that refers to all forms of knowing including perceiving, imagining, reasoning, and judgment....There are six stages of cognitive learning:

Knowledge - Recalling and recognizing information,

Comprehension - Understanding the meaning of information,

Application - Using information learned in specific situations,
Analysis - Breaking information into parts to understand the whole,

Synthesis - Integrating the parts to invent a new whole, and

Evaluation - Using standards and criteria to judge the value of information”.

In a subsequent article by Carter (2003b, p.20), the psychomotor domain that is assessed when utilizing the IFSTA curriculum is described.

Psychomotor, or skill learning, is the domain of learning used by those of us who train fire and emergency service workers. This type of learning encompasses those competencies needed to actually maneuver an implement or make a bodily move to do something. We are talking about the combination of brain and brawn to get the job done.

Before the establishment of the first GFD Recruit Academy in 1998, various instructional strategies were used to train recruits. Burrell, the Chief of Department from 1991-1995, stated: “Recruits were trained by company officers during a six month probationary period. A weekly lesson was presented to the recruits in an informal setting. The training was mostly hands on and designed by the company officer conducting that week’s training” (R. Burrell, personal communication, April 29, 2003).

This inconsistent training influenced this researcher to look to the historical approach to recruit training by other fire departments. It was revealed that other departments also have a history of placing recruit instruction in the hands of company officers. Larson (1990. p.2), in an applied research project entitled Training for the 1990’s, discussed fire training for Wenatchee Fire Rescue in the 1970’s and 1980’s. An autocratic approach, strictly in the hands of the company officer without state or federal
standards, was the methodology used to train recruits. “All the knowledge required of a firefighter was to be able to follow the orders of the company officer”.

The inconsistent training of GFD recruits became a concern and resulted in a more coordinated and organized approach to recruit training. The initial solution was to send recruits to a neighboring department’s recruit academy for training. This did not solve the problem, as the next Chief of GFD Wallace explained: “When they got done, we spent about 5-6 weeks either retraining them or getting them trained to our standards” (M.S. Wallace, personal correspondence, May 30, 2003).

A formal organized GFD Recruit Academy was established in 1998. Prior to establishing the GFD Recruit Academy, various published instructional curriculums were investigated and reviewed. The curriculum selected for use in the first academy was produced by IFSTA. Wallace (personal correspondence, May 30, 2003) stated: “IFSTA was easily available, low cost, and had a consistent quality that made it a natural choice”.

The department’s first in-house academy was conducted under the direction of Chief Wallace. This researcher selected Fire Chief Wallace to be interviewed. In addition, Chief Bales, an instructor in the initial academy and the GFD training officer in 2001 and 2002, was also interviewed regarding the establishment of the GFD Recruit Academy. Chief Wallace authorized the purchase of the IFSTA Essentials of Firefighting: Firefighter I Curriculum, and implemented the program using IFSTA materials. GFD officers and firefighters with expertise in various areas were utilized as instructors. Bales stated this approach was intended to improve instruction, relate the training to NFPA standards, and formalize the recruit-training program (J.E. Bales personal correspondence, July 16, 2003). Each instructor was provided with lesson plans.
from the IFSTA *Instructors Guide: Essentials of Firefighting* as reference material. “The in-house academy, as was perfected over time, improved the knowledge, skills, and abilities of the recruit firefighters that made it through the process” (M.S. Wallace, personal correspondence, May 30, 2003).

In summary, the GFD Recruit academy was planned to improve the quality of entry level firefighter training and was established in 1998. The IFSTA Curriculum was, and still is, utilized for instruction. This curriculum is a competency based program for content and skill learning. The curriculum is implemented, as recommended, using direct instructional strategies. Review of the IFSTA Curriculum materials influenced this researcher to look to Carter for an explanation of cognitive and psychomotor competency as it applies to training of fire fighters. The inconsistency of past recruit training within the GFD raised the question of how other departments have historically trained entry level firefighters and prompted this researcher to explore this question.

**Research Question Two: What are the instructional strategies educators currently utilize?**

In the 1990’s a standards based education model, using strategies proven effective by research, became the trend in public education. Chick (1999, p.91) wrote: “In order for educators to make informed decisions about children and ensure best practices, we must be a research-based profession”. It was interesting to this researcher that a business leader was instrumental in the transition to standards based education. Merrow (2001, p. 655) noted:

The prime mover behind standards has been IBM CEO Louis Gerstner, Jr., a prominent businessman who has been an education reformer for more than 20 years. Gerstner was the principal organizer behind the National Education
Summit meetings in 1996 and 1999, meetings that involved nearly every state governor, America’s business leaders, and President Clinton.

Education has changed by focusing greater attention on curriculum and instruction, on what is taught and how it is taught. The Colorado Legislature passed an Act entitled Standards Based Education in the Public Schools (1993, ¶4) that stated:

The General Assembly further declares that this system of standards-based education will serve as an anchor for educational reform, with the focus of education including not just what teachers teach, but what students learn. In addition, standards based education will advance equity, will promote assessment of student learning, and will reinforce accountability. The General Assembly therefore charges school districts with the responsibility to develop content standards, programs of instruction, and assessments that reflect the highest possible expectations.

Throughout the Denver area and the United States of America, educational reform is taking place using research techniques to define effective instructional strategies. One such research project has identified ongoing improvement and evaluation efforts.

A report issued last year by the Commission on Instructionally Supportive Assessment, an independent group of testing and assessment professionals, highlighted the components required for adequate accountability systems, which include the use of detailed, prioritized standards; optional classroom assessment procedures; well-designed tests that meet professional guidelines; support for professional development opportunities; and ongoing improvement and
evaluation efforts (Association for Supervision and Curriculum Design, June 2003, ¶4).

On January 8, 2002, President Bush signed into law the No Child Left Behind Act of 2001 (NCLB). The act promotes a reform principle that requires an emphasis on proven instructional strategies. Two key themes of the NCLB legislation are highly qualified teachers must teach students, and instructional programs must be based on scientific research (Denver Public Schools, 2003, ¶ 2).

As part of the NCLB government initiative, a clearinghouse has been established for educators and policy makers to share effective instructional strategies. The clearinghouse web site describes why the What Works Clearinghouse (WWC) was created.

The What Works Clearinghouse was established by the U.S. Department of Education’s Institute of Education Sciences to provide educators, policy makers, and the public with a central, independent, and trusted source of scientific evidence of what works in education. It is administered by the Department of Education through contract with a joint venture of the American Institutes for Research and the Campbell Collaboration (What Works Clearinghouse, n.d., ¶1). In the opening speech to a forum on the What Works Clearinghouse, Bryan, the Senior Advisor to the United States Secretary of Education, spoke to the methods that will be required for learners to reach their full educational potential.

They all need to receive educational programs and services that we know work and have evidence they work. Second, if we are serious about determining what are truly effective educational practices or approaches, rather than just the latest
fad and fancy, we require evidence from sound, scientifically based research (What Works Clearinghouse, November 2002, ¶4).

Marzano, an educator and author, has written extensively about what it means to teach thinking. Along with seven other educators, Marzano attended an invitational conference at the Wingspread Conference Center in Racine, Wisconsin. At that time, they embarked on a mission to study the concept of teaching thinking. The group noted shortfalls of using outdated educational practices when they stated: “Meaningless drill and practice will not produce thinking students” (Marzano et al. 1988, ¶23). The collaborative effort of these educators resulted in the writing of the book, *Dimensions of Thinking* in 1998. Marzano is currently involved in educational research at the Mid-Continent Research for Education and Learning (MCREL) in Aurora, Colorado.

Much of the current educational research on instructional strategies is completed using a research technique referred to as meta-analysis.

A meta-analysis combines the results from a number of studies to determine the average effect of a given technique. When conducting a meta-analysis, a researcher translates the results of a given study into a unit of measurement referred to as an effect size (Marzano et al., 2002, p.4). Researchers at MCREL, using meta-analysis, identified and published nine strategies that have a high probability of enhancing student achievement. Both effect size and percentile gains are stated in these meta-analyses. The data from the nine instructional strategies affecting student achievement, as identified by MCREL, is listed in Figure 1.
### Figure 1: Instructional Strategies Affecting Student Achievement

<table>
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<tr>
<th>Category</th>
<th>Average Effect Size</th>
<th>Percentile Gain</th>
</tr>
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<tbody>
<tr>
<td>Identifying similarities and differences</td>
<td>1.61</td>
<td>45</td>
</tr>
<tr>
<td>Summarizing and note taking</td>
<td>1.00</td>
<td>34</td>
</tr>
<tr>
<td>Reinforcing effort and providing recognition</td>
<td>.80</td>
<td>29</td>
</tr>
<tr>
<td>Homework and practice</td>
<td>.77</td>
<td>28</td>
</tr>
<tr>
<td>Nonlinguistic representations</td>
<td>.75</td>
<td>27</td>
</tr>
<tr>
<td>Cooperative learning</td>
<td>.73</td>
<td>27</td>
</tr>
<tr>
<td>Setting objectives and providing feedback</td>
<td>.61</td>
<td>23</td>
</tr>
<tr>
<td>Generating and testing hypothesis</td>
<td>.61</td>
<td>23</td>
</tr>
<tr>
<td>Questions, cues and advanced organizers</td>
<td>.59</td>
<td>22</td>
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</table>


Researcher Jacob Cohen (as cited by Marzano et al., 2001, pp.5-6) presents another way of interpreting effect size. He explains that an effect size of .20 can be considered small, an effect size of .50 can be considered medium and an effect size of .80 can be considered large. A statistical conversion table is used to translate effect size into percentile gain. Translating Cohen’s information using a conversion table yields the
following information: A small effect size of .20 results in an 8 percentile gain, a medium
effect size of .50 results in a 19 percentile gain, and a large effect size of .80 results in a
29 percentile gain.

Cooperative learning, an instructional strategy recommended by MCREL, is
represented in Figure 1. Cooperative learning has an effect size of .73, which is very near
a large effect size of .80. An effect size of .73 translates to a percentile gain of 26.
However, Grossen (1996, p.24) cautions:

Cooperative learning is more than simply group work on projects. It was designed
to complement teacher-directed instruction, providing opportunities for students
to work together to expand on what they have already learned ….Yet, cooperative
learning is often implemented without clear goals or any individual
accountability. In other words, to make cooperative learning work as intended,
teachers need extensive technical training. This training is rarely provided.
Therefore, cooperative learning, despite its research base, may be rendered
ineffective and, in the long term, may come to be regarded as just another fad.

The findings of Sanders (as cited by Marzano et al., 2001, p.3) support the
concept that student performance can be improved through implementation by the
teacher. The Sanders study analyzed achievement scores of over 100,000 students across
the country. Based on his research findings, Sanders discussed the importance of the
teacher. A summary of the study stated:

The results of this study will document that the most important factor affecting
student learning is the teacher. In addition, the results show wide variation in
effectiveness among teachers. The immediate clear implication of this finding is
that seemingly more can be done to improve education by improving the
effectiveness of teachers than by any other single factor.

Darling-Hammond & Sykes (1994, p.4) concurred regarding the importance of the
teacher when they stated:

A great deal of learning would be required for most teachers to be able to do the
kind of teaching and produce the kind of student learning that reformers envision
for none of it is simple. This kind of teaching and learning would require that
teachers become serious learners in and around their practice, rather than
amassing strategies and activities.

Research recently completed by educators suggests: “The ‘art’ of teaching is
rapidly becoming the ‘science’ of teaching” (Marzano, et al., 2001, p.1). Ellis and Fouts
(as cited by Grossen, 1996, p. 22) have developed a classification system for scientific
research (see Figure 2).

Ellis and Fouts (1993, 1994) have suggested a three level system for evaluating
the evidence behind the statement ‘The research says’…. According to the Ellis
and Fouts model, Level I research is ‘basic research’ and theory building.
Research at this level is comprised of correlations, descriptive data and qualitative
case studies. While Level I education research exists in abundance, it is really of
only limited utility. It can be used to disprove a claim of effectiveness, but no
theory regarding effective teaching practices can actually be proven using only
correlation and description…. At Level II, a theory of instructional practice is
tested in the classroom to see if it is more effective than the alternatives. Do
randomly assigned students actually perform at higher levels in classrooms that
use the experimental teaching procedure? Using statistics, researchers analyze the
data to determine if the results are accidental or can be predicted to occur
again….Level III research evaluates the effects of the recommended teaching
intervention using large-scale school and district-wide implementations. Research
at this level is important because it examines the new intervention in full
context….To construct a strong professional knowledge base, we should turn our
attention to Level III research and high performing schools…

Figure 2: Constructing Knowledge from Evidence

<table>
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<tr>
<th>Education</th>
<th>Scientific method</th>
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<tr>
<td>Level I. Theory building</td>
<td>1. Develop a hypothesis</td>
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<tr>
<td>Level II. Test the theory</td>
<td>2. Test the hypothesis by formal</td>
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<tr>
<td></td>
<td>experiment</td>
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<tr>
<td></td>
<td>3. Analyze data to determine the truth of</td>
</tr>
<tr>
<td></td>
<td>the hypothesis</td>
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<tr>
<td>Level III. Replicate results in large scale</td>
<td>4. Peer review, replication of the</td>
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<tr>
<td>studies and school/district wide</td>
<td>experiment, large scale and/or long</td>
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<tr>
<td>implementations</td>
<td>term follow up studies</td>
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Note. From “Making Research Serve the Profession” by B. Grossen, 1996,
permission.
It is common knowledge and repeatedly reported in the press that, in the past, many public school students have not performed well on standardized tests. Grossen (1996, p.7) stated: “Many educational decisions were based on state mandates, followed by a roar of publishers promoting their packaged implementation materials”. This statement influenced this researcher to review the historical context of educational reform. Milan (2003), at the annual Fire Department Instructors’ Conference (FDIC), described two important and well-known instructional strategies that led up to the standards based model. They are Blooms Taxonomy developed in the 1950’s, and Hunter’s Mastery Learning model in the 1980’s. The identification of these two strategies prompted this researcher to review additional literature to gain deeper insights into the evolution of educational instructional strategies utilized today.

The Educator’s Lexicon (Association for Supervision and Curriculum Design, 2002d, ¶8) offers the following definition of Bloom’s Taxonomy:

A classification of educational objectives developed in the 1950’s by a group of researchers headed by Benjamin Bloom of the University of Chicago-Commonly refers to the objectives for the cognitive domain, which range from knowledge and comprehension (lowest) to synthesis and evaluation (highest). The taxonomy has been widely used by teachers to determine the focus of their instruction, and is probably the original reference of the term higher-order thinking.

Hunter’s research heavily influenced two decades of teacher training in the 1970’s and 1980’s. Mastery Learning, often called the direct instruction method, is highly structured through lesson designs. Kinder and Carnine (as cited in Chick 1999, p.86) referred to this method of instruction stating:
Direct Instruction materials are based on effective principles of instructional design and include explicit teaching of rules and strategies; sequencing of examples and nonexamples so that students learn concepts more quickly; and immediate correction and feedback—all of which have been researched and validated.

In summary, much has changed in education since the introduction of Blooms Taxonomy in the 1950’s. Standards based education has been mandated by legislation in the State of Colorado and across the United States of America. Today educators are using evidence based instructional strategies and demanding scientific research on their effectiveness. This influenced this researcher to explore how educational research is conducted. The use of meta analysis is common in educational research. Three levels for evaluating the research were suggested by Ellis and Fouts.

**Research Question Three: What are the instructional strategies other fire departments currently utilize?**

The literature reviewed indicated that there are a wide variety of instructional strategies used by fire departments in training their recruits. Some fire departments have reported a research division associated with their training strategies. For example, the Boston Fire Department (2002, ¶1) has incorporated their training academy into a larger division. “The Training, Maintenance, and Research Division initiates and supervises the job development of fire fighters commencing with the probationary period and continuing throughout their career. In addition, the Division is involved in research programs...”
With reference to instructional strategies employed by other departments, Ridenhour (2002, pp.107-120) discussed the legal impacts, and the importance of documentation and measuring recruit performance against established standards. A series of suggestions were outlined based on the success of the Aurora Colorado Fire Department Recruit Academy. The majority of the article referred to legal requirements and proper record keeping. Reference was made to the importance of providing a job description, and developing applicable standards for recruit training. It was stressed that instruction needs to address the standards.

McLemore (1997, pp.22-24), in an ARP entitled Developing a Recruit Academy in a Combination Fire Department, developed a comprehensive list of what should be covered in a recruit academy. This list was cross referenced to the NFPA 1001 Standard, and included safety, alarms, fire behavior, personal protective equipment, ventilation, ropes, ladders, fire streams, fire control, overhaul and water supply. The objectives were directly tied to the NFPA 1001 Standard using the reference numbers from the standard.

In an ARP paper entitled, Training for the 1990’s, Larson (1990, p.6) stated the Wenatchee Fire Department (WFD) used a recruit manual which: “includes the objectives to be met, time frames to meet them and check offs for the company officer and Training Division”. Chief Widener, of the WFD, referred to the fact this department still utilizes the manual. When responding to a follow up correspondence by this researcher he stated: “We use a revised recruit manual that includes more up to date information and techniques” (G. Widener, personal correspondence, May 12, 2003).

Colorado’s South Metro Fire Rescue (SMFR) utilizes a similar manual for probationary firefighters. Captain West (M.J. West, personal correspondence, July 21,
2003), the developer of the manual, was interviewed for insights into the *SMFR Professional Skills Manual*. He noted the manual is divided into four quarterly training units, and a different company officer is assigned to supervise each quarter. The manual is “…intended to assure all firefighters are proficient at the basic skills required to be a firefighter”. Each quarter culminates in a practical exam, and passing the exam is a prerequisite for advancing to the next quarter. There are dramatic consequences for failure of the quarterly examination including repeating of the quarter, extending probation, withholding any incremental pay increase associated with a change in status, and termination upon the third failure of a quarterly examination. West reported SMFR is pleased with the manual and the training program and stated:

>The book has improved the overall level of knowledge within the department, as well as teamwork and skill level, since all members of the company usually get involved in training the new member. We believe it is important to continually raise the bar of expectations to improve the overall level of knowledge within the department.

The Minneapolis Fire Department also utilizes a one-year probationary period after an intensive four and one half month recruit-training period. The program is divided into quarterly training units with company officer supervision and testing by the Training Division (Munson 2002, pp.7-8).

Instructional strategies utilized by recruit academies generally are related to training for a high-risk profession. Clark (as quoted by Sage 1995, p.5) described the ingredients in high-risk training programs as information, performance outcomes,
Ward (as quoted by Sage 1995, pp.6-7) identified eight common constraints of high-risk training.

Moreover high risk training fails when agency policies, regulations, and SOP’s, training officers, instructors, and employees:

1) fail to take training seriously,
2) allow senior decision makers to discount the value of training,
3) allow training to start and end at the classroom door,
4) allow employees to be trained as elementary and secondary school children rather than adults,
5) evaluate training too timidly,
6) ignore technology of education instruction,
7) concentrate on material things rather than the needs of people, and
8) defend excuses made by a training officer or senior decision makers, rather than making the training academy a service unit of the community to protect the life and property of its citizens, businesses, industry and visitors.

The reference by Ward, regarding the importance of differentiating adult fire service learners from children as learners, prompted this researcher to review additional literature related to adult education. Hassan (as quoted by McGary, 1999, p.12) noted the importance of adult education theory and its relationship to the fire service. *The Adult Learner*, was cited in much of the literature related to the training of fire service personnel as adults. In this book, Knowles, Holton, & Sawnson (1998, pp.181-183) defined Andragogy as:
Andragogy: core set of adult learning principles....Each of these six principles: 1) the learners need to know, 2) self-concept of the learner, 3) prior experience of the learner, 4) readiness to learn, 5) orientation to learning, and 6) motivation to learn – are perspectives that come directly from the adult learner.... Andragogy’s core adult learning principles take the learner seriously. They go beyond basic respect for the learner, and view the adult learner as the primary source of data for making sound decisions regarding the learning process.

Vincent (1998, pp.3-5), in an ARP entitled *Impact of the 40-hour Methods of Teaching Course on Fire Instructors*, discussed the importance of the instructors presenting fire service training. The reason stated for investigating the course was: “The 40-hour Methods of Teaching Course has historically been the instructor’s only exposure to the teaching profession”. When assessing the impact of this particular instructor-training course on fire service instructors, reference was made to the use of certified instructors in the State of Texas. The Texas commission on Fire Protection Personnel presents guidelines for the continuing education required for renewal of fire fighter certification. Vincent stated: “Credit hours from courses taught by instructors who are not certified to a minimum level of Basic Fire Instructor may not be applied toward the annual continuing education requirements”.

In an ARP entitled, *Improving Classroom Training Through Facilitation*, Lobdell (1998, p.23) recommended the Spokane Valley Fire Department improve training by hiring experts to assist with the development of training programs. “The recommended course of action is to use a professional facilitator, first to develop and demonstrate the
concept for the fire service, and then to evaluate and coach them until some experience is gained”.

Clark’s (1993, p.5) article, *Higher Education and Fire Service Professionalism*, is subtitled “If the fire service wants to put more emphasis on professionalism, it should put more emphasis on academics”. Clark (1993 pp.50-51) also reported on comments regarding education and training from the first three Wingspread conferences for the fire service.

At the first Wingspread conference….The Wingspread group identified seven content areas in which the academic community could help meet the fire service’s educational needs: First, mastery of the scientific method, because true professions are based on scientifically sound theoretical and empirical foundations…. Held in 1976, Wingspread II evaluated fire service progress….The development of fire service programs in the U.S. over the past 10 years has been nonsystematic and nondirectional….Wingspread III in 1986, did not address higher education. The only relevant statement they made was “Professional development in the fire service has made significant strides, but improvement is still needed”.

Rubin (1997, p.44) issued a report on the proceedings of the 1996 Wingspread conference. The statement, related to education and training from the Wingspread IV conference, included this quote: “This professionalism should be grounded in an integrated system of nationally recognized and/or certified education and training”.

This researcher noted that Wingspread Conferences are not unique to the fire service. Rubin (1996, p.28) stated that the Wingspread conferences occur in a variety of
professions and are sponsored by the S.C. Johnson Company, a manufacturer of wax products. “The Wingspread Conferences are intensive meetings of a small number of technical specialists gathered to address issues or problems. The selected professionals are asked to clearly and precisely define problems associated with their business”.

Since the available current literature based on instructional strategies in recruit academies similar to the GFD Recruit Academy appeared to be limited, this researcher developed a questionnaire to gain more information from a survey of similar fire departments. This researcher followed suggestions found in the book, *Asking Questions: A Practical Guide to Questionnaire Design* by Sudman & Bradburn (1986). This researcher developed and distributed a questionnaire to survey fire departments belonging to the Colorado Fire Training Officers Association (CFTOA). The questionnaire / survey is included as Appendix A. The letter sent with the survey is included in Appendix B. The reason for selecting the CFTOA population was because of the similarities these departments have to GFD. The majority of CFTOA member departments is involved in the same certification program, and draw from a similar applicant pool. The responses to this survey are found in Appendix C.

In summary, various instructional strategies are utilized by other fire departments. Strong relationships between the recruit academies and the NFPA standards were cited, and the importance of teaching to these standards was discussed. The mention of the recruit training manual used by the Wenatchee Fire Department influenced this researcher to look to how other departments monitor recruit progress. Recruit manuals and structured probationary periods are included as part of some departments’ recruit training programs. The principles of adult education were mentioned in the literature
related to fire fighter training. This resulted in this researcher reviewing additional literature relating to adult education. Fire service leadership identified a linkage to the academic community as early as 1966 at the first Wingspread conference. Other instructional strategies were identified through use of a questionnaire developed by this researcher.

Research Question Number Four: How do these instructional strategies compare with one another?

To statistically compare identified instructional strategies with one another would require Level II research as cited by Grossen (1996, p.22). “At level II, a theory of instructional practice is tested in the classroom to see if it is more effective than the alternatives. Do randomly assigned students actually perform at higher levels in classrooms that use the experimental teaching procedure?” In this applied research project, instructional strategies are compared using descriptive data, because the goal of this researcher is to add to a knowledge base rather than to make decisions as to which strategies are most effective.

An objective of this research question, i.e., comparison of instructional strategies, is to identify learning environments that could improve quality of instruction and result in improved performance of GFD Academy recruits. Although instructional strategies can be compared on many variables, for the purpose of this applied research project instructional strategies related to planning, implementing, and assessing and/or evaluation of the learning environments are compared. This is a descriptive comparison of similarities and differences of outside instructional strategies with instructional strategies implemented within the GFD Recruit Academy.
Planning for instruction in the GFD Recruit Academy is based on a pre-selected curriculum designed for a high-risk profession. The curriculum includes relevant knowledge, and the identification of psychomotor skills needed to perform firefighting duties. The IFSTA *Essentials of Firefighting: Firefighter I Curriculum* was selected in 1998 because of its relationship with NFPA standards, and to provide consistency in recruit training (J.E. Bales, personal communication, July 16, 2003). The same curriculum is utilized today.

Planning for instruction in the educational community is based on developing measurable academic standards that will produce students with critical thinking skills. Hirsch (1996, p.6) stated:

> The goal of present day educational reformers is to produce students with ‘higher-order skills’ who are able to think independently about the unfamiliar problems they will encounter in the information age, who have become ‘problem solvers’ and have ‘learned how to learn’, and who are on their way to becoming ‘critical thinkers’ and ‘lifelong learners’.

Planning for instruction by the other fire departments, in the literature reviewed by this researcher, includes instructional strategies based on Bloom’s Taxonomy, and references to NFPA standards. When asked about the model for the IFSTA curriculum, Walker stated: “I have based the curriculum on Bloom's Taxonomy and progression” (S.S. Walker, personal communication, May 13th 2003). A majority of the content planning by other fire departments is related to NFPA standards, as exemplified by the Illinois Fire Service Institute. Brauer (2003, p.83) noted: “The specific objectives for
each day are derived from the Illinois Office of the State Fire Marshall, whose program objectives for Illinois Certified Firefighter II are drawn from the NFPA standard”.

Implementation of instruction at the GFD Academy focuses on the curriculum utilized, and varies with the training and experience of the instructor. The instructional strategies currently used in the recruit academy are those recommended in the *IFSTA Instructors Guide: Essentials of Firefighting* (IFSTA, 1998). Instructors may utilize published and/or instructor produced materials to present lessons. The IFSTA Curriculum is competency based. The competencies are divided into cognitive domain and psychomotor domain (IFSTA, 1998, p IGIG-4). Implementation of the program for the GFD Recruit Academy is based on direct instruction. The role of the instructor is to implement the content using prescribed instructional materials. Direct instruction, based on the Hunter model, is a specific strategy. Referring to direct instruction, Chick (1999, p.82) quoted that direct instruction is:

…An intensive intervention designed to increase not only the amount of learning but also its quality by systematically developing important background knowledge and explicitly applying it and linking it to new knowledge. In this process mechanistic skills evolve into flexible strategies, concepts combine into schemata, and success in highly structured situations develops into successful performance in naturalistic, unpredictable, complex environments (Carnine, Grossen, & Silbert, 1995, p.1).

Direct instruction was compared to other teaching approaches in a 1996 meta-analysis of 34 studies. The results of this research by Adams & Engelmann (as cited by
Chick, 1999, p.87) revealed: “Direct instruction was favored 80 percent of the time for regular education students and 90 percent of the time for special education students”.

Review of the credentials of 2003 GFD Recruit Academy Instructors revealed that approximately 30 percent of the GFD Academy instructors are certified at the Fire Instructor I level. Those without certification are able to teach recruit classes, since the focus of instruction is on published content rather than on other factors such as motivation of students, unique learning styles, or critical thinking skills.

Educators are implementing instruction utilizing standards based criteria. “Until an instructional practice has been implemented, evaluated, and found to produce better results than its alternatives, there is no research basis for recommending it” (Grossen, 1996, p.8). Educators often focus on instructional strategies related to developing critical thinking skills in their students. Critical thinking skills are often taught using inquiry methods rather than direct instruction. Chick, (1996, p.91) stated:

While direct instruction can be implemented by any teacher with adequate training, it takes a highly skilled teacher to be able to design curriculum that considers students’ background knowledge, teaches the generalizations, patterns, and linkages in the knowledge base, emphasizes higher level thinking, and includes explicit strategy instruction for at risk learners.

The Colorado Education Association (n.d., ¶4) reported:

Teachers must have at least a Bachelor’s degree and demonstrate competency in each of the academic subjects they teach OR [sic] complete an academic major or coursework equivalent to a major OR [sic] a graduate degree in each of the
academic areas in which they teach OR [sic] earn advanced licenses in the same areas.

In addition, teachers must participate in continuing education courses to renew a teaching license “… every five years with six semester hours of college/university credit or 90 clock hours of Professional Development …” (Colorado Department of Education, 2003, ¶1).

In contrast, regarding implementation by fire departments, the Colorado Division of Fire Safety abides by the Rules Pertaining to the Firefighter Voluntary Certification Program (Colorado Department of Public Safety, Division of Fire Safety, 1996), and issues certificates for fire service instructors. An applicant may complete a 16 contact hour instructor methodology course, and pass a written and practical examination to receive certification. There are no continuing education requirements.

Other fire departments are changing the way they instruct entry-level firefighters. “Necessary skills are identified and progressive approaches to disaggregate these skills and assemble a learning framework that supports ‘Teaching firefighters to do their work’ are being developed” (Brauer, 2003, p.83). The developer of the IFSTA Firefighter I Curriculum materials discussed the assessment and evaluation of instructional strategies used by the GFD Recruit Academy. Walker (S.S. Walker, personal correspondence, May 13, 2003) reported that Fire Protection Publications or IFSTA have never evaluated the effectiveness of the curriculum.

Hills (as quoted by Jalongo & Matuku, 1999, p.126) offered the following definition: “Assessment is a general term usually reserved for determination about people. Assessment appraises program effects, one human being at a time”. Keeves (as
quoted by Jalongo & Matuku, 1999, p.126) differentiates evaluation from assessment stating: “ ‘Evaluation’ is another general term used in education when making judgments about things, such as lesson plans, learning experiences, curriculum models, and educational programs”. GFD Recruit Academy assesses their recruits on how well they perform on tests of knowledge and psychomotor skills. The GFD Recruit Academy has not evaluated the effectiveness of their instructional strategies. Neither a large-scale formative or summative evaluation has been conducted. This researcher was unable to discover any research based evaluations of the IFSTA Essentials of Firefighting: Firefighter I Curriculum.

Educators usually assess their success by student performance on criterion referenced and standardized tests. Jalongo & Mutuku (1999, p.127) stated:

Program evaluation is one of the most political, contentious, and challenging dimensions of the educational field, for it is program evaluation results that make or break careers, that determine who will get recognition and resources, and that are used to compare and rank the educational achievements of entire nations.

Assessment of educational instructional strategies is extensive. Hirsch (1996, pp.38-42) reported that studies are conducted both intranationally and internationally on both a small and large scale. There are research studies on a variety of variables including, but not necessarily limited to, class size, critical thinking skills, direct teaching methods, indirect teaching methods, effective teaching modes, higher order thinking skills, brain functions, problem solving skills, social atmosphere, new learning, pace of instruction, clarity of instruction, managing and monitoring whole-class instruction, and drill and practice.
An abundance of literature relates to the evaluation of educational practices in order to reorganize and reform education. Grossen (1996, pp.23-27) stated:

Once these [instructional practices] had been successfully replicated, they could be used as models to teach the rest of the profession how to get the same high achievement levels…. Educators must use their knowledge of how the research is conducted, the methodology, before accepting and applying the results…. Practitioners and policy makers, alike, must start asking to see the research results, to know the methods by which they were gathered, and to look at models where the practices they describe have been proven to work.

There have been many evaluations of educational strategies on a local, state, and national level. Project Follow Through, the largest and most expensive research study in the history of education, is an example of an evaluation on a national basis. “Follow Through began in 1967 as part of President Johnson’s War on Poverty, and continued to receive funding through the summer of 1995” (Grossen, 1996, p.24).

This researcher found no reference in the literature to formative or summative evaluation of instructional strategies by other fire departments. Items on opinions of Colorado Training Officers were included in the questionnaire distributed by this researcher. The items a) The recruit academy prepares students well for written certification evaluations, b) The recruit academy prepares students for practical certification evaluation, and c) The recruit academy prepares students well for duty as a firefighter were to be answered using a Likert scale rating. The respondent could either check 1) Strongly disagree, 2) Disagree, 3) Agree, or 4) Strongly Agree. This survey was
an attempt by this researcher to acquire professional opinions regarding the assessment of
the effectiveness of particular recruit training academies.

In summary, instructional strategies in the GFD Recruit Academy were
descriptively compared with instructional strategies used by educators and other fire
departments. The variables selected for comparisons were planning, implementation, and
assessment and/or evaluation. The writings of Grossen reinforced the selection of
descriptive comparison selected by this researcher, because the goal of this research was
to add to a knowledge base. Planning was similar for GFD Recruit Academy and the
surveyed fire departments through the use of a published curriculum. Educators have
planned their own evidence based standards. Implementation by the fire departments was
based on both certified and non-certified instructors, whereas public school educators
were mandated to have certification supplemented with continuing education coursework.
Assessment for fire departments was based on standardized instruments, typically
supplied by the curriculum developer. No large scale formative or summative evaluation,
or Level II or Level III research for fire departments was found by this researcher. In
contrast, educational literature exists for Level I, Level II, and Level III research.

Procedures

Research Methodology

The desired outcome of this applied research project was to build a knowledge
base to foster recommendations that would lead to the improvement of instructional
strategies utilized by the GFD Recruit Academy. The data collected and findings from
this research are to be included in the knowledge base. A descriptive research method,
including one survey, was selected to identify the strategies utilized within the GFD
Recruit Academy and compare them with strategies currently utilized by educators and other fire departments.

Process

A six-step process was used to conduct this applied research project. The steps were generally sequential.

The first step was to contact the Golden Fire Department officers who changed their previous instructional strategies to establish the GFD Recruit Academy in 1998. Interviews with those involved in the establishment of the first recruit academy were conducted to gain insight into the recruit training process, both before and after the establishment of the GFD Recruit Academy. The interview process, including dates, who was interviewed, and the questions asked is included as Appendix D. Burrell, the GFD Chief from 1991-1995, was interviewed regarding historic recruit training methods. Wallace, GFD Chief from 1995-2001, was interviewed regarding the planning and design of the initial recruit academy. Similarly, questions were asked of the training officer, Bales, who took on the responsibility for the GFD Recruit Academy when the department hired a full time training officer in 2000. The developer of the IFSTA Essentials of Firefighting: Firefighter I Curriculum, Walker, was interviewed to gather information regarding the instructional strategies recommended for implementation of the Curriculum.

From a review of literature, a more comprehensive understanding of the issues related to educational research was obtained. The second step was 1) to review the existing literature by searching articles, books, journals, periodicals, and the Internet to gather data on current meta-analysis of research based instructional strategies used today
by educators, and 2) to gather information on the history of the instructional strategies leading up to the current evidence based educational model.

The third step was to gather information on instructional strategies currently utilized by other fire department recruit academies. A review was conducted of literature found in the Learning Resource Center of the National Fire Academy, fire service trade journals, and Internet sources. This researcher reviewed the literature to gain a deeper insight into the instructional strategies utilized by other fire departments in their recruit training academies. Information was also gathered from interviews of fire department training officers, included in Appendix D.

Since relatively little information was found on instructional strategies used in recruit training by departments with characteristics similar to GFD, the fourth step was to develop and mail a questionnaire to survey similar departments regarding their recruit academies. The information sought was related to instructional strategies used in their recruit programs, and their opinions on the effectiveness of those strategies. The questionnaire was used to survey members of the Colorado Fire Training Officer Association (CFTOA), an organization to which GFD belongs. The instructions on the letter accompanying the survey asked that the surveys be completed and returned. The respondents were assured of anonymity, and that the results of the survey would only be used for this specific applied research project. Return postage was included with the questionnaire to increase the response rate of those surveyed. No records were kept of which departments responded to the survey. The survey instrument was mailed to this particular population, because a majority of member departments are involved in the same certification program, and draw from a similar applicant pool.
The fifth step was to compile the data returned, and calculate the percentages versus the frequency of each surveyed item. The individual item responses were calculated using percentages. “Another way of looking at the frequency of values is through the use of percentages… the percentage is sometimes preferred to the frequency since it incorporates the total number of scores into its calculation” (Hayes, 1998, p.192). The percentage for each item was calculated by dividing the frequency of a given answer by the total number of responses returned.

An objective of this researcher was to identify instructional strategies that have a high probability for improving the learning, and in turn the performance of recruit firefighters serving the growing and increasingly diverse GFD response area. The sixth step was to descriptively, rather than statistically, compare the instructional strategies used by the GFD Recruit Academy with those identified by educators and other fire departments. Information was gathered from the findings of a literature review of each research question, and a review of additional literature discovered during this process. The descriptive comparisons were based on the planning, implementation, and assessment and/or evaluation of the instructional strategies utilized 1) by the GFD Recruit Academy, 2) by educators, and 3) by other fire department recruit academies.

Limitations and Assumptions

The results of this applied research project were limited by several factors that should be noted.

The GFD Recruit Academy curriculum materials themselves were investigated. The ways in which the instructors utilized, or neglected to utilize the materials in training classes and on the drill ground were not observed. Additionally, this researcher assumed
that those interviewed were correct in their responses. This is, however, a limitation due to the fact that personal biases and/or recollections may not be entirely accurate.

The educational research that was reviewed included a meta-analysis of hundreds of research studies. This researcher operated on the assumption that the findings of each study included in the meta-analysis were scientifically analyzed. There is a possibility that the original studies may have had some flaws that could have affected the results of the meta-analysis.

Today, education serves in a political arena as well as an educational one. This researcher assumed that all points of view were presented in the educational literature. Jalongo (1999, p.14) stated: “In tumultuous times, practitioners learn to survive by avoiding controversy and going along with the program, at least superficially”. Conceivably, information relevant to this research may have been omitted from the literature.

The fire department survey size was limited. Each member department of the Colorado Fire Training Officers Association was sent a survey. Not every fire department in the State of Colorado belongs to this organization. Therefore, the population surveyed does not encompass the entire state. Similarly, the thousands of departments beyond the boundaries of the State of Colorado were not surveyed. This limitation is based on a Kahane & Cavender statement (as quoted by Martinette, 2002, p.19) related to the “fallacy of bias statistics, or using a sample that insufficiently represents the total population”. Results of this survey are limited to this applied research project and cannot be generalized.
51 out of 70 surveys were returned. Probably, a more accurate conclusion could have been reached if more departments would have responded. A follow-up letter after the initial mailing could have been sent except that anonymity was assured, and thus no records were kept of who responded to the survey. A higher percentage of participation may have altered the outcome. It would have been of interest to know why 19 departments did not respond.

Definition of Terms

Cognitive learning - “The mental processes involved in learning, such as remembering and understanding facts and ideas” (Association for Supervision and Curriculum Design, 2002c, ¶12).

Criterion referenced tests – “Those tests designed to measure how thoroughly a student has learned a particular body of knowledge without regard to how well other students have learned it” (Association for Supervision and Curriculum Design, 2002c, ¶29).

Curriculum – “Although the term curriculum has many possible meanings, it usually refers to a written plan outlining what students will be taught (a course of study). Curriculum documents often also include detailed directions or suggestions for teaching the content” (Association for Supervision and Curriculum Design, 2002c, ¶32).

Direct instruction – “A general term that refers to behavioral features that describe a highly structured system of teacher-student interactions, many of which correlate with student achievement, such as group responses, corrections, and engaged time” (Rosenshine, as cited by Chick, 1999, p.82).
Formative evaluation – “It involves monitoring and adjusting a program and is much like the process used in action research….The purpose of formative evaluation is to provide constructive feedback that will improve a plan or program immediately so that eventually the data collected will be able to show evidence of the intended long-term results” (Association for Supervision and Curriculum Design, 2003a, ¶1).

Mastery Learning – “A way of organizing instruction that tries to ensure that students have mastered each increment of a subject before going on to the next. The idea assumes that a subject can be subdivided into sequential steps organized hierarchically. Hunter’s lesson design includes eight steps: the anticipatory set, purpose, input, modeling, guided practice, checking for understanding, independent practice and closure” (Association for Supervision and Curriculum Design, 2002e, ¶4).

National Fire Protection Association - “A non-profit organization that researches and formulates consensus standards for public and private agencies. The NFPA is not a federal agency, and its standards and codes are not enforceable unless adopted by an authority in a particular jurisdiction” (Boyd 1999, p.13).

Powerpoint – “A Microsoft application for creating presentations, speeches, slides, etc.” (Webenox, 2003).

Questionnaire - “The complete data collection instrument used by an interviewer and/or respondent during a survey” (Sudman & Bradburn 1986, p.300).

Recruit Academy - “Recruit Academy is a term used to identify a series of training classes that are designed to teach new firefighters the basic skills and knowledge
which are required to operate as a firefighter in a fire department” (McLemore, 1997, p.9).

Summative evaluation – “The major data collection done at important junctures, such as at the end of each year of a program. The purpose of summative evaluation is to document results” (Association for Supervision and Curriculum Design, 2003b, ¶1).

Systemic Reform – “Improvement of education by coordinating all aspects of the system—which in various situations may be a state, a local district, or even a school” (Association for Supervision and Curriculum Design, 2002a, ¶30).

Results

Research Question One: What are the instructional strategies the GFD Recruit Academy currently utilizes?

This ARP showed the methods currently used for instruction in the GFD Recruit Academy are direct instructional strategies suggested by the IFSTA Essentials of Firefighting: Firefighter I Curriculum. The findings from interviews of those involved were that the GFD Recruit Academy was developed to improve the consistency of entry-level training, and was established in 1998. Chief Wallace selected this curriculum based on availability, cost, and consistent quality. The IFSTA Curriculum was, and still is, utilized for instruction. Wallace noted that the curriculum decided on for the first academies in 1998 and 1999 was taken directly from IFSTA (M.S. Wallace, personal communication, May 30, 2003). Bales confirmed the curriculum was utilized in the 2000 and 2001 recruit academy (J.E. Bales, personal correspondence, July 16, 2003). Review of the recruit academy manuals confirmed the use of IFSTA Essentials of Firefighting as
the text and curriculum for the 2002 and 2003 recruit academies (Golden Fire Department, 2003).

Walker, the producer of the IFSTA *Essentials of Firefighting: Firefighter I Curriculum*, stated this competency based program for content and skill learning has strong ties to educational concepts, first presented by Bloom, in the cognitive and psychomotor domains. Walker explained the cognitive skills are assessed through the use of multiple-choice written assessments, and psychomotor skills are assessed using job sheets (S.S. Walker, personal communication, May 13, 2003). GFD Recruit Academy instructors, using direct instruction strategies as recommended by the publishers, implement the curriculum.

**Research Question Two: What are the instructional strategies educators currently utilize?**

The findings from a review of the literature were that a substantial amount of change has occurred in identifying effective educational instructional strategies since the introduction of Bloom’s Taxonomy in the 1950’s. The evolution of educational instructional strategies has continued into the 1990’s and early 2000’s. The identification of research based instructional strategies is the current focus of educators. Researchers confirmed the importance of teacher training, and the teacher as a serious learner about his or her profession.

Ellis and Fouts (as cited by Grossen 1996, p.22) developed a classification system for educational research. Level I relates to theory building, Level II relates to testing the theory, and Level III relates to replicating the results. Grossen stated: “To construct a strong professional knowledge base, we should turn our attention to Level III research”…
Research Question Three: What are the instructional strategies other fire departments currently utilize?

The findings from a review of the literature were that the fire service leadership identified a linkage to the academic community as early as 1966 at the first Wingspread conference. Various instructional strategies utilized by other fire departments were reported. The importance of instructors and the instructional strategies related to training in high risk professions were cited by Vincent (1998) and Ward (as cited by Sage, 1995, pp.6-7). The science of Andragogy, and the core set of adult learning principles were identified by Hassan (as cited by McGary, 1999, p.12). Many of the departments reviewed follow a recruit academy with a structured probationary period. Instructional strategies of recruit departments with characteristics similar to those of the GFD Academy were surveyed by use of a questionnaire developed by this researcher. The return rate of the survey, distributed to the 70 recruit departments who are members of the Colorado Fire Instructors Association, was 73 percent.

A compilation of all returned surveys yielded the following results. The Colorado Division of Fire safety (CDFS) is utilized for certification by 92 percent of surveyed departments, 6 percent utilize the Colorado Metropolitan Certification Board (CMCB), and 2 percent use an internal certification program.

A recruit academy is used for entry-level firefighter training by 92 percent of surveyed departments. Of these, 57 percent use an in house academy, 34 percent participate in a cooperative academy, four percent send their recruits to another agency, and four percent utilize the community college system.
In reference to the duration of recruit academy training, 13 percent of the respondents reported less than 100 hours, 23 percent reported 101-200 hours, 26 percent reported 201-300 hours, and 38 percent reported more than 301 hours of training.

The *IFSTA Essentials of Firefighting* text is utilized by 98 percent of the respondents and two percent reported using the Delmar *Firefighters’ Handbook*. The published curriculum materials are supplemented with instructor produced instructional materials by 79 percent of the respondents.

The certified instructors that teach recruit classes was reported as 0-25 percent by 53 percent of the respondents, 17 percent reported between 26 and 50 percent of instructors are certified, four percent reported that 51-75 percent are certified, and four percent reported over 75 percent of academy instructors are certified.

With reference to written assessments, six percent of the respondents disagreed that the recruit academy prepares students well for written certification evaluations, 43 percent agreed and 51 percent strongly agreed.

Referring to practical student assessments, four percent of the respondents disagreed that the recruit academy prepares students well for practical certification evaluations, 34 percent agreed, and 62 percent strongly agreed.

When asked about preparing the recruit for duty, 62 percent of the respondents agreed that the recruit academy prepares students well for duty as a firefighter, and 38 percent strongly agreed.

Regarding the length of the probationary period following the recruit academy, four percent reported that they require no probationary period, 32 percent reported a 0-6
month probationary period, 62 percent required a 7-12 month probationary period, and two percent required a greater than one year probationary period.

Research Question Number Four: How do these instructional strategies compare with one another? The GFD Recruit Academy instructional strategies were descriptively compared on the variables of planning, implementation, and assessment and/or evaluation with instructional strategies that were used by 1) educators and 2) other fire departments in their recruit training. This comparison revealed the complexity of the definition of effective instructional strategies. GFD Recruit Academy and other fire departments teach the NFPA standards by developing knowledge and psychomotor skills through the use of a published curriculum. The results of the survey of other fire departments similar to the GFD are a quantitative product of this applied research project, and are included as Appendix C.

Educators utilize a standards evidence based approach as described by Grossen. Certification of GFD instructors is through the Colorado Division of Fire Safety or the Colorado Metropolitan Certification Board. Four percent of the outside fire departments surveyed reported over 75 percent of academy instructors are certified by CDFS or CMCB. In contrast, all public school teachers are licensed through the State of Colorado Department of Education. Licensure is a requirement for employment as a teacher in any Colorado Public School System.

Discussion

The knowledge base compiled by this descriptive research may be used for recommending future instructional strategies appropriate for incorporation into the training of entry-level firefighters in the GFD Recruit Academy. Building on the
knowledge base is an ongoing process. Using this ongoing knowledge base process, the leadership of GFD could design and use evaluative research methodology. The knowledge base could also be used to judge future instructional strategies that might be most effective for the GFD Recruit Academy, at a particular point in time. The end goal of this applied research project is to continue building a knowledge base for future decisions relating to the GFD Recruit Academy.

The primary instructional strategy used by the GFD recruit Academy is a direct instruction method based on a competency based curriculum. IFSTA Essentials of Firefighting is also used by an overwhelming majority of the fire departments surveyed. The sole measure of the effectiveness of the instructional strategies used in the GFD Recruit Academy is a summative student assessment, the Firefighter I Examination. The Colorado Division of Fire Safety administers this certification examination. The majority of departments surveyed stated the curriculum prepares students well for assessment, and for duty as a firefighter. It appears GFD is also satisfied with the curriculum and recruit academy due to several factors. The percentage of candidates passing the State Firefighter I examination for GFD recruits has improved since implementation of the initial recruit academy. The methods of instruction and curriculum have remained unchanged, and the direct instruction model provides adequate support materials to be implemented by instructors with varying degrees of expertise and certifications as fire service instructors. However, the comparison of GFD Recruit Academy training with the dramatic improvements demonstrated by research based educational strategies, and the comprehensive training programs executed by other fire departments suggests there is room for improvement.
Evaluation is an essential element for program improvement. The GFD Recruit Academy instructional strategies have not been evaluated either internally or externally in its six-year history. The generality of GFD Recruit Academy standards has not been previously defined, nor have others explored the effectiveness of the current recruit training instructional strategies through evaluations. A formative evaluation that is continuous and comprehensive, in addition to periodic summative evaluations of the GFD Recruit Academy would be necessary for improvements through systemic reform, i.e., the total system.

With respect to who conducts an evaluation, the question of who benefits from the evaluation must be raised. GFD must be cautious if those conducting the evaluation are also those who would benefit from a positive report.

Walberg and Greenberg (1999, p.132) caution:

More generally, bias seems to be part of human nature. Chicagoans warn, ‘Don’t ask your barber whether you need a haircut’. Skepticism (not necessarily cynicism) goes back to classical times. When considering what action to take, Aristotle cautioned his students to consider the source of information, and the Romans asked, ‘Cui bono?’ (Who benefits?).

GFD must carefully consider any future evaluation process. Evidence based criteria must be established, and qualifications for those conducting the evaluation must be considered. For the evaluation to be beneficial, it may be appropriate to engage outside or uninvolved people in the evaluation process. The answer to the question “Who benefits?” should be the citizens of Golden. The citizens would benefit from improved service by GFD through improved recruit training.
When describing the curriculum for the GFD Recruit Academy, the IFSTA *Essentials of Firefighting: Firefighter I Curriculum* can be defined as the total curriculum. However, it is a common practice for fire departments to supplement the IFSTA *Essentials of Firefighting* with a probationary manual, and a structured probationary period following the academy. The *Wenatchee Fire Department Recruit Manual* has been utilized by that department since 1990. It is still considered to be an effective tool for training recruits (G. Widener, personal correspondence, May 12, 2003). South Metro Fire Rescue requires a full year of highly supervised and assessed probation using the *SMFR Professional Skills Manual* (M.J. West, personal correspondence, July 21, 2003). Munson (2002) reported a quarterly training unit, with regular assessment of the recruits, is at the core of the entry-level training program for the Minneapolis Fire Department. It appears to this researcher that a structured probationary period after the academy is a more appropriate time frame for assessing a recruit than what is currently utilized by GFD. The probation period of current GFD recruits relates to their date of application rather than the date of completion of the academy. Therefore, probationary periods for GFD recruits vary from three to nine months after completion of the academy. This variability in probationary time period does not improve or standardize recruit training.

It also appears to this researcher that the GFD Recruit Academy curriculum is implemented without assessing the effectiveness of the instructors. Ward (as quoted by Sage 1995, pp.6-7) describes the training academy as a service unit of the community whose goal is to train recruits to protect the life and property of its citizens, businesses,
industries and visitors. The importance of evaluating the total recruit training program, including instructors, cannot be underestimated.

The goal of Fire Chief Wallace to improve recruit training by establishing a recruit academy has been realized. Review of the State of Colorado certification records show that the performance of GFD recruits on the Firefighter I Examination has improved. A higher percentage of the recruits in 2003 as compared to 1997, prior to establishing the first recruit academy, have passed the State of Colorado Certification Examination on the initial attempt (T. Staples, personal correspondence, June 6, 2003). The use of the IFSTA Essentials of Firefighting: Firefighter I Curriculum, has been useful for helping recruits pass the state test. The increased number passing the State Firefighter I Examination, by achieving 70 percent on the written portion and successful completion of the practical evaluation, has been the only quantitative indicator of the GFD Recruit Academy’s effectiveness.

However, the increased number of recruits passing the state examination is a minor improvement when compared with the potential major improvements that could be realized in recruit training. The learning environment of the GFD Recruit Academy could be expanded to incorporate appropriate evidence based instructional strategies. Dicembre (2002) described how the Baltimore City Public School System developed a research based whole school reform model. Dicembre stated that the components of the entire whole school reform package have enabled schools to significantly increase achievement. It can be hypothesized that a similar improvement in GFD recruit training would also require systemic reform.
The implementation, using the direct instruction method, matches the curriculum used by the GFD Recruit Academy. Elliot, the developer of an instructor methodology course accepted by the CDFS, reported that mastery learning is possibly the most influential model utilized in the State of Colorado instructor methodology courses (B.S. Elliot, personal correspondence, July 22, 2003). There is currently a matching of the IFSTA *Essentials of Firefighting: Firefighter I Curriculum* with the instructional strategy used to train fire service instructors in the State of Colorado. It appears that the certified instructors who are utilized in the GFD Recruit Academy are using methods and materials that do match. However, as many as 70% of the instructors teaching GFD recruits are not certified, and may not have any formal training for direct instruction. Those that are certified may have as little as 16 hours of formal training in instructional methodology. Educators are adamant that the best teaching strategies, even those that are evidence based, can be negated by untrained teachers. Using cooperative learning as an example, Grossen stated: “To make cooperative learning work as intended, teachers need extensive technical training” (Grossen 1996, p.4).

The use of certified instructors has not been required or monitored to date in the GFD Recruit Academy. The instructors themselves have not been evaluated on how they implement the curriculum. The State of Texas requirement that firefighters be taught by certified instructors underscores the value they place on certification standards. Vincent (1998, p.3) stated that the Texas Commission on Fire Protection Personnel insists that certified instructors teach continuing education courses. This is an example of systemic reform involving all levels of the Texas fire training system. The State of Colorado does not have a similar requirement. In Colorado, anyone can teach fire service training
courses, and those courses taught by uncertified instructors can apply toward firefighter recertification. Over half of the respondents to the survey by this researcher stated that only 0-25 percent of their instructors were certified as Fire Instructor I or above. In the State of Colorado, continuing education is not a requirement for renewal of fire instructor certification.

One of the largest impacts on learning identified by both Marzano and Sanders is the teacher. Sanders (as cited by Marzano et al., 2001, p.3) stated: “The most important factor influencing student achievement is the teacher”. Darling-Hammond & Sykes (1991, p.4) cited the importance of the instructor recommending: “…that teachers become serious learners in and around their practice, rather than amassing strategies and activities”. Marzano et al. (2001, p.1) presented the fact that the art of teaching is being transformed into the science of teaching. The qualifications of those instructing recruit courses are possibly the most important aspect of improving recruit training.

The context for understanding current research based instructional strategies is cited by Grossen (1996, p.24): “Without this [extensive research based professional development], an instructional strategy even if it is research based can be rendered ineffective and considered just another fad”. Cooperative learning is a strategy that is deemed effective by scientific research. Grossen cautions it will not be effective unless implemented by teachers trained to understand the components of the strategy.

The IFSTA Curriculum appears to be effective in teaching the skills identified in *NFPA 1001: Fire Fighter Professional Qualifications*. Of respondents to the survey of this ARP, 98 percent utilized the IFSTA materials. Only one department reported using a different curriculum. Higher-level evaluations, described by Ellis and Fouts as levels two
and three, may confirm that the IFSTA *Essentials of Firefighting: Firefighter I Curriculum* is meeting the needs of basic skills and knowledge necessary for entry level recruits. However, a single curriculum developer, even with the assistance of subject matter experts, may or may not have specific or comprehensive enough information for specifically training GFD recruits. The qualities and skills necessary for a GFD recruit serving this rapidly changing district must first be defined.

The GFD Recruit Academy system of training, as is, may not meet the challenges of training adults for the high-risk profession of fire fighting. It is not clear whether the key concepts of adult education, or Andragony, are included in the instructional strategies and curriculum utilized to train GFD recruits. An evaluation of the GFD Recruit Academy must address the unique qualities of adult learners in a high risk profession.

Ward (as cited by Sage, 1995, p.28) cautions against training employees in a high-risk profession as children. This researcher is opposed to adopting any methods of instruction without first evaluating their effectiveness. It is possible some of the instructional methods used in K-12 education may have a place in the GFD Recruit Academy. It is also probable that many of them will not. Designing and implementing evidence based program evaluations must be tied to the scientific method. Clark (1993, pp. 50-51), reported Wingspread I called for mastery of the scientific method. In this researchers opinion, any research based instructional strategies need to be evaluated before incorporation into recruit training procedures.

In this fast growing Golden, Colorado community with diverse needs, teaching concept development along with basic skills and knowledge could be more effective for
training recruits. Most practicing educators would probably reaffirm concept
development is more important than teaching specific facts for a test.

This researcher’s interpretation of the overall findings of this ARP is that the
concept of effective and efficient instructional strategies is extremely complex. The
extent of this complexity was not totally unexpected, yet the complexity influenced this
researcher to alter the action initially planned. Originally, the ARP was to address
identification of the most effective recruit training strategies. It quickly became evident
that a more comprehensive knowledge base must be developed prior to any such
identification. Therefore, no specific instructional strategies are forthcoming from the
results of this ARP. All future instructional strategies utilized by the GFD Recruit
Academy must be evidence based and validated by appropriate research.

All of the departments responding to the survey by this researcher utilize a
curriculum based on a published text. The overwhelming majority of these departments,
i.e., 79 percent, supplement these texts with instructor-produced materials. This fact
points to possible perceived deficiencies in either content or methodology of the
published curriculum.

The departments surveyed generally did not question the effectiveness of their
curriculums. A single summative student assessment, the Firefighter I Examination,
appeared to be the only measure of recruit training effectiveness. The majority of
respondents agreed that the curriculum of their academy prepared the students well for
written and practical certification evaluations. One hundred percent of the respondents
agreed and strongly agreed that their recruit academy prepares students well for duty as
a firefighter. It is of interest to this researcher to consider what their opinions were based
on, and what attributes developed in their academies translate into success as a firefighter. This may be an area worthy of future research.

Several factors may be involved in the high marks the respondents gave their recruit training. One factor might be the lack of scientific evaluations; another might be blind faith in the curriculum due to the percentage of recruits passing the test. Yet another factor might be the concept of the recruit academy as a place where only basic knowledge and psychomotor skills need to be taught. Several departments surveyed have a full year of probation following the academy to more effectively train and assess their recruits. It can be hypothesized that this probationary year is a time when any deficiencies in recruit training may be remedied.

The absence of any level two or three research, as defined by Ellis & Fouts, relating to recruit training instructional strategies is troubling to this researcher. It appears that only level one research, and the development of theories without small or large-scale evaluation is the method of operation for recruit instruction in the GFD Recruit Academy and the CFTOA departments surveyed.

The organizational implications for the GFD Recruit Academy are profound. The status quo can no longer be accepted in light of the increased scope of responsibility cited in the background and significance portion of this research. The GFD Recruit Academy must increase the scope of entry-level firefighter training. This is impossible with an off the shelf firefighter curriculum, no matter what the quality. A revised approach to recruit training must be implemented, and the GFD must commit to improving recruit instruction.
Any improvements in the GFD Recruit Academy will be identified by an evaluation of what is working well with recruit training, and what areas need improvement. The first step in this complex project is to identify the goals of recruit training. The objectives to attain the goals must be measurable and go beyond a single summative evaluation, which is now set as the State Firefighter I Examination. This approach will require a great investment of time and resources by the GFD. A thorough evaluation of the GFD Recruit Academy will require scientific evaluators. The credentials and experience required of these evaluators will need to be established. Once established, they will need latitude to freely evaluate instruction utilized within the GFD Recruit Academy. This evaluation must relate directly to the performance of the Golden firefighter, and the nationally recognized standards of firefighting.

Additionally, the GFD must be prepared to face the questions of why the department, or the city, should spend resources on a system that on the surface doesn’t appear to be flawed. The success rates on certification examinations are acceptable. Some of the higher level skills addressed by an improved academy may not become evident for years. Will citizens and the management of the city respond positively to a statement that says the academy should be operating more effectively? The bottom line drives many policy decisions, and those who advocate increased spending, and those who report inefficiencies often face resistance from all aspects of the organization.

Maintaining the status quo is the easier and less risky course of action. The temptation may be to leave well enough alone, even though improvements in recruit training may be the best long-term solution for the GFD Recruit Academy to become an effective learning organization. Garvin (as cited by Martinette, 2002) identified five
activities necessary to become an effective learning organization. They are: “systematic
problem solving that relies on the scientific method rather than guesswork, experimenting
with new approaches, learning from experience and past history, learning from the best
practices of others, and transferring knowledge quickly and efficiently through the
organization”. It is the opinion of this researcher that these five steps can be incorporated
into an evaluation plan for the GFD Recruit Academy.

This researcher sees an opportunity to gain insight into the instructional process
from the extensive research conducted by educators. The federal government has
participated in the systematic reform of education, and supports a clearinghouse for
sharing educational strategies that work. The National Fire Academy serves a similar
purpose for fire service instructors. Research is published, and some is available online
from participating Executive Fire Officers. In addition, training officers are able to share
information and instructional programs through the Training Resources and Data
Exchange (TRADE) program.

At what point is an instructional program declared a success or a failure? Who is
empowered to make this determination? Neither quantitative nor qualitative information
alone is adequate to evaluate complex, comprehensive programs that serve in the context
of a particular setting. Only through peer review, replication of research, and long term
follow up studies, can effective instructional strategies be identified.

The future of the GFD Recruit Academy will rest with the ongoing commitment
to the process of developing a continuing knowledge base that reviews the theory,
research, and practices of those involved in learning organizations. As Goodman (1997,
Recommendations

The results of this research indicate that there needs to be changes in the instructional strategies of the GFD Recruit Academy. It is recommended 1) that the GFD Recruit Academy continue to build a knowledge base for recommending future instructional strategies appropriate for incorporation into the training of entry-level firefighters, and 2) that the GFD Recruit Academy use evaluative research methodology in the future to assess the effectiveness of the instructional strategies utilized for entry level fire fighter training. Further study and research is suggested to develop evaluative research methods.

Standardizing the length of the probationary period and the development of a structured probationary period following the recruit academy should be implemented. It may be appropriate to institute this intervention before a formal evaluation of the GFD Recruit Academy instructional strategies is conducted. This standardization could assist in developing more appropriate assessment tools for the changing role of Golden Firefighters, and help identify those skills needed beyond the traditional skills covered in the published firefighter curriculum.

A knowledge base regarding the instructor core of the GFD Recruit Academy should be compiled. The credentials and experience of the instructors should be recorded in future recruit academies. It is also suggested that a procedure for evaluating instructors be implemented. In addition to formal evaluation by the academy coordinator and peers
of the instructor, assessments of the instructors by the students should become a part of
the ongoing procedures of the academy.

It is further suggested that a desired outcome statement be developed from the
findings of this applied research project and presented to the officers of the GFD. The
overall goal is to plan a future strategy for systemic change in the GFD Recruit Academy.
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Appendix A: Training Officer Survey

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Dear Training Officer,

Please check the box that most accurately describes the 'entry level' recruit training program utilized by your department. When complete please fold seal and return.

Thank You

1) Type of Department:
- Volunteer
- Career
- Combination

2) Number of Firefighters in the department:
- Less than 49
- 50-99
- More than 100

3) Number of recruits trained annually:
- 1-5
- 6-10
- more than 10

4) What agency does your agency use for certification?
- We do not participate in a certification program
- Colorado Division of Fire Safety (State)
- Colorado Metropolitan Certification Board (CMCB)
- Other

5) Do your recruits attend a recruit academy?
- Yes
- No - Skip to the end

6) What statement best describes the recruit academy:
- In house formal recruit academy
- Cooperative multi agency recruit academy (shared instructors & resources)
- We send recruits to another agency for the academy
- Our recruits attend a Community College recruit academy

7) How long is the recruit academy?
- Less than 100 hours
- 101-200 hours
- 201-300 hours
- Over 300 hours

8) What textbook is used in the recruit academy?
- IFSTA Essential
- Delmar Firefighters Handbook
- Other

9) What best describes instructional materials used by instructors?
- Supplied by the textbook publisher (IFSTA/Delmar)
- Created in house
- Combination of materials supplied by publishers and produced by instructors
- Other

10) What percentage of academy instructors are certified as Fire Instructor 1 or above.
(State or CMCB)
- 0-25%
- 26-50%
- 51-75%
- 76-100%

11) The recruit academy prepares students well for written certification evaluations.
(State/CMCB)
- Strongly disagree
- Disagree
- Agree
- Strongly Agree

12) The recruit academy prepares students well for practical certification evaluations.
- Strongly disagree
- Disagree
- Agree
- Strongly Agree

13) The recruit academy prepares students well for duty as a firefighter.
- Strongly disagree
- Disagree
- Agree
- Strongly Agree

14) How long is the probationary period following the recruit academy?
- No probation
- 0-6 months
- 7-12 months
- Greater than 1 year

Thank you for participating in this survey. If you would like a copy of the results please place your address or email on the label below. All labels will be removed prior to tabulation to assure anonymity.
Appendix B: Training Officer Survey Cover Letter

Golden Fire Department

911 10th Street, Golden, CO 80401

(303) 215-8888

May 15, 2003

Dear Colleague,

The Golden Fire Department is evaluating the effectiveness of our Recruit Academy. The purpose of the attached survey is to assist us in identifying instructional strategies used by other Colorado fire departments. The data collected will be included in an applied research project for the National Fire Academy’s Executive Fire Officer Program.

I respectfully ask that you, or a designee, complete and return the survey to me by the 15th of June. The postage and address are provided on the form, so the survey may be folded, sealed and placed in the mail. Your department will not be identified. All responses are confidential and used for this research project only. If you would like a copy of the survey results, please complete the label attached to the survey form.

Should you have any questions, please do not hesitate to contact me. Your assistance with this research will be greatly appreciated.

Thank You,

Kevin Milan
## Appendix C: Results of Survey

**Note: for items 1-5  N=51**

1) **Type of Department.**

<table>
<thead>
<tr>
<th>Type</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volunteer</td>
<td>8</td>
<td>16%</td>
</tr>
<tr>
<td>Career</td>
<td>14</td>
<td>27%</td>
</tr>
<tr>
<td>Combination</td>
<td>29</td>
<td>57%</td>
</tr>
</tbody>
</table>

2) **Number of Firefighters in the department.**

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 49</td>
<td>14</td>
<td>27%</td>
</tr>
<tr>
<td>50-99</td>
<td>22</td>
<td>43%</td>
</tr>
<tr>
<td>More than 100</td>
<td>15</td>
<td>29%</td>
</tr>
</tbody>
</table>

3) **Number of recruits trained annually.**

<table>
<thead>
<tr>
<th>Number</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5</td>
<td>11</td>
<td>22%</td>
</tr>
<tr>
<td>6-10</td>
<td>20</td>
<td>39%</td>
</tr>
<tr>
<td>More than 10</td>
<td>20</td>
<td>39%</td>
</tr>
</tbody>
</table>

4) **What agency does your agency use for certification?**

<table>
<thead>
<tr>
<th>Agency</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>We do not participate in a certification program</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Colorado Division of Fire Safety (State)</td>
<td>47</td>
<td>92%</td>
</tr>
<tr>
<td>Colorado Metropolitan Certification Board (CMCB)</td>
<td>3</td>
<td>6%</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>2%</td>
</tr>
</tbody>
</table>

5) **Do your recruits attend a recruit academy?**

<table>
<thead>
<tr>
<th>Response</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>47</td>
<td>92%</td>
</tr>
</tbody>
</table>
Note: for items 6-14  N=47

6) What statement best describes the recruit academy.

<table>
<thead>
<tr>
<th>Description</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>In house formal recruit academy</td>
<td>27</td>
<td>57%</td>
</tr>
<tr>
<td>Cooperative multi-agency recruit academy</td>
<td>16</td>
<td>34%</td>
</tr>
<tr>
<td>We send recruits to another agency for the academy</td>
<td>2</td>
<td>4%</td>
</tr>
<tr>
<td>Our recruits attend a Community College recruit academy</td>
<td>2</td>
<td>4%</td>
</tr>
</tbody>
</table>

7) How long is the recruit academy?

<table>
<thead>
<tr>
<th>Duration</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 100 hours</td>
<td>6</td>
<td>13%</td>
</tr>
<tr>
<td>101-200 hours</td>
<td>11</td>
<td>23%</td>
</tr>
<tr>
<td>201-300 hours</td>
<td>12</td>
<td>26%</td>
</tr>
<tr>
<td>Over 300 hours</td>
<td>18</td>
<td>38%</td>
</tr>
</tbody>
</table>

8) What textbook is used in the recruit academy?

<table>
<thead>
<tr>
<th>Textbook</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>IFSTA Essential</td>
<td>46</td>
<td>98%</td>
</tr>
<tr>
<td>Delmar Firefighters Handbook</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>

9) What best describes instructional materials used by instructors?
10) What percentage of the academy instructors is certified as Fire Instructor I or above? (State or CMCB)

- 0-25%: 25 (53%)
- 26-50%: 8 (17%)
- 51-75%: 2 (4%)
- 76-100%: 12 (26%)

11) The recruit academy prepares students well for written certification evaluations. (State/CMCB)

- Strongly disagree: 0 (0%)
- Disagree: 3 (6%)
- Agree: 20 (43%)
- Strongly Agree: 24 (51%)

12) The recruit academy prepares students well for practical certification evaluations.

- Strongly disagree: 0 (0%)
- Disagree: 2 (4%)
- Agree: 16 (34%)
13) The recruit academy prepares students well for duty as a firefighter.

- Strongly Agree: 29 (62%)
- Strongly disagree: 0 (0%)
- Disagree: 0 (0%)
- Agree: 29 (62%)
- Strongly Agree: 18 (38%)

14) How long is the probationary period following the recruit academy?

- No probation: 2 (4%)
- 0-6 months: 15 (32%)
- 7-12 months: 29 (62%)
- Greater than 1 year: 1 (2%)
Appendix D: Interview Questions

J.E. Bales. Personal Interview, July 16, 2003, by K.O. Milan at GFD Station #1, 0900

with replies returned in written form.

Questions asked:

When did GFD present the first organized recruit academy?

How were recruits trained prior to the first academy?

Why did GFD institute a recruit academy?

The IFSTA Essentials of Firefighting: Firefighter I Curriculum was selected for the academy, were other curriculums considered?

Was any research done on the effectiveness of instructional materials?

How were instructors selected?

How were instructors prepared, or what materials were provided to them?

How were recruits evaluated?

Did the recruit academy improve the quality of recruit training?

What changes were made to the recruit academy while you were the Training Officer for GFD?

R. Burrell, Personal Interview, April 29, 2003, by K.O. Milan at GFD Station #1, 1830. Replies recorded by the interviewer.

Questions asked:

How were recruits trained prior to the first academy?

Was any research done on the effectiveness of instructional materials?

How were instructors selected?

How were instructors prepared, or what materials were provided to them?
How were recruits evaluated?

B.S. Elliot, Telephone Interview, July 22, 2003, by K.O. Milan, @1400. Replies recorded by the interviewer.

Questions asked:

What instructional methods are covered in the Instructional Methodology Course recognized by the State of Colorado, Division of Fire Safety?
What adult learning concepts are covered?
How are fire service instructors taught to deal with varieties in learning styles?
What format are fire service instructors taught for lesson planning?
What assessment tools are taught?
Is program evaluation addressed in this course?

T. Staples, Telephone Interview, June 6, 2003, by K.O. Milan, @1400. Replies recorded by the interviewer.

Questions asked:

What percentage of GFD passed the State of Colorado Firefighter I examination on the initial attempt in 1997?
What percentage of GFD passed the State of Colorado Firefighter I examination on the initial attempt in 1998?
What percentage of GFD passed the State of Colorado Firefighter I examination on the initial attempt in 1999?
What percentage of GFD passed the State of Colorado Firefighter I examination on the initial attempt in 2000?
What percentage of GFD passed the State of Colorado Firefighter I examination on the initial attempt in 2001?

What percentage of GFD passed the State of Colorado Firefighter I examination on the initial attempt in 2002?

What percentage of GFD passed the State of Colorado Firefighter I examination on the initial attempt in 2003?

How do these pass rates compare to overall pass rates throughout the state?

S.S. Walker, Telephone Interview, May 13, 2003 @ 1030, questions sent via email and replies sent via email.

Questions asked:

Has any research been done on the effectiveness of the IFSTA Curriculum?

Has any research been done on the efficiency of the IFSTA Curriculum?

Are educational consultants or experts used to develop course materials?

Does IFSTA incorporate any adult learning concepts into the course materials?

Some of the objectives identified by IFSTA are not found in the NFPA 1001 standard. How are these decided upon, and who writes these objectives?

The instructor guide (p. IGIG-4) discusses ‘competency’ based instruction. How is competency defined in these criterion referenced cognitive evaluations? (Is answering with an accuracy of a certain percentage, scoring 80% for example, equal to competency?)

How is competency defined in psychomotor evaluations? (Is demonstrating with an accuracy of a certain percentage, 80% of the time for example, equal to competency?)
On page IGIG-7, the term ‘mastery’ is used. Does this relate to ‘Mastery Learning’ used in education? If so, is the mastery learning seven-step lesson plan used in instruction? Dr. Hunter defines these steps as anticipatory, purpose (objective), input (vocabulary etc), modeling, guided practice, checking for understanding, independent practice, closure (wrap up).

Are any new instructional methodologies being explored to update the curriculum?

When 1001 was revised in 2002 what process did IFSTA do to ensure the Essentials of Firefighting: Firefighter I Curriculum met this standard?

M.S. Wallace, Telephone Interview, May 30, 2003 @ 1430, questions sent via email and replies sent via email.

Questions asked:

When did GFD present the first organized recruit academy?

How were recruits trained prior to the first academy?

Why did GFD institute a recruit academy?

The IFSTA Essentials of Firefighting: Firefighter I Curriculum was selected for the academy, were other curriculums considered?

Was any research done on the effectiveness of instructional materials?

How were instructors selected?

How were instructors prepared, or what materials were provided to them?

How were recruits evaluated?

Did the recruit academy improve the quality of recruit training?
What changes were made to the recruit academy while you were Chief of GFD?

M.J. West, Telephone Interview, July 21, 2003 @ 0900, questions sent via email and replies sent via email.

Questions asked:

How is the probationary period structured after the academy?

Who supervises the recruit during probation?

What is the purpose of the professional skills manual?

How are the activities in the manual planned?

How are the activities in the manual implemented?

How are the activities in the manual assessed?

Have the manual, or the structure of the probationary year, been evaluated or revised?

Does your department find the program and manual effective?

G. Widener, Telephone Interview, May 12, 2003 @ 1300. Questions sent via email and replies returned via email.

Questions asked:

Do you currently have a post secondary educational requirement for entry-level positions?

Do you have any results to support the statement "...recruits that are hired with at least some college education, will have a greater ability to learn and understand these new technologies" by Chief Widener. More simply stated, have you tracked college vs. non-college recruits and their success?
Do you currently use the recruit manual (described by Chief Larson) for the firefighter's first year?

If so, how has it been revised since 1990?

Chief Larson refers to a quarterly training unit with specific objectives and standards to be met for each unit. Are you still using a quarterly schedule?

Do you require post secondary degrees for promotion?